Essays in Development Economics

Intrahousehold Decision Making in Developing Countries

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in Economics
by

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Declaration

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Anu Puthenmadathil Jose

Summary

Providing insights into mechanisms through which households manage resources, this thesis aims to add to the empirical evidence on strategic decision-making among spouses using experimental and survey data. While the chapters make important contributions to our understanding of mechanisms of household deliberations, the findings are relevant for policymakers and practitioners interested in improving welfare through interventions in social protection and financial inclusion.

Chapter 1 focuses on the comparative effectiveness of strategies and delivery mechanisms used in the development policy sphere for women empowerment. To understand interactions between mental accounting, spousal control and couple's communication, informed by recent innovations in the fin-tech space, we mimicked practical iterations of income type and spousal monitoring in a pre-registered lab-in-the-field experiment with 1,008 couples in Kolkata, India. The experimental design was a cross randomisation where, first, for half the sample, the female spouse worked for resources, and the other half received money as a gift before allocation decisions were made under five different monitoring frameworks that mirror potential iterations in account type: private, private labelled, visible, approval and negotiation. Our findings highlight the importance of female labour market participation and the mental accounting of earned resources. Earned income by wives was allocated to a greater extent to accounts over which she had more control. While no overall effect of workfare on consumption decisions was found, we did find that for women who have low control over money, earning money induces them to spend more on their personal consumption. Labelling newly acquired resources for household purposes in individual accounts for both wife and husband did not alter expenditure patterns, indicating a failure of the mental accounting of household resources in individual accounts. Spousal visibility of male decision-making ensures they allocate more towards the collective and away from themselves. Conversely, spousal transparency and communication did not alter the

wife's allocation patterns, but such innovations came at a cost for the less empowered: in households where the wife has low control over money or is more risk averse, the visibility of her decisions by the husband or an approval requirement from her husband for her decisions leads her to allocate more to accounts he has control in. Our findings provide important insights for the design and delivery of social protection programmes and suggest the existence of potential welfare gains of shared or joint financial products for managing household resources.

With a focus on economic autonomy and economic violence, chapter 2 aims to understand how exogenous changes in male perspectives through a male-focused gender transformative program in the Democratic Republic of Congo (DRC) affect economic violence experienced by their partner for different levels of spousal discordance on wife's economic autonomy. This study attempts to uncover the relationship between women's empowerment and intimate partner violence that various theoretical channels and mixed empirical findings have previously characterised. First, pre-intervention, we find that households where women take economic autonomy when their husbands do not acknowledge her autonomy are associated with more economic violence. Second, we find that male-focused gender-transformative programs are most effective in households with higher levels of spousal economic contest and violence. In contrast, the intervention had no significant effect on economic violence in households where women did not contest for autonomy. While previous studies have focused on how women's self-reported bargaining power can influence the effects of female empowerment programs, this chapter is the first work to take into account the implications of differences in spouses' views of autonomy for the success of such programs.

Chapter 3 examines how income shocks affect intrahousehold expenditure patterns in agricultural economies. Using rainfall data and household panel data, with responses from both spouses, from rural Ethiopia, we show that a negative household level income shock significantly reduces female expenditures relative to male expenditures (31.4% greater reduction). We specifically explore the channel of female and male labour supply as an explanation behind the observed differentiated impacts on spousal consumption. We find evidence that

engaging in off-farm employment provides women with an independent income and allows them to smooth their expenditures during farm income shock. We also find evidence that the wife's involvement in managing and controlling the household farm, measured as her time spent on the farm relative to the husband, negates the shock-induced gender differential in expenditures. Together, these results highlight gender-specific impacts of household income shocks on consumption and the role female economic opportunities play in negating intrahousehold impacts of such household shocks.

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Introduction

Due to the persistent influence of the first generation of theories of the household and tendencies to collect aggregate household data, it has taken until recent decades for the role of intrahousehold decision making, and spousal heterogeneity in access to resources, to take centre stage in the discourse on female welfare and empowerment (Ambler et al., 2021). Inspired by more advanced models of the household, and powered by more detailed individual level household data, the intrahousehold revolution has improved our understanding of the nature of poverty (Brown et al., 2019), and informed social protection and financial inclusion policies throughout the world (Duflo, 2003; Ashraf, 2009).

The primary motivation of this thesis is that the 'intrahousehold' revolution in the development literature is incomplete; there are more insights to learn about the process of intrahousehold decision making.

First, consistent with the existing literature on intrahousehold decision making, which advocate a broader approach focusing on all agents who interact in the household decision making process, this thesis seeks to understand issues of female welfare and empowerment from the perspective of more than one household member. This perspective stands in contrast to a dominant strand of the literature that measures female empowerment using outcomes such as her labour market decisions and her own account of household decision making power.

Second, technological advances and innovation open up possibilities, not just for deeper measurement of outcomes by household member, but potentially for improved social protection targeting and delivery, and tailored financial services. Such technological advancements will continue at pace, filtering down to low income household over time, and will ensure the study of intrahousehold dynamics will remain centre stage in the decades ahead.

With these themes in mind, this thesis provides unique contributions to the literature in the following areas:

- Strategies and delivery mechanisms of anti-poverty programmes [Chapter 1]
- Optimal design of financial products [Chapter 1]
- Male focussed gender transformative training [Chapter 2]
- Differentiated effect of household-level shocks [Chapter 3]

Chapter 1, co-authored with Tara Bedi and Michael King, focuses on improving strategies and delivery mechanisms of anti poverty programmes that aim to advance women's economic empowerment. Through a lab-in-the-field experiment with 1,008 couples in Kolkata, India, we assess the impact of women personally earning money on subsequent financial decisions of couples, specifically under different joint decision making terms. Within our experimental setting, we study the importance of women's labour market participation by understanding the effects of earned and unearned income on spousal decision making. We find that earning money not only improves her control over the income, but also gives her leverage during the bargaining process with her husband.

Examining the effect of mental accounting for household money in individual accounts, we find evidence of potential issues with household resources residing in individual accounts, suggesting potential improvements in women's economic empowerment from joint accounts for household resources. We then elicit joint spousal decision making for women's resource allocation in three forms: digital approval for female decisions by husband, digital transparency of spousal decisions, and an in-person couples negotiation. We fail to find evidence that any form of joint decision making with husband reduces the share of amount she allocates to accounts she controls or affects her spending patterns. However, our results highlight that tailored mechanisms based on underlying preferences and control structures of couples influence women's decision making while jointly making decisions with husband. We observe that in households where wife has low autonomy over resources, women give

up control over money under digital mechanisms of transparency and approval for her decisions by husband. But at the same time, a digital mechanism to share and communicate financial decisions with husbands provides better cognitive performance for women who exhibit poor information flow with their husbands.

In Chapter 2, , co-authored with Michael King, Mousson Estelle Jamel Koussoube, Rachael Susan Pierotti, and Julia Vaillant, we explore the channel of disagreement and agreement over women's autonomy in household financial decision making in Democratic Republic of Congo (DRC) to understand economic violence and study how exogenous changes in male perspectives through gender transformative approaches have differential effects based on spousal perceptions of female economic autonomy. Following Annan et al. (2021), we use a multidimensional approach to measure women's economic autonomy over household decision making using survey responses from male and female partners. We explain the heterogeneity in effects of the program based on spousal discordance on women's economic autonomy using the non-cooperative bargaining model of household proposed by Eswaran and Malhotra (2011) and are able to test testable predictions of their model linking wife's economic autonomy and economic violence patterns. Our analysis consists of two main parts: first, we test the association between different patterns of wife's economic autonomy and incidence of economic violence, and second, we test for heterogeneous effects of the program on economic violence based on the levels of wife's economic autonomy in household decisions recorded at baseline.

Before the gender transformative program, we find that wife contesting for economic autonomy is significantly worse for economic violence than two other patterns of decision making; when spouses agree that she is involved in decision making and when husband gives her more autonomy than she takes. This is consistent with the status inconsistency theory of IPV that contesting for autonomy in decision making in households may result in worse outcomes for women, in our case, more incidence of economic violence. Our main results indicate that engaging men in the process of women's rights have differential effects based on the decision making patterns that exist in the household. When men find violence reprehensible as a result of gender transformative training, the effects are significant in only

two types of environments: where there is higher levels of spousal economic contest and violence, and where there is spousal agreement of wife's high decision making power and low violence. Checking for the program's effect on the likelihood of women contesting for economic autonomy, we also provide suggestive evidence that women's contest for autonomy is a reaction to the violence she experiences. By focusing on spousal agreements and disagreements on their respective role in household financial decision making, this chapter contributes to the understanding of channels that can interact the effects of programs that aim to reduce intimate partner violence and improve female empowerment.

Chapter 3 studies gender differentiated effect of household-level shocks using rainfall and panel data in rural Ethiopia. Contributing to the within-household inequality strand of the literature, we estimate how household income shocks affect intrahousehold consumption patterns in agricultural economies and what role labour supply opportunities play in managing household shocks. To capture the causal effect of a negative household income shock on gender-specific expenditures, we exploit the exogenous variation in household farm income caused by rainfall shocks and merge it with the Living Standard Measurement Survey (LSMS) from rural Ethiopia for three panel years 2011-12, 2013-2014, and 2015-16.

Our results indicate gender-differentiated effects of negative income shock on the intrahousehold allocation of expenditures. A negative income shock leads to a decrease in female non-food expenditures by 31.4% relative to male non-food expenditures. Our finding adds to the literature on women's higher susceptibility to impacts of negative income shock than men. We find evidence of spouses' using off-farm employment as an income-smoothing mechanism during a negative household income shock and observe a gender differential in such labour supply adjustments. Given the importance of off-farm employment in women's empowerment in Sub-Saharan Africa, especially rural areas (Van den Broeck and Kilic, 2019), we further analyse the heterogeneous effect of income shock on gender-specific expenditures based on the wife's participation in non-agricultural activities within the household and outside the household. We observe that the gender-differentiated changes in expenditure following a negative income shock are driven by households where

the wife did not engage in any household off-farm employment, such as small-scale business or temporary wage employment, underlining the need for designing gender-specific social protection schemes to help households cope with farm income shocks.

Chapter 1
Mental Accounting, Spousal Control and Intra-Household Communication: Evidence from an Experiment in India

1.1 Introduction

Anti-poverty programmes globally have sought to advance women's economic empowerment through unconditional cash transfers and programmes with conditionalities such as child school enrolment or workfare (Haushofer and Shapiro, 2018; Adato et al., 2000; Rodriguez, 2022). Despite the now pervasive presence of these programmes across the globe, the evidence base on optimal design is mostly missing. For example, little is known about the consequences of household-level mechanisms of financial resource delivery across the spectrum of individualised to shared financial accounts (Field et al., 2019; Fiala et al., 2017). Indeed, theories of bargaining power, mental accounting and asymmetric information each predict that the design and delivery of anti-poverty programmes will influence important outcomes such as female autonomy and household welfare (Doss, 2013; Thaler, 2008; Chen, 2013).

To address this gap in the literature, we first estimate the impact of the female spouse personally earning money, as opposed to receiving money as a gift, on subsequent allocation and expenditure decisions in a lab-in-the-field experiment in India. A particular focus

of this study, the concept of mental accounting, popularised by Thaler (2008), suggests that earned income may be treated differently to unearned income simply because of how households understand ownership of incoming resources (Cox et al., 2007; Jakiela, 2011). More generally, while there is evidence in the development literature on the positive impact of work for women (Sivasankaran, 2014; Heath and Jayachandran, 2016), there is mixed empirical evidence on the role working plays in the female agency. Duflo (2012) finds that working improves agency for women, whereas others find that improved women's labour opportunities do not increase her involvement in household decision making (Jensen, 2012; McKelway, 2019). This study is the first to examine the role played by the mental accounting of earned resources in gender empowerment.

Second, we study the role played by differentiated spousal control and monitoring over financial decisions and assess how practical iterations in the decision-making framework, inspired by innovations in the fintech sector, affect the intrahousehold allocation and expenditure decisions. We specifically investigate the mental accounting of household resources in private accounts and the role played by approval, visibility and negotiation in spousal allocation decisions. Building on the previous work of Ashraf (2009) and Schaner (2017), to provide insights on optimal account design in the Fintech era, this study represents a comprehensive examination of approval, visibility and negotiation in spousal allocation decisions.

We hope this study inspires a re-examination of the role joint accounts can play in household decision-making and welfare. There are a number of reasons why private accounts may not always be optimal. First, despite the benefits of control over resources and bargaining power as argued by Anderson and Baland (2002); Aker et al. (2016); Field et al. (2019), there may be unintended negative consequences from the separation of domains on female empowerment such as low subjective well being for women, or more spending on luxury goods (Ashraf et al., 2014; Garbinsky and Gladstone, 2019). Second, financial individualisation may not be optimal for couples and families with significant shared expenditure and shared savings/investment goals. For example, household resources that reside in one partner's account may lessen the sharing for joint household expenses (Ashraf, 2009). Third,

women's private access to financial products may not translate to her ability to take full control over the money due to gender norms in certain contexts that influence control and usage of financial products (Schaner, 2017).[1] Moreover, mobile banking and fintech products have opened up innovation possibilities for financial products with the potential for household welfare improvements (Suri and Jack, 2016; Lee et al., 2021; De Mel et al., 2020).

We first mimic the individualised decision-making among couples in a household through two experimental arms: Private and Private Labelled for Household. A consequence of the global trend towards financial account individualisation has resulted in household resources often residing in the dominant spouse's account. If mental accounting prevails, the location of household resources may not matter, and there are reasons to think there is no issue with earmarked household resources in individual accounts (Thaler, 1999). And there are reasons to be optimistic. For example, earmarking money for specific purposes is shown to have increased savings behaviour of individuals (Dupas and Robinson, 2013; Aggarwal et al., 2020).[2] To provide direct evidence on this question, we examine the effect of mental accounting of household money in individual accounts by comparing individual decisions of spouses in a private account where money is labelled for household purposes to one where money is not labelled for household purposes.

Separately, we estimate the impact of practical iterations in spousal control and couple's communication for resource allocation in three forms: approval for female decisions by the husband, transparency or visibility of spousal decisions, and an in-person couples negotiation for female decisions. Under the Approval treatment arm, female decisions are "approved" or otherwise by her husband through a digital system. In this experimental arm, we digitally simulate the household decision-making processes in a setting such as ours where women may often have access to resources but do not necessarily have the final say on decisions (Pahl, 1995). We then extend the notion of control over decisions, under the

[1] In a study in Kenya, she shows that ATM cards for female accounts reduced women's control over her account because the cards made it convenient for their spouses to withdraw money.

[2] Benhassine et al. (2015) looks at the gender aspect of labelling by observing the effectiveness of labelling a cash transfer for education purposes by targeting mothers in one case and fathers in another. They find similar results of labelling, regardless of targeting the mother or father for the program.

Visible treatment arm, by providing women full control over decision-making but without the privacy of their decisions from their husbands. This treatment arm relates to the literature on intrahousehold allocation where theoretical models assume perfect information (Chiappori, 1992; Lundberg and Pollak, 1996) and yet empirical evidence points to information asymmetries within household (Ashraf, 2009; Castilla, 2019). We further iterate spousal monitoring with a highly collaborative spousal decision-making process where couples make in-person negotiations regarding female allocation decisions. Literature on intrahousehold decision-making often record inefficiencies in such bargaining process (Castilla, 2019; Schaner, 2015) and points to the possibility that negotiated outcome is determined by the relative power of spouses in household (Ashraf, 2009).

We selected 1,008 low-income couples identified as literate and having bank accounts from the client pool maintained by several microfinance organisations and through household sampling in semi-urban Kolkata, India. Like the rest of urban areas in India, our sample is characterised by low female labour force participation (Andres et al., 2017).[3] While it was a pre-requisite for our study that female and male participants have individual bank accounts, this is not a particularly restrictive pre-requisite as access to bank accounts is close to universal in India, and Demirgüç-Kunt et al. (2022) find a zero gender gap in account ownership in India. Relevant to our study, however, is the 10% gender difference in the percentage of inactive accounts, with more female inactive accounts. This is likely to be attributed to a range of factors, including lower economic empowerment and bargaining power of women and administratively burdensome rule attached to bank accounts, which may act as a barrier for women to access and use financial services continuously.

In our experiment, couples made two allocation decisions, under whose control to allocate income to and what to spend it on, separately and sometimes in conjunction with one another. While such allocation decisions are made related to unearned or earned income by the wife, in subsequent rounds of games with the same decision-making conditions, we assess allocation and expenditure decisions of money that could be won individually by

[3] 28.2% of women in our sample are working women, which is slightly above the national urban average, 18.6%.

spouses in a lottery. This second round of allocation games contrasts with the first in two respects. One, for the woman, her husband has full information about receiving the income during the first allocation games, whereas, in the second one, she can choose to deny receiving the amount as in Ashraf (2009). Two, for the men, instead of making decisions about income earned or received by their wives in the first allocation game, they make decisions about the money they could win in the lottery under the conditions of privacy, privacy with labelling, and transparency of their decisions to the wife.

Analysing the effect of female workfare, we find that when women work for money, the share of the amount she allocates to her bank account or a private female voucher is 5.5 percentage points more than when she did not earn the amount. Earning money by performing a task provides women with a sense of ownership of the money and improves their control over the money. While we find no overall effect of workfare on subsequent expenditure decisions, we find that, for women with low control over money, personally earning money induces them to spend more on their personal expenses.[4]

Within the in-person negotiation setup of our lab setting, we find that if she worked for the amount, she is likely to claim an 8.9 percentage points higher share of the amount towards her bank account or a female voucher in the negotiation process, compared to when she was gifted the amount. Independently earning the amount gives women more bargaining power in the household negotiation process, which translates to their increased ability to claim a higher share of the amount to accounts over which she has control. It also has implications on spending patterns, leading her to spend more towards her own expenses and less towards collective use by all household members.

We find no overall effects on allocation and spending decisions from labelling female-held money or male-held money for household purposes when compared with private resources in private accounts. While our information nudge may have been too subtle, we consider this as evidence of potential issues with household resources residing in individual ac-

[4]We measure women's control over the money in the household by their high willingness to pay to have control over money and existing patterns of hiding income/expenditure from their husbands.

counts, suggesting potential improvements in women's economic empowerment from joint accounts for household resources. However, in our study, we fail to provide evidence on the effect of spousal monitoring on the wife's allocation decisions. Additionally, we find that, in households where the wife has low control over money, visibility of her decisions by her husband or an approval requirement from her husband for her decisions leads her to allocate 12.06 percentage points and 11.23 percentage points more to accounts under his control, respectively. These findings indicate that, in households where the wife has low autonomy over resources, women give up control over money under digital mechanisms of transparency and approval for her decisions by her husband.

Under a lottery game where wife and husband had equal chances of winning the lottery, we find that spousal transparency of decisions leads to women spending less for collective use (and more for herself) and men spending more for everyone in the household (and less for himself) compared to when their decisions are kept private from their spouse. Hence we observe opposite effects for women and men when their financial decisions are visible to their spouses, where transparency gives women more leverage to spend for themselves. and, for men, it prevents spending less on themselves. This implies that visibility may have provided the wife more legitimacy in spending unearned money for her own expenses in a context where she does not usually control household resources and spending.

Keeping with the literature that privacy and communication with husband on decisions can have effects on the mental well-being of women (Ashraf et al., 2014), we check if the monitoring rules relating to spousal decision-making affects women's emotional well-being and mental bandwidth. Visibility of decisions by husband and an approval mechanism from their husband on their decisions improved women's mental bandwidth score for women who reported that they had ever hidden income or expenditure from their husband. This suggests that for women who exhibit poor information flow with their husbands, a digital mechanism to share and communicate financial decisions provides women with better cognitive performance.

This study contributes to three different strands of literature. First, we contribute to

the social protection literature on the relevance of workfare versus transfers (Cox et al., 2007; Thaler, 2008; Jakiela, 2011; Bhanot et al., 2018). While the literature has focused on households as one singular unit in order to measure the impact of workfare versus transfers, our work is the first to assess the relative importance of workfare versus cash gifts for women's economic autonomy. Our findings have important implications for social protection programs, such as ongoing discussions about universal income programs, and for the intersection of literature on labour force participation, gender pay gaps and financial product independence.

Second, our study provides insights on aspects of gender targeting for financial product access. Evidence from recent literature suggests that targeting women for programs improves their bargaining power within the household, thus increasing spending on household goods and children (Duflo, 2003; Attanasio and Lechene, 2002; Akresh et al., 2016; Field et al., 2019; Armand et al., 2020). However, within a family setting, women may not have complete control over the resources she has access to. Few studies like Schaner (2017) and Fiala et al. (2017) provides evidence in this direction. Through comparing the Private treatment arm to varying levels of monitoring under spousal decision-making, we explore potential mechanisms of financial decision-making among couples.

Third, we contribute to existing experimental literature on joint accounts, extending it in the context of the fintech era. 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). However, recent studies indicate that there could be unintended consequences in providing women with privacy and control over resources (Ashraf et al., 2014; Schaner, 2017). Our study specifically advances the work of Ashraf (2009) by comparing the relative impacts of five forms of financial arrangements (account types) in varying levels of control and monitoring. Our focus on joint accounts provides an important addition to the literature on how couples manage their finances in developing countries, particularly in relation to privacy and control of resources.

This paper proceeds as follows. We discuss the conceptual framework in section 2 and

describe the experimental design in section 3. Section 4 describes our data and empirical strategy, and we report the results in section 5. Section 6 concludes with a discussion of the results.

1.2 Theoretical Framework

We extend and adapt the theoretical framework in Ashraf (2009) to our study context and experimental treatment arms. We extend the framework in a number of ways. First, while spouses receive money through "luck of the draw" in their framework, we additionally incorporate the aspect of a sense of ownership the wife gets through earning the amount. Second, we extend the individual decision-making framework among couples beyond privacy by including a real-world scenario of transferring money labelled for household purposes to an individual spouse in the family. Also, adding the additional elements of monitoring by labelling money for household purposes and an "approval" requirement for the wife's decisions by the husband, we extend the framework of monitoring through transparency and communication in Ashraf (2009). We adopt the spousal decision-making scenarios to our context where the husband has the final say in household decision-making as compared to the context in Ashraf (2009) where the wife is traditionally in control of household finances.

While we describe the theoretical framework from the point of women making financial decisions and their strategies, different strategies would apply when husbands make decisions, which we explain in detail in Appendix A.

1.2.1 Basic Setup

Consider a basic setup of the household where the wife (Player W) and the husband (Player H) decide about the household's financial resources. Suppose the contract of financial management in a household happens in the following way: the wife will turn over her income to her husband, and the husband will have the final say on how to allocate it for household

expenditures and also give the wife an allowance for her needs. This contract could be thought of as a result of social norms in our study context, India, where the husband is considered the spouse in control of financial resources in the household.[5] Let Y be an income shock the wife receives in a given period. In our experiment, Y can be received in two ways: by performing a task or as a gift. Let S represent the degree to which spouses assign personal ownership to income earned through a task and income received as a gift, $S \in [0, 1]$.

S under task is greater than S under gift due to the concept of mental accounting where the wife takes more ownership (and the husband gives more ownership) on earned income compared to unearned income. Cross-randomization of couples across treatment arms varying in degrees of transparency, control over decision-making, and communication allows us to identify the role of ownership of income under these conditions.

In our setting, mimicking real-world scenarios, the wife has five available strategies to allocate the money she earned from the task or received as a gift: $\{T_W, T_H, V_W, V_H, V_S, O_S\}$, where T_W and T_H is to transfer money to the wife and the husband, respectively, V_W and V_H is to commit to consumption for the wife and the husband, respectively, V_S is to commit to consumption for collective consumption by household and O_S is to transfer all the money to someone else who is not their partner. Transferring money to the wife's bank account and committing to consumption for the wife (T_W and V_W) can be considered the share of income fully controlled by the wife. Transferring money to the husband's bank account and committing to consumption for the husband (T_H and V_H) can be considered the share of income fully controlled by the husband.

If the wife transfers money to her husband, he allocates a fraction $(1 - S)\theta$ to his private or household public good consumption, and the wife gets $S(1 - \theta)$ for herself. The parameter θ can be considered the husband's tax rate on any income the wife gets. Apart from taking θ from her income, the husband assigns the wife S for her ownership over the

[5] In our sample, the wife's willingness to pay any amount to have control over money (18%) is almost double as compared to the husband's willingness to pay (35%). This is an indication that the husband controls household financial resources.

income, based on whether she earned it or not.

The tax rate θ that the husband imposes on his wife is predetermined in the marriage contract. The larger the tax rate θ imposed by the husband, the more incentive the wife has to transfer the income to herself or commit to any type of consumption, private or shared. If θ is low enough, that is, her husband taxes little of her income, then she plausibly derives utility from joint decision-making with her husband through improving their relationship. In this specific case, her utility of turning over income to him in the form of direct transfer or committed consumption for him could be greater than the utility from taking control of the income through transfer to her bank account or private consumption.

If the wife chooses a male voucher, the husband may try to undo the consumption commitment in the case that he did not approve her commitment to consumption. He may be able to undo a share of the committed consumption, denoted by α, where $\alpha \in [0, 1]$. If $\alpha = 0$, then the husband cannot undo any of the committed consumption that the wife made and if $\alpha = 1$, then the husband can completely undo the committed consumption that the wife made and regain his control over income. α represents the degree to which he can undo the committed consumption.[6] In the case that he undoes the committed consumption that she made for her husband, he retrieves αY. Out of the αY he retrieves, she gets her share $S(1-\theta)\alpha Y$. The husband may also impose a punishment whose monetary equivalent is P if he does not prefer his wife to make a committed consumption for him.

Suppose the wife decides to transfer the amount to her bank account. The husband may find out about the transfer with probability p. Then he would take control of the allocation jointly with her (or alone) and may impose a punishment whose monetary equivalent is P. Suppose we denote C as the monetary equivalent of the disutility she receives from sharing control with her husband. There could also be a situation where the wife gains from sharing control with her husband due to an improvement in intimacy, and, in that case, C can be thought of as the utility she receives from sharing control with her husband.

[6]The degree of undoing the committed consumption can also be in the form of cutting the budget allocations in the future based on the committed consumption made.

Hence, if the husband finds out about her decision to transfer to her bank account, she gets her share in the household allocation process: $S(1-\theta)Y - P - C$.

The punishment P imposed by the husband if the wife makes an allocation decision without his approval or in case she decides to hide the decisions she made, is increasing in the tax rate θ. If the marriage contract is in such a way that the husband taxes a lot of her income, it would also imply that the punishment P associated with her decision-making scenarios is also high. However, punishment P is decreasing in the sense of ownership of income S. If the husband assigns her control of money due to the task she performs, then the punishment P that he imposes on her would be lower as compared to if she hadn't earned money. In such a case, the wife's utility of keeping income for herself or committing to private consumption is higher as compared to other strategies.

The probability p with which her husband may find out about the decisions she made could vary based on her strategies. For example, the probability of getting caught after a consumption commitment may be higher than the probability of getting caught otherwise. The probability p that we describe here is only related to the probability of finding about the wife's decisions and not about her income. Within our experimental setting, in a separate allocation game, along with incomplete information about her decisions, we also capture the additional effects of incomplete information about the wife receiving the income. In this case, the probability p of the husband finding about her strategies would be lower as there is an additional option to plausibly deny that she received the money.

The disutility she receives from sharing control with her husband, C, could be high or low based on the tax rate θ the husband imposes on the wife. If the tax rate θ in the marriage contract is low, then she would not face high disutility from sharing control with her husband and, indeed, benefit from the joint decision-making with the husband. However, if θ is high enough, outcomes of sharing control with the husband may be too far from her preferences, and she may perceive low values of C.

Suppose the wife chooses to commit to consumption for herself and let the probability

of being caught be $\hat{p}$. $\hat{p}$ need not be equal to p since the probability of getting caught after making a consumption commitment is different from the probability of getting caught otherwise. If she gets caught after choosing to commit to consumption for herself, then the husband may impose punishment P for committing to consumption he may not necessarily approve of and will try to undo the consumption commitment. In this case, as well, she receives disutility C from giving up full control over decision-making on the committed consumption for herself. Also, as before, the husband may be able to undo a share of the committed consumption, αY. In that case, he takes $\alpha\theta Y$ from her. She receives $(1-\alpha)Y$ from the committed consumption she made for herself and also received her share $S(1-\theta)$ of αY, that is, $S(1-\theta)\alpha Y$ from what he can retrieve. Hence, in total she receives: $(1-\alpha)Y + S(1-\theta)\alpha Y - P - C = [1-\alpha(1-S(1-\theta)]Y - P - C$.

Suppose the wife chooses strategy V_S to make committed consumption for household use. If the husband does not find out, the wife allocates the income and keeps share $S(1-\gamma)Y$ for herself. γ can be thought of as the share of Y wife gives to the household public good and could be different from θ, the share that the husband keeps for household consumption out of the income. If the husband finds out with probability $\hat{p}$, then he might try to undo the committed consumption by αY. In that case, he takes control over the decision to spend income jointly or alone. She receives $S(1-\theta)$ from the committed consumption retrieved αY, and also receives $S(1-\theta)$ of committed consumption $(1-\alpha)Y$. In total, she receives, $S(1-\theta)\alpha Y + S(1-\theta)(1-\alpha)Y = S(1-\theta)Y$. In this strategy as well, the husband imposes a punishment P for committing to consumption he may not necessarily approve of. Also, she may receive disutility C from giving up her full control over consumption.

Suppose the wife chooses the strategy to transfer Y to a third person other than her husband. Let $\tilde{p}$ be the probability that the husband finds out. $\tilde{p}$ is not equal to $\hat{p}$ or p since the probability of him finding out about the transfer she made to someone else is different from the transfer made to her account or a consumption made by her. If the husband finds out with probability $\tilde{p}$, then as in the case of committed consumption before, he might be

able to undo a part of the transfer, αY. In that case, she receives her share $S(1-\theta)\alpha Y$.[7] If the husband does not find out about the transfer to the third person, she might be able to retrieve αY of the transfer from the transfer she made. For example, it could be the case that she sent the money to her extended family to buy her goods, or she is paying off her personal debt to a family member. In that case, with probability $(1-\tilde{p})$, she gets αY. We describe F's utility function and her preference for different strategies in Appendix A.

Parameter Variation Across Experimental Treatments

The treatment arms in this study vary in three parameters: a sense of ownership (S), disutility that the wife has from sharing control over decision-making from the husband (C), transparency ($p, \hat{p}, \tilde{p}$), and punishment (P). θ can be considered a condition under the marriage contract between couples, and α can be considered a technological constraint for committed consumption for spouses under all treatment arms.

In our experimental setting, we vary the sense of ownership of money through two treatment arms. One is where the wife performs a task to receive the money, and another is where she receives the amount as a gift. We hypothesise that spousal decision-making will be affected by the sense of ownership that the wife perceives from earning the income as compared to receiving the income as a gift.

Across the treatment arms, the female spouse's disutility from giving up full control decision-making varies, as defined by the parameter C. Women get complete control over decisions, binding in Private, Private Labelled, and Visible treatment groups. Under Negotiation, spouses jointly decide on how to allocate the money, which means the wife suffers some utility loss from giving up full control over the decision but may gain from jointly negotiating with her husband on allocation decisions. For low levels of tax rate θ from her husband, disutility from sharing control with her husband on decision making,

[7] The α under the strategy O_S may vary based on whether she transfers to her extended family/friends or his extended family/friends.

C, could be less under Private, Private Labelled, and Visible. If the husband imposes less tax on her income, her intimacy gains from joint decision-making would be higher than the loss from giving up full control over decisions. Hence, by making decisions without consultation with her husband would give her a low level of C under low levels of θ. Under Joint Approval, for any levels of θ, since the decision is made only after the "Approval" from her husband, she loses more control over the decision than all the other treatment arms. Hence, in this scenario, her disutility from losing full control over decisions is the highest. Overall, the level of C under each treatment arm is determined by the tax rate that the husband imposes, θ.

In the Private and Private Labelled conditions, both spouses do not have full information about their partner's choices. Thus, in Private and Private Labelled conditions, decisions were unobserved such that there exists a certain probability that the partner will find out. Under Private and Private Labelled conditions, we assume $\tilde{p} \leq p \leq \hat{p} < 1$. Committed consumption in the form of a gift voucher for private consumption is arguably more observable than transferring money to a personal bank account ($p \leq \hat{p}$). Also, if the wife decides to transfer the amount to a third person, there is a probability $\tilde{p}$ with which her husband can find out. $\tilde{p}$ could be lower than p and $\hat{p}$ because there is less probability of observing money transferred to another person as compared to money in her account or goods purchased from committed consumption. Under Visible, Approval, and Negotiation, all spouses' decisions are revealed to their partners and hence, $\tilde{p} = p = \hat{p} = 1$.

The treatment arms also vary in the level of punishment P that the husband can impose on his wife if she makes decisions far from his preferences or hides her decisions. Under the Private condition, where income could be used for any purposes and decisions are not visible to partners, the expected punishment is low. However, since income under the Private Labelled condition is labelled for household purposes, the punishment would be higher than the Private Non-labelled condition. In the Approval and Negotiation condition, both spouses communicated their decisions in two different ways. Under the Approval condition, the husband could "accept", or "reject" his wife's decisions on how to allocate the income, and hence there was limited communication. Hence, given that the husband dictates the

decisions completely, the level of expected punishment is lower in Approval as compared to Negotiation or Visible. Under the Negotiation condition, couples communicate in person about their preferences and make joint decisions on allocation. The punishment level under this treatment arm is higher than the punishment under Approval, given the bargaining framework under negotiation compared to a dictator framework in Approval. Under the Visible, decisions are visible to the partner, and there is no communication of preferences between partners. This can lead to higher punishment if he disapproves of her decisions. Hence, the punishment level under Visible is higher than Negotiation and Approval.

Table 1.1 summarises the values of parameters, S, C, p, and P under the treatment condition in our experiment.

Table 1.1: Predicted Parameter Values by Experimental Treatment Arms

	Private	Private Labelled	Approval	Visible	Negotiation
Gift	S_{low} C_{low} for θ_{low} $p \leq \hat{p} < 1$ P_{low}	S_{low} C_{low} for θ_{low} $p \leq \hat{p} < 1$ $P > P_{low}$	S_{low} C_{high} for θ_{all} $p = \hat{p} = 1$ P_{low}	S_{low} C_{low} for θ_{low} $p = \hat{p} = 1$ P_{high}	S_{low} C_{low} for θ_{low} $p = \hat{p} = 1$ $P > P_{low}$
Task	S_{high} C_{low} for θ_{low} $p \leq \hat{p} < 1$ P_{low}	S_{low} C_{low} for θ_{low} $p \leq \hat{p} < 1$ $P > P_{low}$	S_{low} C_{high} for θ_{all} $p = \hat{p} = 1$ P_{low}	S_{low} C_{low} for θ_{low} $p = \hat{p} = 1$ P_{high}	S_{low} C_{low} for θ_{low} $p = \hat{p} = 1$ $P > P_{low}$

1.3 Experimental Design

1.3.1 Sampling

We use a sample of 1,008 couples randomly selected from several microfinance organisations' client pools and through sampling in semi-urban Kolkata, India. Couples were initially contacted via phone and asked about their willingness to participate in the study. Further, we checked their eligibility to participate in the study under the following eligibility criteria: (1) Couples are married and living in the same household, (2) both are literate, (3) both have individual bank accounts and (4) both are 60 or less years of age. We restricted the sample to couples 60 years or less and have individual bank accounts due to restrictions on the usage of survey instruments and pay-out options provided by our partner organisation, respectively. However, this study and its results would be relevant for couples who make household decisions on a day-to-day basis and have access to physical or digital financial services.

1.3.2 Assignment to Treatment

We randomise at two levels: one, based on a work requirement of female partners, and second, based on various joint account terms such as privacy, labelling, and communication. The first level of randomisation determined whether the female partner worked during the first half an hour of the experiment. The second level of randomisation determined differential levels of labelling, information, and communication among couples concerning their financial decisions. We describe the various treatment arms and associated interventions in Figure 1.1.

During the second level of randomisation, participants were randomised into five treatment groups, namely:

1. **Private** - Participants were informed that their choices would be kept private from

their spouses.

2. **Private, with Resources Labelled Joint** - Participants were informed that their decisions are kept private from their spouse, but any amount they receive from this experiment is for common family expenditures. We provide a simple nudge that the amount is for family expenditures and can help them achieve their family financial goals.

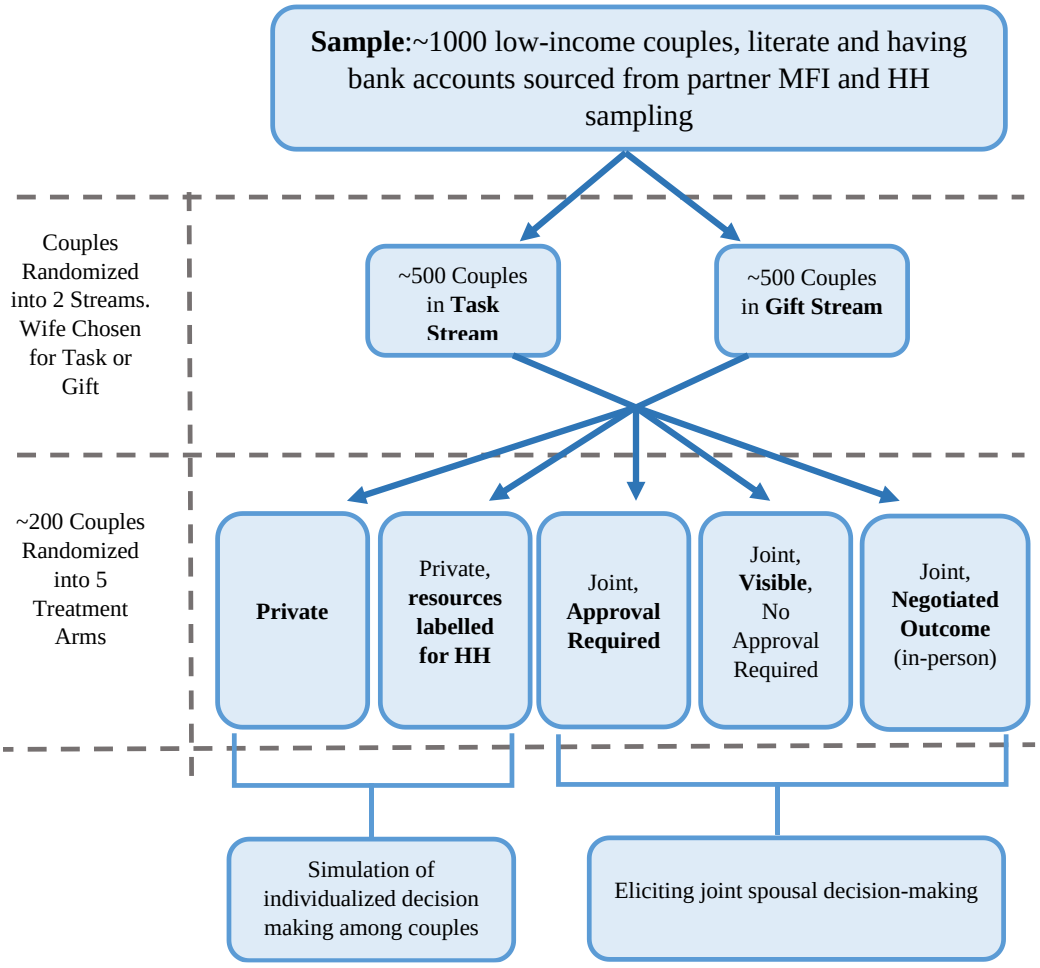
3. **Approval Required** - Under this treatment arm, husbands were given a chance to "approve" or "reject" the decision made by their wives through a digital app. The game ended if the husband "approved" her decision, and her choices on allocation were enacted. The wife had to choose again if her husband "rejected" her decision until he "approved" her decision. This sequential game went on for three rounds or until the husband "approved" the wife's decision. If the husband did not approve his wife's decision three times, he had to forgo his chance to accept or reject the allocation during the fourth round. However, he was able to see the decision that his wife made.

4. **Visible, No Approval required** - Under this treatment arm, couples could see the decisions made by their partner after deciding how to allocate the money and the respective expenditure decisions. Participants under this treatment arm made decisions without consultation with their partner, but information on their decisions was later shared with them through a digital app after the experiment.

5. **Negotiated Outcome** - Under this treatment arm, female partners were required to communicate and negotiate their decision in person with their husbands in a separate room. After the negotiation, the couple jointly made their allocation and expenditure decisions. We also captured participants' preferences before the in-person negotiation to understand the difference between the preferred choice and the outcome of negotiation between couples.

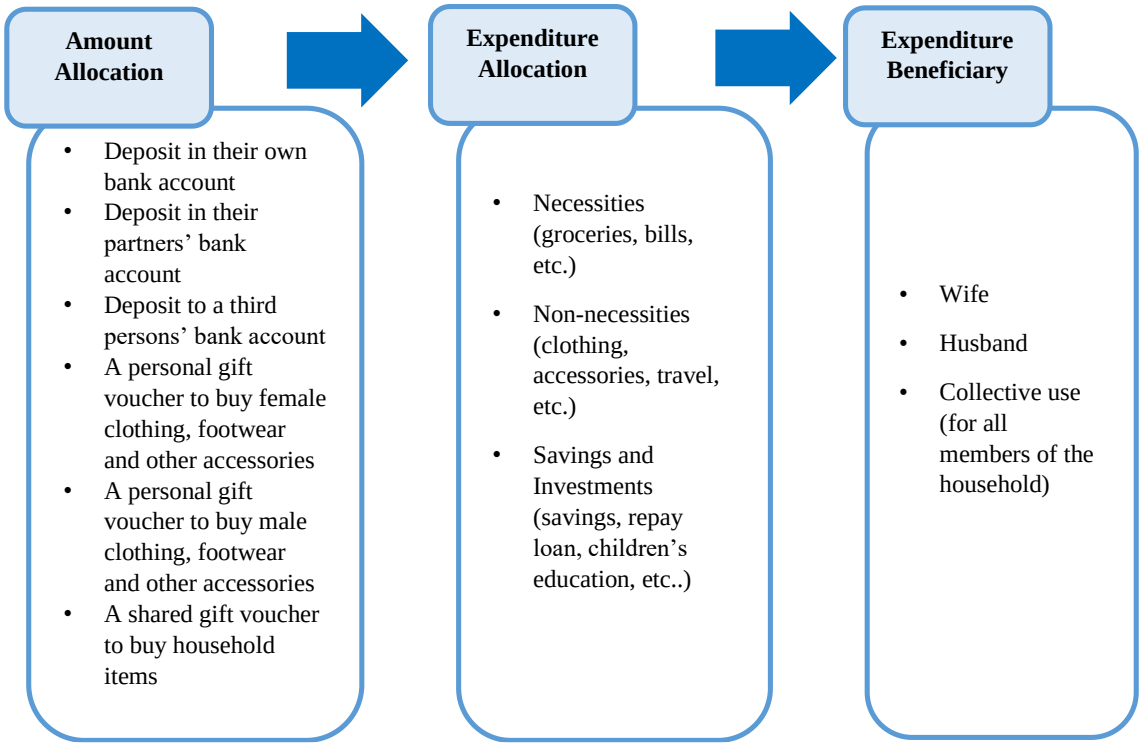
Under the different types of treatment at the first and second randomisation levels, couples made decisions on how they wished to allocate a certain amount of money into the six

Figure 1.1: Assignment to Treatment



different options outlined in the theoretical section: depositing in their own bank account, depositing in their partners' bank account, depositing to a third person'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, and a shared gift voucher to buy household items. Participants were also asked how they plan to spend the amount on different types of expenditure, which range from savings to children's expenditure to different types of daily expenditure goods such as food items and personal goods. We also capture information on whom participants would like to spend the amount on, for example, self or partner or all members of the family (Figure 1.2).

Figure 1.2: Assignment to Treatment



1.3.3 Timeline of the Experiment Session

The experiment session began with a survey to record household and individual characteristics of couples, which took approximately half an hour. During the next half an hour of the experiment, each couple were randomised into a 'task' or 'gift' stream. Under the "task" stream, female spouses worked for half an hour for 400 rupees on a moderately intensive mundane task of packing rice into small bags, while their partner watched on or read some magazine in the same room.[8] Women were expected to achieve a target of 30 small bags within the timeframe of half an hour. This ensured that the task replicated the structure of daily wage work with certain expectations. Under the "gift" stream, female spouses received 400 rupees, while both male and female participants enjoyed some magazines and other temporary, within-room distractions.[9]

[8] 400 rupees is the equivalent amount of daily wage in the study area, mimicking our lab setting to a workfare program setting.

[9] As done in Bhanot et al. (2018), participants were asked to come to the front of the room to confirm their name, bank details on a sheet of paper, explaining that these details would be important for receiving

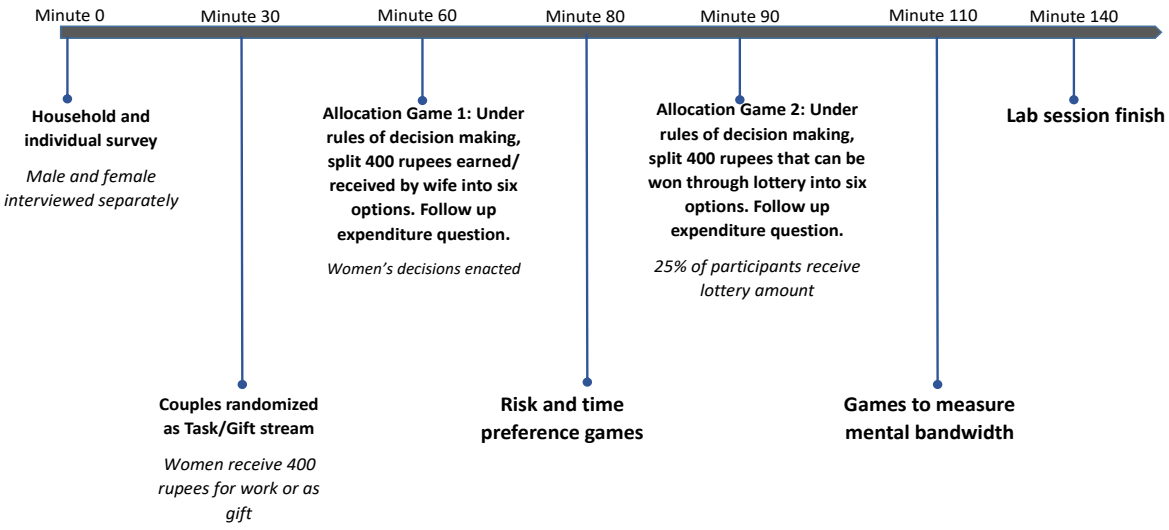
After half an hour of working or waiting, all couples entered the lab for a session to complete an allocation game on how they would like to spend the 400 rupees earned/received by women under varying conditions of privacy, labelling and communication between partners, the five treatment arms of the second level randomisation. Both partners were in separate rooms during the allocation game and were given an android tablet, each with survey CTO installed. Men and women were asked separately how they would like to split 400 rupees that women earned or received into one or more options as described in Figure 1.2. While women were asked how they wished to spend the money they earned or received, men were asked how they wish their wives to spend the money they earned or received during the first round.

In the first round, we enacted women's decisions on allocation. Participants were asked to assign an amount ranging from zero to four hundred rupees into the above five allocation categories. Depositing in a bank account allows participants to decide later how they wish to spend the amount received while choosing vouchers was a way of committing to a particular consumption good. Private vouchers were only redeemable for the purchase of 'female' items (or male' items). For example, suppose the wife allocates an 'x' amount to a personal gift voucher for female products. In that case, she receives 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 also record how they plan to spend the amount towards different types of expenditure and for whom the expenditure would be made. The participant's answers to the follow-up question on expenditure need not be binding because we could not restrict their expenditures to the items they choose in the allocation game.

Following this, both males and females played another round of the allocation game where they were given an opportunity to win 400 rupees with a 25% probability through a lottery system. This was in addition to the 400 rupees women won in the first round of work or no work. This contrasts with the first round of the allocation game in two respects. In

money.

Figure 1.3: Assignment to Treatment



the first round of the allocation game, both the partners had full information that women receive 400 rupees from working or waiting, while the lottery in the second round ensured plausible deniability for women about receiving the amount. This helps us identify the difference in women's choices when we move from a setting of certain to uncertain earnings, allowing for greater freedom in allocation choice. Secondly, during the second round of the allocation game, we analyse the effect of household resources in the male account (Private, Labelled for Household) and the transparency of female decisions. The decisions couples had to make about the amount they would potentially win through lottery were similar to the first round of the allocation game (Figure 1.2). The allocation games were followed by some questions and games to assess the emotional well-being and 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 3.2 outlines the timeline of the experiment session.

1.4 Data and Empirical Strategy

1.4.1 Summary Statistics

Table 1.2 provides descriptive statistics on the couples who participated in the study under different rules of spousal financial decision-making. The women in the study have an average age of 36 and married at age of 21. The majority are educated, with 75% of the women having a high school education or higher, while just over 28% of them are employed. Just over a quarter, 26%, of the women have some form of informal savings, and 25% of women use mobile banking. The men in the study had an average age of 43 and married at age 27. The majority of the men, 67%, also have a high school education or more, and 99% of men are employed. Only 14% of men have informal savings and 32% of men use mobile banking. On average, the couples in the study are married for 16 years, have one child, and 31% of the couples have a joint account with their spouse.

Table 1.2: Descriptive Statistics

	Task	Gift	Private	Private Labelled	Public Visible	Public Approval	Public Negotiation
				Household			
Years being married	15.60	15.57	15.03	15.50	15.58	17.34	14.50
	(9.63)	(8.96)	(9.27)	(9.35)	(8.98)	(10.36)	(8.24)
Household members	4.01	4.27	4.46	3.92	4.07	4.11	4.16
	(1.40)	(1.62)	(1.84)	(1.31)	(1.40)	(1.46)	(1.49)
Number of children	1.21	1.34	1.29	1.25	1.27	1.34	1.21
	(0.82)	(0.83)	(0.88)	(0.83)	(0.81)	(0.92)	(0.70)
Number of adults over 60	0.35	0.41	0.41	0.29	0.36	0.39	0.43
	(0.64)	(0.68)	(0.74)	(0.55)	(0.62)	(0.68)	(0.68)
Number of rooms	1.93	1.84	2.01	1.80	2.00	1.80	1.81
	(0.80)	(0.82)	(0.93)	(0.75)	(0.83)	(0.71)	(0.80)
Has a joint bank account with spouse	0.32	0.29	0.28	0.32	0.33	0.33	0.28
	(0.47)	(0.46)	(0.45)	(0.47)	(0.47)	(0.47)	(0.45)
				Female			
Age	36.40	35.80	35.38	36.65	35.98	37.63	34.88
	(9.02)	(8.55)	(9.14)	(8.60)	(8.48)	(9.36)	(8.13)
Age at marriage	21.08	20.47	20.59	21.52	20.68	20.36	20.72
	(4.95)	(4.38)	(4.34)	(5.70)	(4.09)	(4.82)	(4.22)
High school education or more	0.70	0.79	0.74	0.78	0.69	0.79	0.75
	(0.46)	(0.40)	(0.44)	(0.41)	(0.46)	(0.41)	(0.43)
Employed	0.28	0.29	0.31	0.31	0.21	0.29	0.29
	(0.45)	(0.45)	(0.46)	(0.46)	(0.41)	(0.46)	(0.46)
Typical month income is 10 k rupees or more	0.10	0.09	0.10	0.08	0.07	0.13	0.10
	(0.31)	(0.28)	(0.29)	(0.27)	(0.25)	(0.34)	(0.30)
Contributes half or more towards HH income	0.68	0.76	0.72	0.70	0.70	0.74	0.74
	(0.47)	(0.43)	(0.45)	(0.46)	(0.46)	(0.44)	(0.44)
Use informal savings	0.22	0.30	0.25	0.28	0.26	0.32	0.20
	(0.42)	(0.46)	(0.43)	(0.45)	(0.44)	(0.47)	(0.40)
Use mobile banking	0.28	0.23	0.20	0.30	0.30	0.19	0.27
	(0.45)	(0.42)	(0.40)	(0.46)	(0.46)	(0.40)	(0.44)
				Male			
Age	42.72	42.65	42.23	43.05	42.49	44.05	41.64
	(9.94)	(9.43)	(9.98)	(9.66)	(9.43)	(10.06)	(9.14)
Age at marriage	27.08	26.97	26.98	27.59	26.70	26.92	26.95
	(5.67)	(5.40)	(5.17)	(6.16)	(5.01)	(5.46)	(5.78)
High school education or more	0.59	0.76	0.72	0.68	0.62	0.71	0.65
	(0.49)	(0.43)	(0.45)	(0.47)	(0.49)	(0.46)	(0.48)
Employed	0.99	0.98	0.98	0.98	0.99	0.97	0.99
	(0.12)	(0.13)	(0.14)	(0.12)	(0.07)	(0.16)	(0.12)
Last month income is 10 k rupees or more	0.67	0.57	0.62	0.56	0.66	0.61	0.65
	(0.47)	(0.50)	(0.49)	(0.50)	(0.47)	(0.49)	(0.48)
Contributes half or more towards HH income	0.91	0.89	0.89	0.87	0.95	0.88	0.91
	(0.28)	(0.31)	(0.32)	(0.34)	(0.22)	(0.32)	(0.28)
Use informal savings	0.10	0.18	0.15	0.11	0.13	0.14	0.16
	(0.30)	(0.38)	(0.36)	(0.31)	(0.34)	(0.35)	(0.37)
Use mobile banking	0.35	0.29	0.30	0.27	0.37	0.29	0.37
	(0.48)	(0.46)	(0.46)	(0.44)	(0.48)	(0.45)	(0.48)
N	1000	1016	400	400	404	400	412

1.4.2 Balance between treatment groups

We use the joint test of orthogonality to test the balance between treatment and control groups. We run the following regression to check if the coefficients $\beta_1 = \beta_2 = \beta_3 = .. = 0$.

$$Treat = \beta_0 + \beta_1 * X_1 + \beta_2 * X_2 + \beta_3 * X_3 + \ldots + u \tag{1.1}$$

Table 1.3 reports results from the joint test of orthogonality for testing balance between various treatment and control groups. For all treatment types, we cannot reject the hypothesis that coefficients for household characteristics are all equal to zero. Hence, the joint test of orthogonality shows a balance between all types of treatment and control groups.

Table 1.3: Balance Table

	Task	Labelling	Visibility	Approval	Negotiation
	(1)	(2)	(3)	(4)	(5)
Number of years married	0.003	0.001	0.004	0.007***	-0.000
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)
Number of children	-0.043*	-0.032	-0.017	-0.015	-0.024
	(0.026)	(0.033)	(0.034)	(0.029)	(0.034)
Number of adults over 60	-0.032	-0.070	-0.024	0.015	0.003
	(0.025)	(0.047)	(0.040)	(0.038)	(0.038)
Have a joint account	0.016	0.062	0.030	0.041	-0.011
	(0.037)	(0.044)	(0.050)	(0.050)	(0.048)
Wife is employed	0.008	0.005	-0.138**	-0.037	-0.008
	(0.041)	(0.055)	(0.056)	(0.054)	(0.066)
Couple age difference	-0.006	-0.005	-0.006	-0.007	-0.001
	(0.004)	(0.006)	(0.006)	(0.005)	(0.005)
Wife has high school education or more	-0.076	0.045	-0.056	0.051	0.027
	(0.053)	(0.068)	(0.071)	(0.080)	(0.065)
Husband's monthly income is 10 k rupees or more	0.088**	-0.046	0.013	0.023	0.038
	(0.040)	(0.054)	(0.060)	(0.056)	(0.059)
N	1975	783	785	785	789
F	1.716	1.247	1.235	1.566	0.165
p_value	0.103	0.282	0.287	0.151	0.995

Notes: Dependent variables: Dummy variable 1 if participant is in treated group, 0 if participant is in control group.p value from joint orthogonality test is reported.* p<0.1, ** p<0.05, *** p<0.01.

1.4.3 Empirical strategy

To estimate the causal effect of treatments related to various rules of workfare and monitoring rules among spouses for financial decision-making, we perform the following empirical specification for participant i:

$$Y_i = \alpha + \beta_1 Task + \beta_2 M + X_h + \epsilon_i \tag{1.2}$$

where Y_i is the outcome variable, M is a dichotomous variable equal to one if a participant is under a specific treatment arm under different rules of spousal monitoring, ranging from private to public negotiation, X_h are household control variables for the participant, and ϵ_i is the error term. The standard errors are clustered at the session level. We focus on the coefficient β_1 to understand the effect of workfare versus unconditional transfers and the coefficient β_2 for different rules related to spousal financial decision-making.

To understand the interactive effect of workfare and different rules among spouses for financial decision-making, we perform the following empirical specification for participant i:

$$Y_i = \alpha + \beta_1 Task + \beta_2 M + \beta_3 M * Task + X_h + \epsilon_i \tag{1.3}$$

where Y_i is the outcome variable, M is a binary variable equal to one if a participant is under a specific treatment arm under different rules of spousal monitoring, X_h are household control variables for the participant, and ϵ_i is the error term. The standard errors are clustered at the session level. We focus on the coefficient $\beta_1 + \beta_3$ to estimate the effect of workfare under different rules of spousal monitoring and the coefficient $\beta_2 + \beta_3$ to estimate the effect of different rules of spousal monitoring under workfare.

Our primary set of outcome variables is divided into three aspects of financial decision-making: to whom the amount is allocated, the type of allocation expenditure, and for whom the expenditure is made. For capturing the effect on who the amount is allocated to, our three main outcome variables are (1) Amount share to the wife, (2) Amount share

to the husband, and (3) Visible to the partner.[10] We calculate the "amount share to the wife" as the share of 400 rupees the participant chooses to transfer to the wife's bank account and a voucher for female products. We similarly define the "amount share to the husband". We calculate "Visibility" as a binary variable equal to one if participants transfer the money to their partner's bank account, a voucher for themselves or their partner or a shared voucher for both, and zero otherwise. This outcome overlaps with the other two outcomes, for example, if the wife allocates an amount to her husband's account, this increases the amount share to the husband and the amount under "Visibility".

Under the first allocation game, for the female, the decisions are regarding the money she earned or received, while for the male, these are the decisions he would have liked her to take regarding the money she earned or received. In the appendix section of the paper, we analyse the female and male responses on how they would like to allocate and spend the money the wife earned or received. We report the difference in these effects for female and male responses and check if the coefficients are significantly different from each other. In the second allocation game, this outcome definition changes for the husband as it is now what he chooses to allocate to his wife if he wins the lottery.

To analyse the effect on the type of expenditure allocation, we categorise the expenditure into three types: (1) Necessities, including groceries, bill payments such as rent and electricity and so on, (2) Non-necessities, including clothing, tobacco, and personal male products and female products, (3) Savings and investments, which includes savings, children's education, repaying loan or debt. We also look at the impact on whom they wish to make the expenditure for, which have three beneficiary categories: (1) wife, (2) husband, and (3) everyone in the household, including wife and husband. As a robustness check to correct for multiple hypothesis testing, we also report Anderson's q-values (Anderson, 2008) in all our results.

[10]We do not categorise the strategies of participants as described in our theoretical framework due to insufficient observations for some categories. For example, only a few under each treatment arm choose strategies of choosing vouchers (due to preference for money over vouchers) or transferring the amount to a third person.

1.5 Results

In this section, we first present our findings on the effect of workfare versus gifted amount on spousal decision-making regarding whom the amount is allocated to, the type of allocation expenditure and for whom the expenditure is made. We then present the effects under different rules on spousal decision-making.

1.5.1 Workfare Versus Unconditional Transfers

Overall Effect

We first analyse the effect of female workfare on spousal financial decision making. In Table 1.4, we find that when women work for the amount, the share of amount she allocates to her bank account or private female voucher is 5.5 percentage points more as compared to when she received the amount as a gift (Panel A, column 1, $p < 0.05$, $q < 0.1$). Linked with this, we find that under workfare, women are 5.6 percentage points less likely to allocate the amount to accounts visible to their husbands, such as the husband's bank account or any type of voucher (Panel A, column 5, $p < 0.05$, $q < 0.1$). Additionally, in Table C1, we find that the husband also is in agreement with her decision to allocate money to her account. We find no statistically significant effect on the couple's spending patterns when the wife earns the amount (Panel B and Panel C). However, it is worth noting in Panel C that the wife wishes to allocate 5.4 percentage points more share of money to her own expenses if she worked versus when she did not (although not statistically significant). Our results on the importance of workfare are robust after accounting for multiple hypothesis testing. What these results suggest is that personally earning income increased the wife's sense of ownership of the money, and hence women allocated more to accounts over which she has more control, but interestingly this ownership does not necessarily translate to lower shared spending. Our findings also highlight the husband's perception of women's workfare and the related ownership of the money earned. These results contribute to the literature that women's earned income is causally related to her

having control over resources, which in turn gives her direct bargaining power (Doss, 2013).

Workfare under In-person Negotiation

While we observe an overall effect of workfare on female control over money, we further examine if workfare provides the wife more advantage to bargaining under an in-person negotiation with her husband. This analysis would mimic how female-earned money is treated differently to her receiving a free transfer within a day-to-day household decision-making negotiation setting among couples. We analyse whether her ability to claim control over money (or enact her preferences) in the bargaining process varies based on whether she worked. The outcome variable for this analysis is the difference between the negotiated outcome and female/male initial preferences before the negotiation. In Table 1.5, we examine the role of workfare in the negotiation process between the couple by focusing only on the couples in the "Negotiation" treatment group.

Our results mirror the existing empirical evidence that personally earning money provides women with a sense of ownership and improves their say in household decision-making (Majlesi, 2016; Luke and Munshi, 2011; Bertocchi et al., 2014; Anderson and Eswaran, 2009). Earning money gives her direct bargaining power, which in turn may have provided her with more leverage during an in-person negotiation with her husband to take more control over the money she earned (by allocating more to accounts under her control). In Table 1.5 (Panel A, column 1), we find that if she worked for the amount, she is likely to claim 8.9 percentage points higher share of the amount towards her bank account or a female voucher ($p < 0.01$, $q < 0.05$) in the negotiation process, compared to when she was gifted the amount. Under the negotiation process, workfare also reduces the likelihood that she transfers the amount to accounts visible to her husband by 7.1 percentage points (Panel A, column 5, $p < 0.05$, q value not significant).

The couple's decision on the type of expenditure they would spend the amount on is

Table 1.4: Effect of women's workfare on spousal decision making

	Female Spouse					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A - Amount allocation						
	Amount share to wife		Amount share to husband		Visibility	
Task [A]	0.055	0.052	-0.034	-0.033	-0.056	-0.054
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
	[0.016]**	[0.029]**	[0.086]*	[0.104]	[0.020]**	[0.026]**
	{0.099}*	{0.153}	{0.216}	{0.322}	{0.099}*	{0.153}
N	1008	987	1008	987	1008	987
Gift Mean	0.84	0.84	0.12	0.12	0.16	0.16
Panel B - Expenditure allocation						
	Necessities		Non-necessities		Savings and Investments	
Task [B]	0.003	0.012	-0.005	-0.017	0.010	0.013
	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.04)
	[0.898]	[0.628]	[0.840]	[0.536]	[0.769]	[0.703]
	{0.665}	{0.794}	{0.665}	{0.794}	{0.665}	{0.794}
N	995	974	995	974	995	974
Gift Mean	0.26	0.26	0.15	0.15	0.57	0.57
Panel C - Expenditure Beneficiary						
	Wife		Husband		Collective Use	
Task [C]	0.054	0.033	-0.015	-0.016	-0.017	0.004
	(0.03)	(0.03)	(0.01)	(0.01)	(0.03)	(0.03)
	[0.101]	[0.268]	[0.174]	[0.197]	[0.578]	[0.888]
	{0.216}	{0.473}	{0.296}	{0.456}	{0.627}	{0.929}
N	995	974	995	974	996	975
Household Controls	No	Yes	No	Yes	No	Yes
Gift Mean	0.31	0.31	0.04	0.04	0.65	0.65

Notes: Dependent variables: Columns in panel A indicate the amount allocation decisions made by spouses. Columns in panel B indicate share of amount participant wishes to spend on the specific category of expenditure. Columns in panel C indicate share of amount participant wishes to spend on individual/individuals described.Percentage point changes are calculated relative to the mean of the respective control group, which in this case is the treatment group where women receive the amount as a gift. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

not determined by whether she worked or not (Table 1.5, Panel B). Examining how workfare affects the decision on whom to spend the money towards during spousal negotiation, we find that couples agree on spending 10.2 percentage points less towards all household members if she worked for the amount (Table 1.5, Panel C, column 5, $p < 0.05$, q value not significant). Although not statistically significant, this is associated with her spending 6.7 percentage points more for her personal expenditures. In a negotiation process, a sense of ownership of the amount through workfare allows the female spouses to negotiate better to spend less for collective use and more towards themselves. As for the husband's decisions (Table 1.5, Columns 7 to 12), although the estimates are not statistically significant, we observe that post-negotiation, share to him reduces by 5.9 percentage points and share to the wife increases by 8.6 percentage points under workfare. This provides suggestive evidence that in addition to providing more say for women under bargaining, women's workfare also leads to men relinquishing more share of resources to their wives.

Table 1.5: Effect of Workfare on Spousal Decision Making under an In-person Negotiation

	Female Spouse						Male Spouse					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A - Amount allocation												
	Amount share to wife		Amount share to husband		Visibility		Amount share to wife		Amount share to husband		Visibility	
Task [A]	0.089	0.087	-0.031	-0.035	-0.071	-0.064	0.086	0.097	-0.059	-0.090	0.032	0.004
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.08)	(0.09)	(0.07)	(0.08)	(0.06)	(0.07)
	[0.004]***	[0.003]***	[0.282]	[0.206]	[0.039]**	[0.062]*	[0.258]	[0.257]	[0.410]	[0.272]	[0.587]	[0.955]
	{0.042}**	{0.028}**	{0.320}	{0.368}	{0.137}	{0.315}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
N	206	200	206	200	206	200	206	200	206	200	206	200
Gift Mean	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.27	0.27	-0.32	-0.32	0.54	0.54
Female - Male [A]	0.00	-0.01	0.03	0.06	-0.10	-0.07						
Female=Male [A]	0.97	0.90	0.69	0.50	0.11	0.35						
Panel B - Expenditure allocation												
	Necessities		Non-necessities		Savings and Investments		Necessities		Non-necessities		Savings and Investments	
Task [B]	-0.034	-0.033	-0.023	-0.008	0.063	0.049	0.040	0.050	-0.021	-0.064	-0.028	0.002
	(0.04)	(0.04)	(0.04)	(0.05)	(0.06)	(0.07)	(0.06)	(0.06)	(0.06)	(0.07)	(0.09)	(0.09)
	[0.373]	[0.427]	[0.586]	[0.872]	[0.275]	[0.457]	[0.508]	[0.410]	[0.735]	[0.350]	[0.747]	[0.983]
	{0.335}	{0.400}	{0.484}	{0.564}	{0.320}	{0.400}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
N	202	196	202	196	202	196	202	196	202	196	202	196
Gift Mean	-0.02	-0.02	0.00	0.00	0.02	0.02	-0.06	-0.06	0.02	0.02	0.04	0.04
Female - Male [B]	-0.07	-0.08	-0.00	0.06	0.09	0.05						
Female=Male [B]	0.23	0.21	0.98	0.39	0.32	0.63						
Panel C - Expenditure Beneficiary												
	Wife		Husband		Collective Use		Wife		Husband		Collective Use	
Task [C]	0.067	0.062	0.039	0.039	-0.102	-0.094	0.051	0.047	0.037	0.035	-0.124	-0.114
	(0.05)	(0.05)	(0.02)	(0.03)	(0.05)	(0.05)	(0.08)	(0.08)	(0.04)	(0.04)	(0.07)	(0.08)
	[0.190]	[0.240]	[0.111]	[0.125]	[0.045]**	[0.090]*	[0.531]	[0.565]	[0.328]	[0.335]	[0.103]	[0.148]
	{0.295}	{0.368}	{0.201}	{0.333}	{0.137}	{0.315}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
N	202	196	202	196	202	196	202	196	202	196	202	196
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Gift Mean	0.01	0.01	-0.02	-0.02	0.00	0.00	0.25	0.25	-0.03	-0.03	-0.23	-0.23
Female - Male [C]	0.02	0.01	0.00	0.00	0.02	0.02						
Female=Male [C]	0.83	0.83	0.94	0.91	0.74	0.78						

Notes: Dependent variables: All the depedent variables is the difference between the negotiated outcome and female/male's intial preferences. Columns in panel A indicate the amount allocation decisions made by spouses. Columns in panel B indicate share of amount participant wishes to spend on the specific category of expenditure. Columns in panel C indicate share of amount participant wishes to spend on individual/individuals described. Percentage point changes are calculated relative to the mean of the group where women receive the amount as a gift within the negotiation treatment group. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

Workfare under Varying Levels of Male Monitoring for Female Decisions

In this section, we check for the effect of workfare under different practical scenarios of decision making among couples, ranging from a digital approval mechanism for the wife's decision to an in-person negotiation regarding her decisions. We estimate and report $\beta_1+\beta_3$ from equation 1.3. From Table 1.6 (Row C), we find that the positive effect that women's workfare has on her taking control over the resources is only present for women in the Negotiation treatment group. An approval requirement and visibility of decisions from husbands nullify the positive effect that workfare has on women taking control of their money. However, in Table 1.7 (Row A and Row B, Column 5), we find that workfare leads to a higher share towards savings and investments only under a digital approval requirement from her husband or digital transparency with her husband. That is, digital mechanisms of sharing control with her husband provide an additional effect of workfare by improving the household's share towards savings and investments. In terms of the effect of workfare under different rules related to male monitoring of female decisions regarding the expenditure beneficiary, we find marginal effects on decreased share towards the husband and collective use and an increased share to the wife under visibility (Table 1.8). Under an in-person negotiation, workfare leads to more spending towards the wife and less spending towards collective use ($p < 0.1$, q value not significant). Interestingly, under the threat of rejection from the husband, the wife allocates 6.7 percentage points lower share of money for her personal spending and 7.5 percentage points more towards collective spending. But these estimates are not statistically significant, possibly due to the low sample size.

Workfare based on Individual and Couple Characteristics

Now, we analyse the heterogeneous treatment effect of women's workfare on financial decisions based on their individual and intrahousehold characteristics. Overall, when women work for the amount, they allocate a higher share of resources to accounts they control and less to accounts their husband controls or have visibility of. We suppose that the sense of ownership that workfare provides would depend on women's individual characteristics,

Table 1.6: Effect of Workfare under Male Monitoring of Female Allocation Decisions

	Amount share to wife		Amount share to husband		Visibility	
	(1)	(2)	(3)	(4)	(5)	(6)
Task&Approval [A]	0.005	0.004	0.013	0.016	-0.000	-0.002
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
	[0.909]	[0.925]	[0.764]	[0.694]	[1.000]	[0.971]
	{0.697}	{0.882}	{0.676}	{0.727}	{0.697}	{0.882}
Task&Visible [B]	0.064	0.056	-0.049	-0.051	-0.076	-0.071
	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
	[0.260]	[0.306]	[0.286]	[0.279]	[0.149]	[0.162]
	{0.380}	{0.495}	{0.401}	{0.495}	{0.364}	{0.391}
Task&Negotiation [C]	0.114	0.093	-0.087	-0.076	-0.120	-0.098
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
	[0.010]***	[0.037]**	[0.023]**	[0.043]**	[0.003]***	[0.014]**
	{0.135}	{0.301}	{0.163}	{0.301}	{0.091}*	{0.301}
N	808	790	808	790	808	790
Household Controls	No	Yes	No	Yes	No	Yes
Control Mean [A]	0.87	0.87	0.10	0.10	0.14	0.14
Control Mean [B]	0.81	0.81	0.16	0.16	0.20	0.20
Control Mean [C]	0.82	0.82	0.14	0.14	0.17	0.17
[A] - [B]	0.06	0.05	-0.06	-0.07	-0.08	-0.07
[A]=[B]	0.41	0.45	0.33	0.28	0.27	0.30
[C] - [B]	0.05	0.04	-0.04	-0.03	-0.04	-0.03
[C]=[B]	0.50	0.60	0.53	0.66	0.53	0.68
[C] - [A]	0.11	0.09	-0.10	-0.09	-0.12	-0.10
[C]=[A]	0.08	0.16	0.09	0.11	0.05	0.12

Notes: Dependent variables: Row [A] is the effect of workfare when having an-app based approval requirement from husband , row [B] is the effect of workfare when wife's decisions are transparent to husband, row [C] is the effect of workfare during in-person negotiation with husband on decisions. All the above described rows are compared to their respective control group. Rows [A]-[B], [C]-[B] and [C]-[A] reports difference in coefficients for the corresponding rows. Rows [A]=[B], [C]=[B] and [C]=[A] reports p value from testing the hypothesis that coefficients forfor the corresponding rows are equal. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in {} parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

Table 1.7: Effect of Workfare under Male Monitoring of Female Expenditure Allocation Decisions

	Necessities		Non-necessities		Savings and Investments	
	(1)	(2)	(3)	(4)	(5)	(6)
Task&Approval [A]	-0.071	-0.061	-0.076	-0.077	0.155	0.152
	(0.06)	(0.06)	(0.05)	(0.05)	(0.06)	(0.06)
	[0.214]	[0.290]	[0.107]	[0.123]	[0.014]**	[0.019]**
	{0.368}	{0.495}	{0.325}	{0.370}	{0.135}	{0.301}
Task&Visible [B]	-0.067	-0.058	-0.029	-0.037	0.106	0.106
	(0.05)	(0.06)	(0.05)	(0.05)	(0.06)	(0.06)
	[0.224]	[0.312]	[0.572]	[0.452]	[0.089]*	[0.099]*
	{0.368}	{0.495}	{0.639}	{0.527}	{0.295}	{0.370}
Task&Negotiation [C]	0.107	0.130	-0.006	-0.020	-0.101	-0.108
	(0.06)	(0.06)	(0.05)	(0.06)	(0.07)	(0.07)
	[0.072]*	[0.027]**	[0.904]	[0.721]	[0.144]	[0.114]
	{0.295}	{0.301}	{0.697}	{0.727}	{0.364}	{0.370}
N	796	778	796	778	796	778
Household Controls	No	Yes	No	Yes	No	Yes
Control Mean [A]	0.30	0.30	0.17	0.17	0.50	0.50
Control Mean [B]	0.33	0.33	0.20	0.20	0.47	0.47
Control Mean [C]	0.17	0.17	0.14	0.14	0.69	0.69
[A] - [B]	0.00	0.00	0.05	0.04	-0.05	-0.05
[A]=[B]	0.96	0.98	0.45	0.52	0.56	0.59
[C] - [B]	0.17	0.19	0.02	0.02	-0.21	-0.21
[C]=[B]	0.03	0.02	0.74	0.81	0.03	0.02
[C] - [A]	0.18	0.19	0.07	0.06	-0.26	-0.26
[C]=[A]	0.04	0.03	0.31	0.42	0.01	0.01

Notes: Row [A] is the effect of workfare when having an-app based approval requirement from husband , row [B] is the effect of workfare when wife's decisions are transparent to husband, row [C] is the effect ofworkfare during in-person negotiation with husband on decisions. All the above described rows are compared to their respective control group. Rows [A]-[B], [C]-[B] and [C]-[A] reports difference in coefficients for the corresponding rows. Rows [A]=[B], [C]=[B] and [C]=[A] reports p value from testing the hypothesis that coefficients for the corresponding rows are equal Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

Table 1.8: Effect of Workfare under Male Monitoring of Female Expenditure Beneficiary Decisions

	Wife		Husband		Collective Use	
	(1)	(2)	(3)	(4)	(5)	(6)
Task&Approval [A]	-0.067	-0.078	-0.010	-0.009	0.075	0.088
	(0.06)	(0.06)	(0.02)	(0.02)	(0.06)	(0.06)
	[0.305]	[0.221]	[0.558]	[0.617]	[0.243]	[0.166]
	{0.405}	{0.495}	{0.639}	{0.692}	{0.377}	{0.391}
Task&Visible [B]	0.086	0.059	-0.040	-0.040	-0.056	-0.030
	(0.07)	(0.07)	(0.02)	(0.02)	(0.07)	(0.06)
	[0.204]	[0.369]	[0.081]*	[0.087]*	[0.402]	[0.642]
	{0.368}	{0.495}	{0.295}	{0.370}	{0.502}	{0.692}
Task&Negotiation [C]	0.137	0.114	0.002	0.000	-0.129	-0.104
	(0.07)	(0.07)	(0.02)	(0.02)	(0.07)	(0.07)
	[0.058]*	[0.119]	[0.926]	[0.984]	[0.072]*	[0.136]
	{0.295}	{0.370}	{0.697}	{0.882}	{0.295}	{0.374}
N	796	778	796	778	796	778
Household Controls	No	Yes	No	Yes	No	Yes
Control Mean [A]	0.34	0.34	0.02	0.02	0.64	0.64
Control Mean [B]	0.33	0.33	0.05	0.05	0.64	0.64
Control Mean [C]	0.28	0.28	0.04	0.04	0.69	0.69
[B] - [A]	0.15	0.14	-0.03	-0.03	-0.13	-0.12
[B]=[A]	0.11	0.13	0.31	0.30	0.16	0.18
[C] - [B]	0.05	0.05	0.04	0.04	-0.07	-0.07
[C]=[B]	0.58	0.57	0.21	0.25	0.42	0.41
[C] - [A]	0.20	0.19	0.01	0.01	-0.20	-0.19
[C]=[A]	0.04	0.06	0.67	0.75	0.04	0.05

Notes: Dependent variables: Row [A] is the effect of workfare when having an-app based approval requirement from husband , row [B] is the effect of workfare when wife's decisions are transparent to husband, row [C] is the effect ofworkfare during in-person negotiation with husband on decisions. All the above described rows are compared to their respective control group. Rows [A]-[B], [C]-[B] and [C]-[A] reports difference in coefficients for the corresponding rows. Rows [A]=[B], [C]=[B] and [C]=[A] reports p value from testing the hypothesis that coefficients for the corresponding rows are equal. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

like their general self-efficacy and their relationship with their husbands, measured using indicators such as their high willingness to pay to have control over money and high intra-household decision making power. We observe that individual or couple characteristics do not drive the overall effect of workfare on her allocation decisions, except for self-efficacy (Figure 1.4). For women with self-efficacy scores higher than the median, a sense of ownership from workfare leads her to allocate 6.2 percentage points more to herself ($p < 0.05$. q value not significant).[11]

Additionally, in households where women have limited control over resources, workfare provides her with a sense of ownership of the amount and induces her to spend more towards her expenses. We find that if the wife has ever hidden income or expenditure from her husband, under workfare, she decides to spend 17 percentage points more on herself ($p < 0.01$, $q < 0.05$) and 15 percentage points less for collective use by everyone in the household ($p < 0.05$, $q < 0.1$). The same results hold for women who have a high willingness to pay for control over resources.[12] If the wife has less control over resources in a household, under workfare, she wishes to spend 12 percentage points higher share of the money for herself ($p < 0.01$, $q < 0.1$) and 9.5 percentage point lower share of the money for collective use ($p < 0.05$, q value not significant).

[11] A detailed description of the definition of high self-efficacy and other variables used for heterogeneous treatment effects analysis can be found in Appendix E

[12] We measure "high willingness to pay" as a binary variable equal to one if the woman chooses to pay any amount greater than zero to transfer money won in a hypothetical lottery game to her account, and zero otherwise. Almås et al. (2018) shows that this measure is a more effective way to measure bargaining power than traditional survey-based measures.

Figure 1.4: Heterogeneous Effects of Women's Workfare on Allocation Decisions

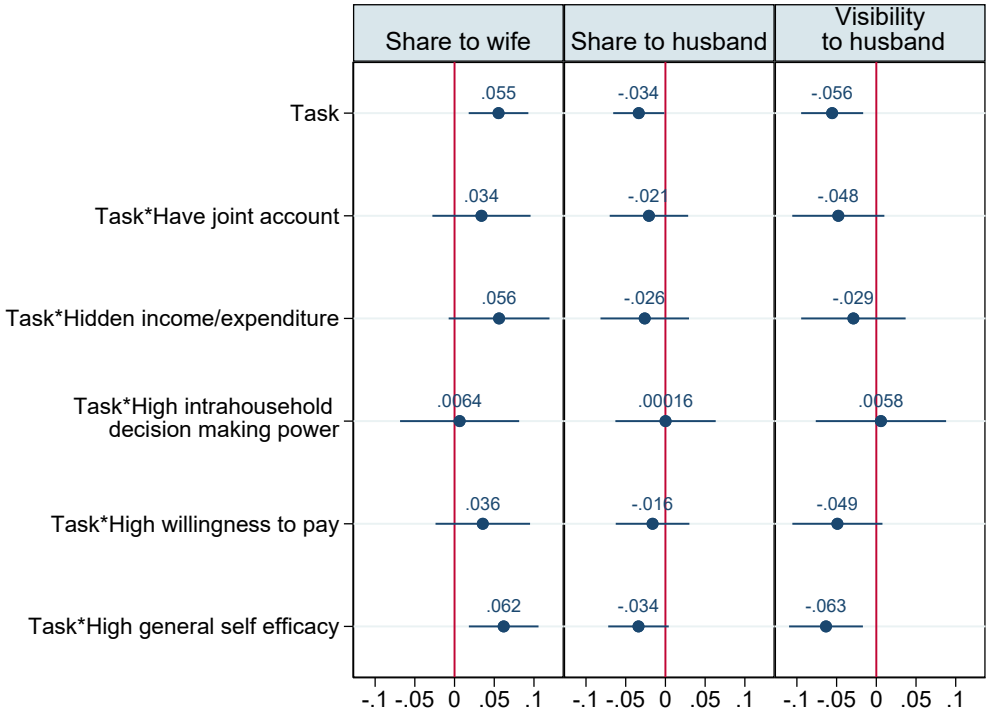
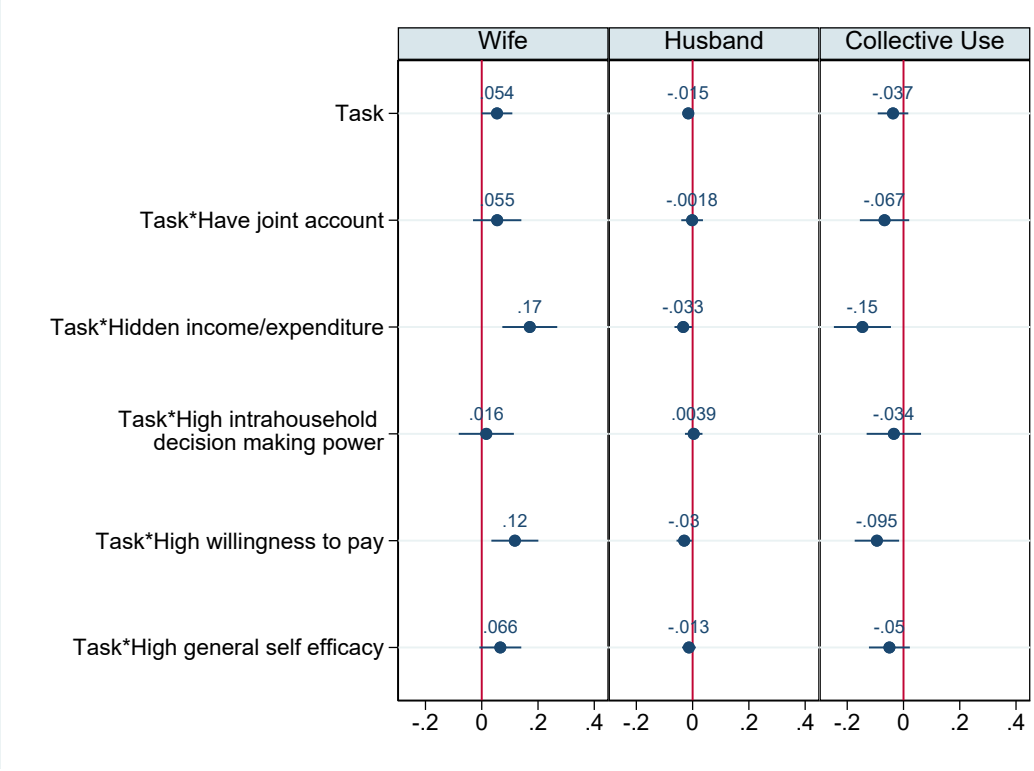


Figure 1.5: Heterogeneous Effects of Women's Workfare on Decisions Regarding Expenditure Beneficiary



1.5.2 Household Resources in Individual Accounts

Household Resources in Female-held Accounts

We now shift our focus to analysing the effect of transferring money for household purposes to a female individual account (Private Labelled for Household versus Private). When money labelled for household purposes is transferred to accounts under female control, we find no overall effects on allocation and spending decisions (Table 1.9). This finding contradicts the dominant approach in policies whereby an increased sharing of resources and spending on household public goods is expected when transferring "shared" household resources to female-held accounts.

We observe that women in treatment arms where money is not labelled for household pur-

poses spend 63% of the amount towards collective use by all household members. Hence, even when resources are not labelled for household purposes, women mostly perceive money under their control as money for household public goods. Additionally, in the context of a lab setting where couples came together to make household financial decisions, women may have already perceived the setting as one for joint decision making based. The null results from labelling female-held resources for household purposes could also be associated with the information nudge being too subtle in this specific context.

The one area we find some marginal impacts is when we look at the effect of labelling under workfare scenario. Rows [B] in Table 1.9 indicate the effect of labelling if the wife worked for the amount. The coefficients reported are $\beta_2 + \beta_3$ in equation 1.3. If the wife had worked for the amount meant for household purposes, she is more likely to allocate the amount to her bank account or a private voucher ($p < 0.1$, q value not significant). This could be attributed to the sense of ownership that workfare provides the wife to take control of resources labelled for household purposes. In this workfare scenario, the share of labelled resources that the wife chooses towards her husband's personal expenditure is less, though the result again is only significant at the 10% p-value and not significant at the q value. This decrease is accompanied by an increase in the amount spent for collective purposes, though this result is insignificant. Again, the sense of ownership of money through tasks provides women the ability to spend a greater share of money towards household public goods and a lower share of money towards the husband's personal expenditures.

Household Resources in Female-held and Male-held Accounts

Using the second allocation game in our experimental setup, where couples decide on how they would allocate and spend the money they could potentially win through a lottery, we are able to compare how couples make decisions about household resources in their individual account. From Table 1.10, we do not find evidence that putting resources labelled as household resources under female or male controlled scenarios change spousal decision

Table 1.9: Effect of labelling money earned/received by women on their financial decisions

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A - Amount allocation						
	Amount share to wife		Amount share to husband		Visibility	
Labelling [A]	0.019	0.015	-0.004	-0.001	-0.010	-0.007
	(0.03)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)
	[0.591]	[0.673]	[0.891]	[0.967]	[0.788]	[0.859]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Labelling&Task [B]	0.083	0.086	-0.043	-0.045	-0.080	-0.085
	(0.04)	(0.05)	(0.03)	(0.04)	(0.05)	(0.05)
	[0.063]*	[0.067]*	[0.220]	[0.235]	[0.110]	[0.113]
	{0.417}	{0.436}	{0.495}	{0.543}	{0.417}	{0.436}
N	400	391	400	391	400	391
Non-labelled Mean	0.87	0.87	0.09	0.09	0.14	0.14
Non-labelled&Task Mean	0.86	0.86	0.10	0.10	0.15	0.15
Panel B - Expenditure allocation						
	Necessities		Non-necessities		Savings and Investments	
	(1)	(2)	(3)	(4)	(5)	(6)
Labelling [A]	0.005	0.002	0.010	0.022	-0.015	-0.022
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.06)
	[0.898]	[0.951]	[0.791]	[0.582]	[0.768]	[0.688]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Labelling&Task [B]	-0.023	-0.014	0.016	0.019	0.017	0.006
	(0.06)	(0.06)	(0.06)	(0.07)	(0.08)	(0.09)
	[0.701]	[0.806]	[0.792]	[0.772]	[0.835]	[0.945]
	{0.979}	{1.000}	{0.979}	{1.000}	{0.979}	{1.000}
N	397	388	397	388	397	388
Non-labelled Mean	0.26	0.26	0.14	0.14	0.59	0.59
Non-labelled&Task Mean	0.29	0.29	0.16	0.16	0.54	0.54
Panel C - Expenditure Beneficiary						
	Wife		Husband		Collective Use	
	(1)	(2)	(3)	(4)	(5)	(6)
Labelling [A]	-0.028	-0.027	0.014	0.012	0.008	0.011
	(0.05)	(0.04)	(0.02)	(0.02)	(0.05)	(0.05)
	[0.566]	[0.536]	[0.528]	[0.587]	[0.873]	[0.820]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Labelling&Task [B]	-0.011	-0.032	-0.051	-0.056	0.042	0.068
	(0.07)	(0.07)	(0.03)	(0.03)	(0.08)	(0.07)
	[0.881]	[0.633]	[0.065]*	[0.061]*	[0.603]	[0.349]
	{0.979}	{1.000}	{0.417}	{0.436}	{0.979}	{0.723}
N	397	388	397	388	397	388
Household Controls	No	Yes	No	Yes	No	Yes
Non-labelled Mean	0.34	0.34	0.04	0.04	0.63	0.63
Non-labelled&Task Mean	0.36	0.36	0.06	0.06	0.60	0.60

Notes: Dependent variables: Columns in panel A indicate the amount allocation decisions made by women in the sample. Columns in panel B indicate share of amount female participant wishes to spend on the specific category of expenditure. Columns in panel C indicate share of amount female participant wishes to spend on individual/individuals described. Rows [A] indicate effect of labelling money earned/received by women on their financial decisions and rows [B] indicate the effect of labelling female-held money if women earned the amount. Percentage point changes are calculated relative to the mean of the respective control group. For rows [A], the results are compared to the treatment group where transactions are private and resources are not labelled. For rows [B], the results are compared to the treatment group where transactions are private and resources are not labelled and if she earned the amount. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in {} parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

making compared to when money is not labelled for household purposes. While it is common for programs that aim to improve household welfare outcomes to transfer household money to individual accounts, our results fail to detect any evidence in the direction that such an approach leads to more sharing towards household spending. This finding suggests that household money in jointly controlled and monitored scenarios where both partners have control and monitoring capacities, defined by mechanisms of visibility, approval requirement or communication, could potentially lead to more sharing of household resources.

Even though we find no overall effects of household money in individual accounts, we find some heterogeneous results from labelling male-held resources for family purposes, based on couple characteristics (Figure 1.6). We find that in households where women have more willingness to pay, that is, she has less bargaining power in the household, men allocate 14 percentage points lower share of the amount to their wife's account ($p < 0.1, q < 0.1$), and 13 percentage points higher share of the amount to his own account ($p < 0.1, q < 0.1$). Hence, in scenarios of low bargaining power of women, transferring household money to a male account may lead to a further decrease in her control over money. Also, we find that men with impatient time preferences and risk-averse behaviour allocate a greater share of the amount to their wife's account (14.17 percentage points in case of impatient time preferences ($p < 0.05, q < 0.1$) and 9.5 percentage points in case of risk-averse behaviour ($p < 0.1, q < 0.1$)) and less share of amount to his account (16.04 percentage points less in case of impatient time preference ($p < 0.05, q < 0.1$) and 10.85 percentage points less in case of risk-averse behaviour ($p < 0.1, q < 0.1$)). Men with impatient time preferences and are risk averse give control of their money to the wife if the money is meant for household purposes. Although not statistically significant, we find that in households where couples have a joint account, men are 14 percentage points less likely to transfer money to accounts under their control and 14 percentage points more likely to transfer to accounts under their control when resources are labelled for household purposes. In households where joint financial decision making exists in the form of a joint bank account, labelling resources in husband's account for household purposes marginally leads to the husband taking more control of the money.

Table 1.10: Effect of labelling on allocation decisions

	Female Spouse						Male Spouse					
	Amount share to wife		Amount shared to husband		Labelling		Amount share to wife		Amount shared to husband		Labelling	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Labelling [A]	0.065	0.060	-0.019	-0.019	-0.060	-0.051	0.036	0.031	-0.046	-0.042	0.035	0.030
	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
	[0.109]	[0.142]	[0.551]	[0.546]	[0.174]	[0.239]	[0.428]	[0.506]	[0.319]	[0.370]	[0.451]	[0.524]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
N	400	391	400	391	400	391	400	392	400	392	400	392
Non-labelled Mean	0.82	0.82	0.11	0.11	0.18	0.18	0.52	0.52	0.48	0.48	0.52	0.52
Female - Male [A]	0.03	0.03	0.03	0.02	-0.09	-0.08						
Female=Male [A]	0.65	0.64	0.63	0.69	0.10	0.18						

Panel B - Expenditure allocation

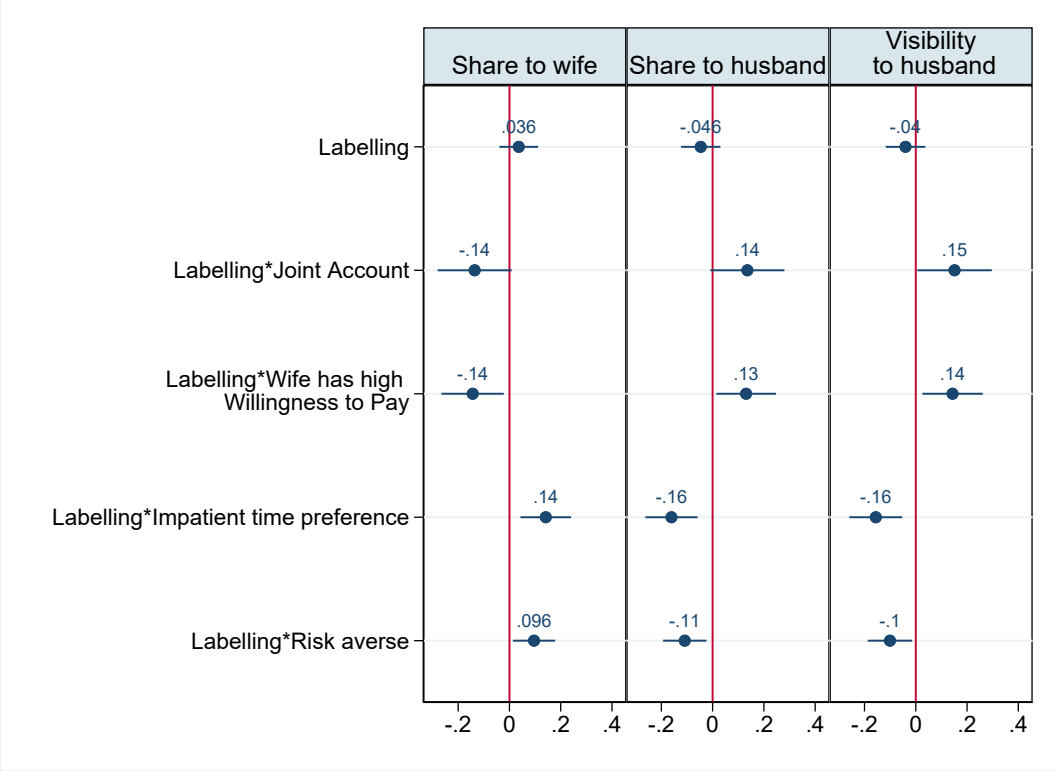
	Necessities		Non-necessities		Savings and Investments		Necessities		Non-necessities		Savings and Investments	
Labelling [A]	0.008	0.012	-0.029	-0.031	0.032	0.030	-0.084	-0.078	0.035	0.031	0.044	0.042
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.06)	(0.03)	(0.03)	(0.06)	(0.06)
	[0.845]	[0.747]	[0.485]	[0.463]	[0.537]	[0.572]	[0.130]	[0.163]	[0.259]	[0.268]	[0.456]	[0.483]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Non-labelled Mean	0.23	0.23	0.16	0.16	0.60	0.60	0.35	0.35	0.09	0.09	0.56	0.56
Female - Male [A]	0.09	0.09	-0.06	-0.06	-0.01	-0.01						
Female=Male [A]	0.20	0.22	0.20	0.22	0.89	0.88						

Panel C - Expenditure Beneficiary

	Wife		Husband		Collective Use		Wife		Husband		Collective Use	
Labelling [A]	0.032	0.036	0.020	0.023	-0.057	-0.061	0.006	0.000	-0.024	-0.031	0.014	0.023
	(0.04)	(0.04)	(0.02)	(0.02)	(0.04)	(0.04)	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)	(0.03)
	[0.410]	[0.383]	[0.275]	[0.194]	[0.148]	[0.141]	[0.774]	[0.989]	[0.352]	[0.216]	[0.616]	[0.378]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
N	396	387	396	387	396	387	398	390	398	390	398	390
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Non-labelled Mean	0.33	0.33	0.03	0.03	0.66	0.66	0.04	0.04	0.08	0.08	0.90	0.90
Female - Male [A]	0.03	0.04	0.04	0.05	-0.07	-0.08						
Female=Male [A]	0.55	0.44	0.16	0.08	0.15	0.10						

Notes: Dependent variables: Columns in panel A indicate the amount allocation decisions made by spouses. Columns in panel B indicate share of amount participant wishes to spend on the specific category of expenditure. Columns in panel C indicate share of amount participant wishes to spend on individual/individuals described. Columns (1) to (6) denote responses by female spouse on how she would like to allocate or spend amount she could win in lottery and columns (7) to (14) denote responses by male spouse on how he would like her to allocate or spend amount he could win in lottery. Percentage point changes are calculated relative to the mean of the group where resources are not labelled for household purposes. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

Figure 1.6: Heterogeneous Effect of Labelling Male-held Resources Based on Couple Characteristics



1.5.3 Decision Making among Couples under Spousal Monitoring

In the lab setting, we mimic practical iterations of how joint accounts for women might work, varying in spousal control, monitoring and communication levels. We test if household money held by spouses, characterised by an approval requirement, transparency and in-person negotiation, affects spousal decision-making. We do this by estimating the effect of varying levels of control, monitoring and communication for female financial decisions through a digital approval requirement from the husband, digital visibility of decisions to the husband, and an in-person negotiation with the husband. Under the "Approval" treatment arm, decisions made by women are communicated through an app-based system to the husband, who would have to "approve" her choices for the decision to be final. The decisions made by women in this treatment arm can be perceived as decisions she made

under a threat of "rejection" by her husband [13]. Under the "Visible" treatment arm, allocation and expenditure decisions made by women are made visible to the husband through an app-based system. Couples in the " Negotiation" treatment arm made decisions regarding money the wife earned/received through in-person communication in a separate room within the lab setting.

Spousal Monitoring on Female Decision Making

In the lab setting, we fail to find evidence that any form of monitoring and control mechanisms by the husband for female decision-making, in the form of approval requirement or transparency or in-person communication with the husband, reduces the share of the amount she allocates to accounts she controls (Table 1.11, Table 1.12, and Table 1.13). When women make decisions privately, they allocate 87% of the amount to accounts they have control over and 9% of the amount to accounts their husband controls. The null results for the varying monitoring levels of spousal decision-making within the lab setting could be attributed to the fact that the amount was always directed to the wife as a gift or payment for work.

In relation to how women make decisions on expenditure allocation, we do not find evidence that any level of transparency and communication rules affect the expenditure choices of women. Women in the "Private" treatment group allocate 59% towards savings and investment, 26% towards necessities such as food and bill payments and 14% towards non-necessities such as clothing, footwear and other accessories. When there is no spousal monitoring, women aspire to allocate a greater proportion to savings. This is consistent with the previous studies that find individual financial products for women improve savings behaviours (Field et al., 2019). We find no evidence on what direction spousal interaction through approval requirement, transparency and communication affects expenditure patterns.

[13] In our lab setting, only one out of 200 husbands in the "Approval" treatment arm used the option to reject wife's decisions. Given the low usage of the "reject" option by the husband for the wife's decisions, the treatment effects we observe, if any, can be explained as the effects of the wife having a threat of "rejection" of decisions by the husband

Similarly, we do not find any significant effects on for whom women decide to spend the expenditure under different rules of spousal decision making (Table 1.13). Even without approval requirements, transparency and communication with their husband, female spouses wish to spend more towards collective use and themselves in comparison to how much she decides to spend for their husband's expenses. Women in the private treatment group choose to spend 63% of the amount for collective use by all household members, 34% of the amount for themselves, and 4% for husbands. This is in line with empirical studies that find that targeting transfers to females increases spending towards women and all household members (Duflo, 2003; Akresh et al., 2016; Armand et al., 2020). Our results show no evidence of the husband's monitoring and control mechanisms affecting how female partners allocate expenditure among household members.

Spousal Monitoring of Female Decisions under Workfare

We now assess the effect of spousal approval requirement, transparency and communication in the case where the wife earned the amount. We estimate and report $\beta_2 + \beta_3$ from equation 1.3. In Table 1.14, we find that if she earned the amount, she is 10 percentage points less likely to transfer it to accounts which are visible to her husband (that is, her husband's account or choose any type of consumption voucher) after an in-person negotiation versus when she makes the decision privately ($p < 0.05$, q value not significant). Although not statistically significant, this is associated with an increase in share to the wife's personal bank account by 6.8 percentage points. As in Section 5.1.2, this could be assigned to the interacted effect of in-person bargaining when women personally earn money.

We find some marginal effects from the approval requirement of her husband and the visibility of her decisions to her husband on her expenditure decisions in Table 1.15 and Table1.16 ($p < 0.1$, q value not significant). We find that an approval requirement from the husband leads women to spend 11.2 percentage points greater share of their earned

Table 1.11: Effect of Joint Decision Making on Female Allocation Decisions

	Amount share to wife		Amount share to husband		Visibility	
	(1)	(2)	(3)	(4)	(5)	(6)
Approval [A]	-0.001	-0.006	0.020	0.026	0.005	0.009
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)
	[0.971]	[0.860]	[0.498]	[0.382]	[0.895]	[0.820]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Visible [B]	-0.031	-0.035	0.044	0.050	0.023	0.026
	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)
	[0.444]	[0.380]	[0.167]	[0.115]	[0.547]	[0.485]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Negotiation [C]	0.001	0.015	0.006	-0.004	-0.024	-0.039
	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)
	[0.984]	[0.686]	[0.846]	[0.895]	[0.508]	[0.277]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
N	808	790	808	790	808	790
Household Controls	No	Yes	No	Yes	No	Yes
Private Mean	0.87	0.87	0.09	0.09	0.14	0.14
[A] - [B]	-0.03	-0.03	0.02	0.02	0.02	0.02
[A]=[B]	0.41	0.42	0.46	0.46	0.61	0.61
[C] - [B]	0.03	0.05	-0.04	-0.05	-0.05	-0.07
[C]=[B]	0.41	0.16	0.22	0.07	0.18	0.05
[C] - [A]	0.00	0.02	-0.01	-0.03	-0.03	-0.05
[C]=[A]	0.95	0.51	0.61	0.30	0.34	0.12

Notes: Dependent variables: The columns *Amount share to wife* and *Amount share to husband* is the share of amount allocated by participant to wife and husband, respectively. The column *visibility* is a binary variable coded as 1 if participant chooses to deposit in husband's bank account or any type of voucher. Row [A] is the effect of having an-app based approval requirement from husband, row [B] is the effect of digital transparency in wife's decisions, row [C] is the effect of in-person negotiation with husband on decisions. All the above described rows are compared to the control group where there wife makes decisions privately. Percentage point changes are calculated relative to the mean of the respective control group. Rows [A]-[B], [C]-[A] and [C]-[B] reports difference in coefficients for the corresponding rows. Rows [A]=[B], [C]=[A] and [C]=[B] reports p value from testing the hypothesis that coefficients for the corresponding rows are equal. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

Table 1.12: Effect of Joint Decision Making on Female Expenditure Allocation Decisions

	Necessities		Non-necessities		Savings and Investments	
Approval [A]	-0.003	-0.001	-0.006	-0.003	-0.008	-0.008
	(0.04)	(0.03)	(0.04)	(0.04)	(0.05)	(0.05)
	[0.945]	[0.971]	[0.883]	[0.936]	[0.856]	[0.864]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Visible [B]	0.034	0.047	0.040	0.035	-0.069	-0.076
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)
	[0.394]	[0.219]	[0.311]	[0.361]	[0.199]	[0.157]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Negotiation [C]	-0.045	-0.035	0.000	-0.003	0.055	0.049
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)
	[0.290]	[0.377]	[0.999]	[0.938]	[0.286]	[0.347]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
N	796	778	796	778	796	778
Household Controls	No	Yes	No	Yes	No	Yes
Private Mean	0.26	0.26	0.14	0.14	0.59	0.59
[A] - [B]	0.04	0.05	0.05	0.04	-0.06	-0.07
[A]=[B]	0.36	0.25	0.15	0.23	0.15	0.11
[C] - [B]	-0.08	-0.08	-0.04	-0.04	0.12	0.13
[C]=[B]	0.07	0.06	0.25	0.27	0.01	0.01
[C] - [A]	-0.04	-0.03	0.01	0.00	0.06	0.06
[C]=[A]	0.33	0.44	0.87	1.00	0.18	0.24

Notes: Dependent variables: share of amount participant chooses to spend on the category of expenditure. Row [A] is the effect of having an-app based approval requirement from husband, row [B] is the effect of digital transparency in wife's decisions, row [C] is the effect of in-person negotiation with husband on decisions. All the above described rows are compared to the control group where there wife makes decisions preivately. Percentage point changes are calculated relative to the mean of the respective control group. Rows [A]-[B], [C]-[B] and [C]-[A] reports difference in coefficients for the corresponding rows. Rows [A]=[B], [C]=[B] and [C]=[A] reports p value from testing the hypothesis that coefficients for the corresponding rows are equal. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

Table 1.13: Effect of Joint Decision Making on Beneficiary of Expenditure

	Wife		Husband		Collective Use	
Approval [A]	-0.036	-0.027	-0.020	-0.021	0.044	0.038
	(0.05)	(0.05)	(0.02)	(0.02)	(0.05)	(0.05)
	[0.433]	[0.562]	[0.247]	[0.216]	[0.379]	[0.447]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Visible [B]	0.024	0.011	-0.005	-0.003	-0.024	-0.013
	(0.04)	(0.04)	(0.02)	(0.02)	(0.05)	(0.05)
	[0.579]	[0.784]	[0.790]	[0.873]	[0.617]	[0.774]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Negotiation [C]	0.003	-0.010	0.002	0.002	-0.009	0.002
	(0.04)	(0.04)	(0.02)	(0.02)	(0.05)	(0.04)
	[0.952]	[0.822]	[0.923]	[0.897]	[0.835]	[0.967]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
N	796	778	796	778	796	778
Household Controls	No	Yes	No	Yes	No	Yes
Private Mean	0.34	0.34	0.04	0.04	0.63	0.63
[A] - [B]	0.06	0.04	0.02	0.02	-0.07	-0.05
[A]=[B]	0.22	0.42	0.30	0.23	0.15	0.27
[C] - [B]	-0.02	-0.02	0.01	0.01	0.01	0.01
[C]=[B]	0.64	0.66	0.68	0.74	0.74	0.75
[C] - [A]	0.04	0.02	0.02	0.02	-0.05	-0.04
[C]=[A]	0.45	0.74	0.13	0.10	0.29	0.48

Notes: Dependent variables: share of amount participant chooses to spend the expenditure on individual/individuals described. Row [A] is the effect of having an-app based approval requirement from husband, row [B] is the effect of digital transaparency in wife's decisions, row [C] is the effect of in-person negotiation with husband on decisions. All the above described rows are compared to the control group where there wife makes decisions preivately. Percentage point changes are calculated relative to the mean of the respective control group. Rows [A]-[B], [C]-[B] and [C]-[A] reports difference in coefficients for the corresponding rows. Rows [A]=[B], [C]=[B] and [C]=[A] reports p value from testing the hypothesis that coefficients forfor the corresponding rows are equal. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

money towards savings and investments. It is also associated with her spending 11.7 percentage points higher share of her earned money towards household public goods and 5.1 percentage points lower share for her husband. Visibility of decisions to her husband allows female partners to spend 5 percentage points less share of their earned money towards their husband's personal expenditure. In-person negotiation under workfare also has similar effects. Under an in-person negotiation, couples decide to spend 5.2 percentage points more share of the expenditure on the wife if she earned the amount (not statistically significant). Again, this could be attributed to the sense of ownership earning money provides. Even with digital mechanisms of surveillance of her decisions, she is able to share less with her husband when she has earned the amount.

Emotional Well-being and Mental Bandwidth under Spousal Monitoring

Based on a growing strand of literature that the absence of privacy in household decision-making in the form of transparency of decisions and communication can improve women's mental well-being, we measure women's emotional well-being and mental bandwidth under varying levels of spousal transparency and communication soon after the lab-session (Ashraf et al., 2014). We created the emotional well-being index as a standardised variable of four items measuring women's emotional well-being during allocation games; feeling of nervousness, inability to concentrate, tiredness, and difficulty coping with all the things they had to do. We code the emotional well-being index so that a higher score means better emotional well-being. We describe in detail the creation of variables in Appendix E. In Table 1.17, we find that none of the rules relating to spousal decision-making affects women's emotional well-being.

We complement our analysis with scores from games that measure the mental bandwidth of the participant. The games we use to measure the mental bandwidth of women after the allocation game help us correctly identify the effects of male monitoring on women's mental well-being and cognitive performance, as there is little to no scope for misreporting. We create the mental bandwidth index, a standardised index of scores from four games,

Table 1.14: Effect of Monitoring on Female Allocation Decisions when She Earn the Amount

	Amount share to wife		Amount share to husband		Visibility	
	(1)	(2)	(3)	(4)	(5)	(6)
Task&Approval [A]	0.010	0.008	0.017	0.021	-0.010	-0.011
	(0.05)	(0.05)	(0.04)	(0.04)	(0.05)	(0.05)
	[0.839]	[0.874]	[0.666]	[0.597]	[0.852]	[0.826]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Task&Visible [B]	0.010	0.006	0.010	0.011	-0.030	-0.029
	(0.05)	(0.05)	(0.04)	(0.04)	(0.05)	(0.05)
	[0.855]	[0.918]	[0.821]	[0.795]	[0.577]	[0.582]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Task&Negotiation [C]	0.068	0.073	-0.048	-0.055	-0.100	-0.108
	(0.05)	(0.05)	(0.04)	(0.03)	(0.05)	(0.05)
	[0.156]	[0.126]	[0.190]	[0.109]	[0.040]**	[0.024]**
	{1.000}	{0.943}	{1.000}	{0.943}	{1.000}	{0.943}
N	808	790	808	790	808	790
Household Controls	No	Yes	No	Yes	No	Yes
Private&TaskMean	0.86	0.86	0.10	0.10	0.15	0.15
[A] - [B]	0.00	-0.00	-0.01	-0.01	-0.02	-0.02
[A]=[B]	1.00	0.97	0.86	0.82	0.67	0.70
[C] - [B]	0.06	0.07	-0.06	-0.07	-0.07	-0.08
[C]=[B]	0.19	0.10	0.13	0.07	0.08	0.04
[C] - [A]	0.06	0.07	-0.06	-0.08	-0.09	-0.10
[C]=[A]	0.15	0.11	0.08	0.04	0.03	0.02

Notes: Row [A] is the effect of having an-app based approval requirement from husband when wife earned the amount, row [B] is the effect of transaparency in wife's decisions when wife earned the amount, row [C] is the effect of in-person negotiation with husband on decisions when wife earned the amount. All the above described rows are compared to the control group where there wife makes decisions privately and she earned the amount. Rows [A]-[B], [C]-[B] and [C]-[A] reports difference in coefficients for the corresponding rows. Rows [A]=[B], [C]=[B] and [C]=[A] reports p value from testing the hypothesis that coefficients forfor the corresponding rows are equal. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

Table 1.15: Effect of Monitoring on Expenditure Allocation Decisions when She Earn the Amount

	Necessities		Non-necessities		Savings and Investments	
	(1)	(2)	(3)	(4)	(5)	(6)
Task&Approval [A]	-0.063	-0.059	-0.062	-0.058	0.112	0.111
	(0.05)	(0.05)	(0.05)	(0.06)	(0.07)	(0.06)
	[0.227]	[0.237]	[0.254]	[0.296]	[0.095]*	[0.077]*
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{0.943}
Task&Visible [B]	-0.025	-0.010	0.007	-0.001	0.028	0.021
	(0.06)	(0.05)	(0.05)	(0.05)	(0.08)	(0.07)
	[0.656]	[0.854]	[0.889]	[0.987]	[0.713]	[0.780]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Task&Negotiation [C]	-0.015	0.003	-0.021	-0.030	0.046	0.038
	(0.06)	(0.06)	(0.05)	(0.06)	(0.08)	(0.08)
	[0.818]	[0.962]	[0.689]	[0.602]	[0.572]	[0.619]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
N	796	778	796	778	796	778
Household Controls	No	Yes	No	Yes	No	Yes
Private&TaskMean	0.29	0.29	0.16	0.16	0.54	0.54
[A] - [B]	0.04	0.05	0.07	0.06	-0.08	-0.09
[A]=[B]	0.49	0.42	0.04	0.11	0.11	0.11
[C] - [B]	0.01	0.01	-0.03	-0.03	0.02	0.02
[C]=[B]	0.86	0.83	0.54	0.55	0.80	0.80
[C] - [A]	0.05	0.06	0.04	0.03	-0.07	-0.07
[C]=[A]	0.44	0.35	0.42	0.58	0.31	0.28

Notes: Row [A] is the effect of having an-app based approval requirement from husband when she earned the amount, row [B] is the effect of transparency in wife's decisions when she earned the amount, row [C] is the effect of in-person negotiation with husband on decisions when she earned the amount. All the above described rows are compared to the group where there wife makes decisions privately and she earned the amount. Rows [A]-[B], [C]-[B] and [C]-[A] reports difference in coefficients for the corresponding rows. Rows [A]=[B], [C]=[B] and [C]=[A] reports p value from testing the hypothesis that coefficients for the corresponding rows are equal. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

Table 1.16: Effect of Monitoring on Expenditure Beneficiary when She Earn the Amount

	Wife		Husband		Collective Use	
	(1)	(2)	(3)	(4)	(5)	(6)
Task&Approval [A]	-0.089	-0.078	-0.051	-0.050	0.117	0.108
	(0.06)	(0.06)	(0.03)	(0.03)	(0.07)	(0.07)
	[0.139]	[0.192]	[0.074]*	[0.077]*	[0.096]*	[0.119]
	{1.000}	{0.943}	{1.000}	{0.943}	{1.000}	{0.943}
Task&Visible [B]	0.047	0.029	-0.050	-0.048	-0.017	-0.001
	(0.06)	(0.06)	(0.03)	(0.03)	(0.07)	(0.07)
	[0.454]	[0.628]	[0.063]*	[0.089]*	[0.812]	[0.985]
	{1.000}	{1.000}	{1.000}	{0.943}	{1.000}	{1.000}
Task&Negotiation [C]	0.052	0.036	-0.022	-0.022	-0.040	-0.024
	(0.06)	(0.06)	(0.03)	(0.03)	(0.06)	(0.06)
	[0.353]	[0.523]	[0.458]	[0.483]	[0.499]	[0.679]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
N	796	778	796	778	796	778
Household Controls	No	Yes	No	Yes	No	Yes
Private&TaskMean	0.36	0.36	0.06	0.06	0.60	0.60
[A] - [B]	0.14	0.11	0.00	0.00	-0.13	-0.11
[A]=[B]	0.03	0.08	0.99	0.87	0.04	0.07
[C] - [B]	0.01	0.01	0.03	0.03	-0.02	-0.02
[C]=[B]	0.93	0.90	0.19	0.22	0.68	0.66
[C] - [A]	0.14	0.11	0.03	0.03	-0.16	-0.13
[C]=[A]	0.01	0.05	0.16	0.14	0.00	0.01

Notes: Row [A] is the effect of having an-app based approval requirement from husband when she earned the amount, row [B] is the effect of transparency in wife's decisions when she earned the amount, row [C] is the effect of in-person negotiation with husband on decisions when she earned the amount. All the above described rows are compared to the group where there wife makes decisions privately and she earned the amount. Rows [A]-[B], [C]-[B] and [C]-[A] reports difference in coefficients for the corresponding rows. Rows [A]=[B], [C]=[B] and [C]=[A] reports p value from testing the hypothesis that coefficients for the corresponding rows are equal. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

to measure the participant's responsiveness, accuracy, memory, and stress level. After controlling for household characteristics, we find marginal effects on mental bandwidth for women in the "Approval" treatment group. Accounting for household characteristics, we find that women who made decisions under the threat of "rejection" of their decisions from their husbands have a 0.11 standard deviation higher mental bandwidth index than women who made decisions privately ($p < 0.1$, q value not significant). Given that mental bandwidth was measured soon after the experiment, "Approval" of her decisions from her husband might have reduced her stress about the differences in preference he might have, resulting in a better mental bandwidth score. We also analyse the effect of assignment into different treatment groups on each item of the emotional well-being index and emotional bandwidth index in Table D1 and D2 and find no statistically significant effects.

Table 1.17: Effect of Monitoring on Women's Emotional Well-being and Mental Bandwidth

	Emotional Well-being Index		Mental Bandwidth Index	
	(1)	(2)	(3)	(4)
Approval [A]	0.009	0.011	0.071	0.110
	(0.02)	(0.02)	(0.06)	(0.06)
	[0.676]	[0.587]	[0.251]	[0.078]*
	{1.000}	{1.000}	{1.000}	{0.881}
Visible [B]	0.013	0.013	0.017	0.018
	(0.02)	(0.02)	(0.07)	(0.07)
	[0.545]	[0.536]	[0.799]	[0.786]
	{1.000}	{1.000}	{1.000}	{1.000}
Negotiation [C]	-0.001	-0.004	0.016	0.020
	(0.02)	(0.02)	(0.07)	(0.07)
	[0.953]	[0.846]	[0.821]	[0.762]
	{1.000}	{1.000}	{1.000}	{1.000}
N	808	790	808	790
Household Controls	No	Yes	No	Yes
Private Mean	3.92	3.92	-0.09	-0.09

Notes: Percentage point changes are calculated relative to the mean of the treatment group where decisions made were purely private. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

Spousal Monitoring under Individual and Couple Characteristics

We now focus on the heterogeneous effect of transparency and communication among spouses on the outcomes: women's allocation to accounts under their control and women's

mental well-being.[14] As mentioned in the previous section of results, we find no effects of transparency of communication among spouses on women's transfer to different types of accounts and vouchers. In Figure 1.10, we find that if the wife has a high willingness to pay to have control over the money, then the share she allocates to her husband's bank account or a male voucher is 11 percentage points more when her decisions are to be "approved" by husband as compared to when her decisions are completely private ($p < 0.05$, q value not significant). A high willingness to pay for control over money indicates low bargaining power in the household. Hence, in a household where the wife has low control over money, an approval requirement for her decisions by her husband leads her to allocate more to the accounts he controls. We observe similar results for women with a high willingness to pay when there is transparency in their decisions with their husbands. In Figure 1.11, we find that when the wife has less control over the money in the household, the threat of rejection of her decisions through an in-app mechanism increases the amount she allocates to accounts her husband controls by 12 percentage points ($p < 0.05$, q value not significant). Both these findings indicate that in households where women have low autonomy over resources, visibility and a digital approval system for women's financial decisions can lead to her giving up more control over the money. However, this does not hold when couples make decisions through in-person bargaining.

Women who are risk averse also show similar patterns of allocation when their decisions are visible to their husbands. That is, risk-averse women, allocate 9.2 percentage points lower share of the amount to accounts under her control ($p < 0.05$, q value not significant) and 7.7 percentage points higher share of the amount to accounts under her husband's control ($p < 0.1$, q value not significant) when her decisions are visible to the husband.

We also find heterogeneous effects of an in-person negotiation for couples who have a high quality of relationship (figure 1.12). A high quality of relationship demonstrates a good level of communication among the couple. We find that if wife reports having a high quality of relation with her husband, after an in-person negotiation, the wife allocate 10.33

[14] We checked for the heterogeneous effect of spousal decision-making on outcomes of expenditure patterns and found no effects.

percentage points lower share of money to accounts visible to her husband ($p < 0.05$, q value not significant).

Our results on the heterogeneous effects of transparency and varying levels of communication on women's emotional well-being and emotional bandwidth index suggest that a digital mechanism to share and communicate financial decisions provides better mental well-being for women who exhibit poor information flows with their husbands. We find that women who report that they had ever hidden income or expenditure from their husbands score better by 30 standard deviations ($p < 0.05$, q value not significant) on the emotional bandwidth index score under the transparency of their decisions to their husbands. We find similar effects for women who made decisions under the threat of "rejection" of decisions from their husbands. Women who had hidden income or expenditure from their husbands obtained 23 standard deviations higher scores on the emotional bandwidth index under an in-app approval system as compared to women in the "Private" treatment group ($p < 0.05$, q value not significant).

Figure 1.7: Heterogeneous treatment effects of approval requirement for wife's decisions

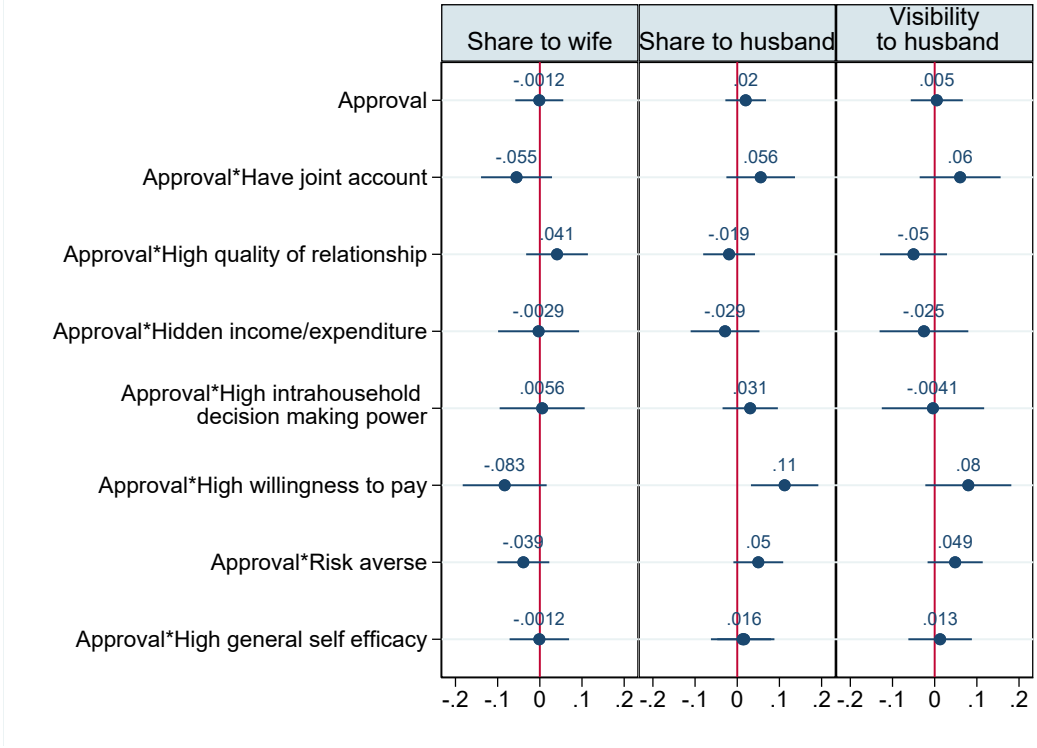


Figure 1.8: Heterogeneous treatment effects of transparency of wife's decisions

Figure 1.9: Heterogeneous treatment effects of in-person negotiation of spouses for decisions

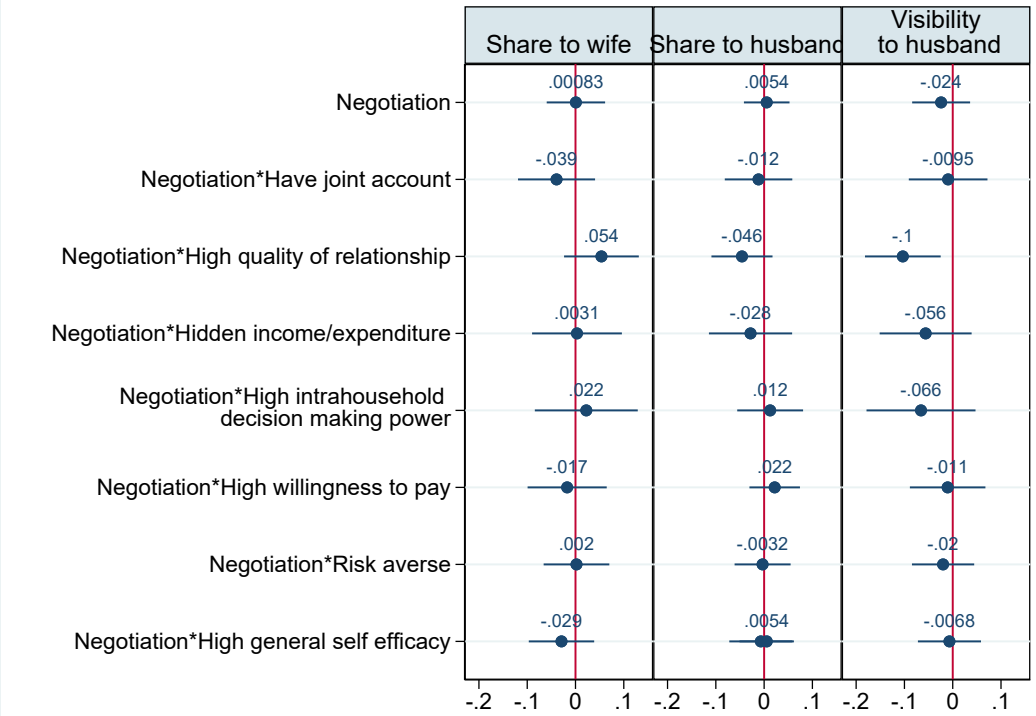


Figure 1.10: Heterogeneous treatment effects of approval requirement for wife's decisions

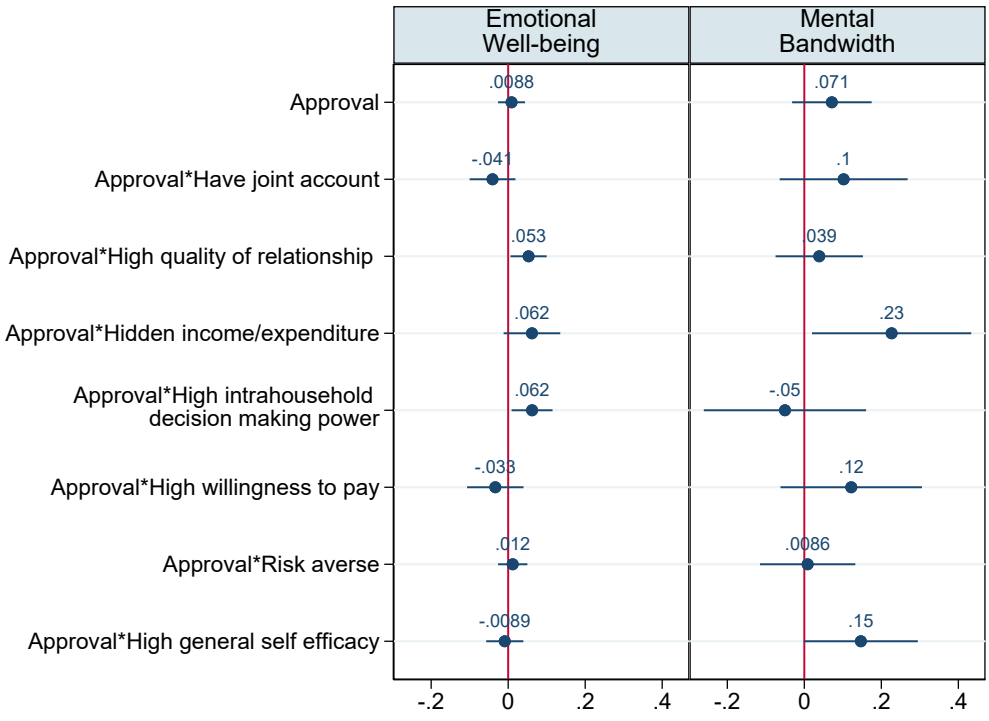


Figure 1.11: Heterogeneous treatment effects of transparency of wife's decisions

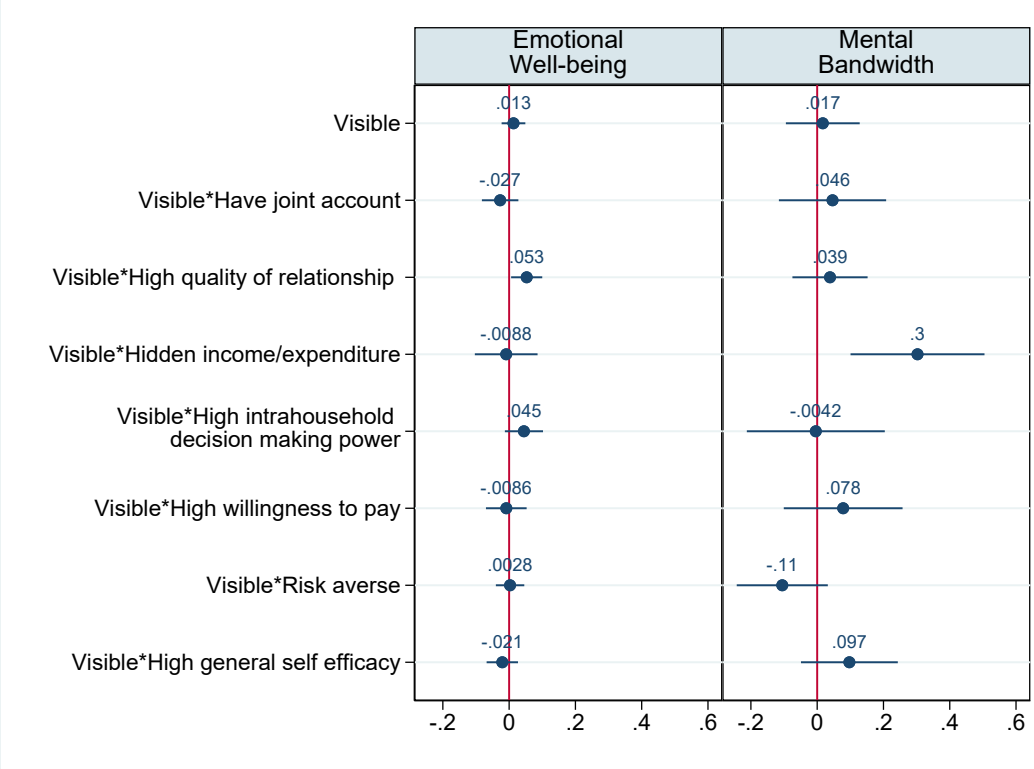
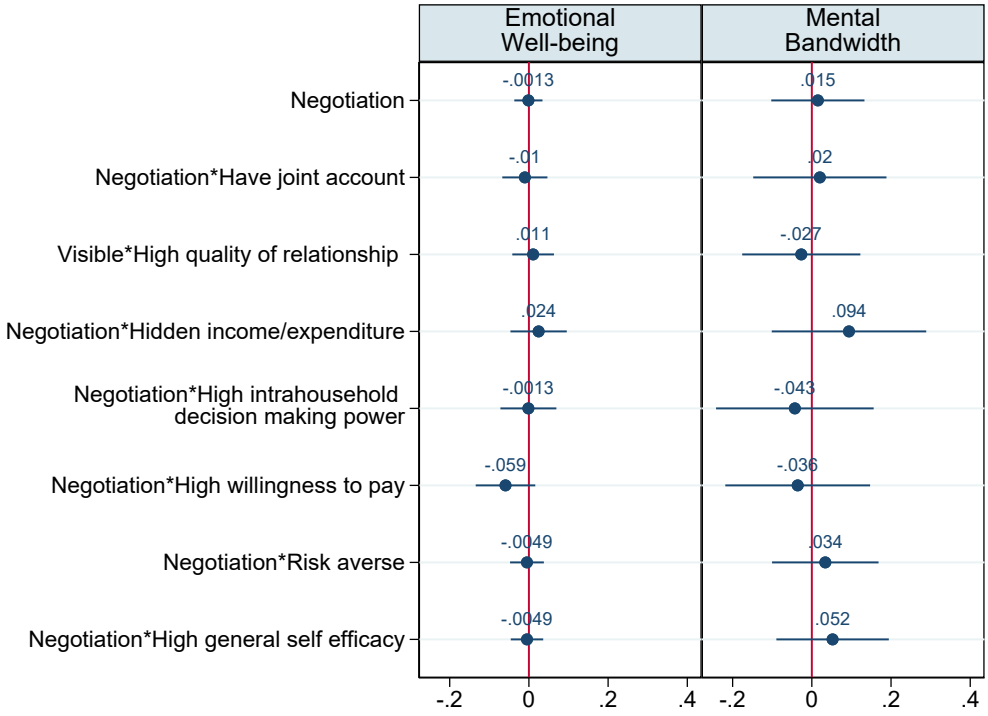


Figure 1.12: Heterogeneous treatment effects of in-person negotiation of spouses for decisions



Transparency of Female and Male Decisions

Using data from the allocation game where couples decide on how they allocate and spend money they could win through a lottery, we compare the effect of transparency on female and male decisions. During the second allocation game described in Section 3.3, the possibility of winning the lottery by each partner provides comparability for how wives and husbands make decisions under transparency. We find the opposite effects of visibility for women and men. Under visibility of their decisions, while women spend 11.4 percentage points lower share of money towards household public goods ($p < 0.01, q < 0.05$), their husband spends 4.5 percentage points greater share of money towards household public goods (Panel C, column 5 and 11 in Table 1.18). Also, when decisions are visible to their partner, the wife spends 8.4 percentage points greater share of money towards her personal expenses, and the husband spends 4.1 percentage points lower share for his personal ex-

penses. This result is corroborated by the result that the husband spends 6.6 percentage points more on non-food grocery items for everyone in the household and 10.1 percentage points less on food and other essential bills. This indicates that while spousal transparency encourages women to spend more for themselves, it deters men from spending on their personal expenses. Visibility of her decisions may have provided the wife more legitimacy in spending unearned money for her own expenses. But for men, since he controls most of the household resources and spending, visibility of their decisions to their wives may have led them to spend less on themselves.

Table 1.18: Effect of Transparency on Female and Male Decisions

	Female Spouse						Male Spouse					
	Amount share to wife		Amount shared to husband		Visibility		Amount share to wife		Amount shared to husband		Visibility	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Visibility [A]	0.019	0.003	0.014	0.017	-0.022	-0.001	0.021	0.032	-0.031	-0.043	0.020	0.033
	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
	[0.655]	[0.940]	[0.673]	[0.599]	[0.624]	[0.989]	[0.614]	[0.471]	[0.459]	[0.339]	[0.633]	[0.457]
	{0.260}	{0.535}	{0.428}	{0.577}	{0.260}	{0.535}	{0.509}	{0.508}	{0.441}	{0.508}	{0.509}	{0.508}
N	402	392	402	392	402	392	402	393	402	393	402	393
Non-visible Mean	0.82	0.82	0.11	0.11	0.18	0.18	0.52	0.52	0.48	0.48	0.48	0.52
Female - Male [A]	-0.00	-0.03	0.04	0.06	-0.04	-0.03						
Female=Male [A]	0.97	0.63	0.40	0.28	0.47	0.57						

Panel B - Expenditure allocation

	Necessities		Non-necessities		Savings and Investments		Necessities		Non-necessities		Savings and Investments	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Visibility [A]	-0.001	0.019	0.064	0.056	-0.051	-0.062	-0.101	-0.087	0.066	0.060	0.030	0.020
	(0.04)	(0.04)	(0.04)	(0.04)	(0.06)	(0.07)	(0.05)	(0.05)	(0.03)	(0.03)	(0.05)	(0.05)
	[0.986]	[0.655]	[0.123]	[0.177]	[0.425]	[0.356]	[0.037]**	[0.058]*	[0.027]**	[0.041]**	[0.574]	[0.705]
	{0.467}	{0.812}	{0.260}	{0.535}	{0.467}	{0.812}	{0.225}	{0.332}	{0.509}	{0.332}	{0.441}	{0.644}
N	397	387	397	387	397	387	400	391	400	391	400	391
Non-visible Mean	0.23	0.23	0.16	0.16	0.60	0.60	0.35	0.35	0.09	0.09	0.56	0.56
Female - Male [A]	0.10	0.11	-0.00	-0.00	-0.08	-0.08						
Female=Male [A]	0.10	0.08	0.96	0.93	0.31	0.30						

Panel C - Expenditure Beneficiary

	Wife		Husband		Collective Use		Wife		Husband		Collective Use	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Visibility [A]	0.084	0.070	0.015	0.020	-0.114	-0.103	-0.009	-0.009	-0.041	-0.039	0.045	0.040
	(0.04)	(0.04)	(0.02)	(0.02)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)
	[0.033]**	[0.062]*	[0.487]	[0.305]	[0.004]***	[0.006]***	[0.664]	[0.655]	[0.064]*	[0.083]*	[0.072]*	[0.117]
	{0.131}	{0.160}	{0.397}	{0.535}	{0.027}**	{0.023}**	{0.509}	{0.644}	{0.509}	{0.332}	{0.441}	{0.332}
N	397	387	397	387	397	387	400	391	400	391	400	391
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Non-visible Mean	0.33	0.33	0.03	0.03	0.66	0.66	0.04	0.04	0.08	0.08	0.90	0.90
Female - Male [A]	0.09	0.08	0.06	0.06	-0.16	-0.14						
Female=Male [A]	0.03	0.06	0.11	0.08	0.00	0.00						

Notes: Dependent variables: Columns in panel A indicate the amount allocation decisions made by spouses. Columns in panel B indicate share of amount participant wishes to spend on the specific category of expenditure. Columns in panel C indicate share of amount participant wishes to spend on individual/individuals described. Columns (1) to (6) denote responses by female spouse on how she would like to allocate or spend amount she could win in lottery and columns (7) to (14) denote responses by male spouse on how he would like her to allocate or spend amount he could win in lottery. Percentage point changes are calculated relative to the mean of the group where participant's choices are non-visible to their partner. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

1.5.4 Plausible deniability

Data from women's decisions during the two allocation games makes it possible to analyse the role of plausible deniability in women's financial decisions. We capture the impact of plausible deniability by comparing how women's financial decisions change between the first and second allocation games. In the first allocation game, women had to make allocation and expenditure decisions about the money they knew with full certainty that they would receive. During the second allocation game, women had to make allocation and expenditure decisions about resources they could win through a lottery with a 25% chance under the same rules of privacy, labelling, information sharing and communication. The second allocation game is different to the first for female participants because if she wins the lottery, she can now plausibly deny to her husband that she received the lottery, which was not the case in the first game.

For this analysis, we focus only on women in the "Gift" group since it is only in the "Gift" group that women receive the amount as a free transfer during both allocation games. For the "Task" group women, the first and the second allocation game are different in two ways; one, she earned the amount through the task in the first game and did not earn in the second game, and two, there was no opportunity to plausibly deny that she received the amount in the first game whereas, in the second game, she had the opportunity to withhold the information about receiving the amount. Hence, including the women in the "Task" group for the analysis could give us spurious results when trying to identify the role of plausible deniability in women's decisions. Also, we include only women in the treatment groups whose decisions are kept private from their husbands. By focusing on women who can keep their decisions private, we are able to understand the role of plausible deniability in the share they allocate to whom and what they spend it on. For women in the treatment arms that vary decision visibility, we cannot separate the impact of plausible deniability from visibility. For the results below, we focus on only women in the "Gift" group and the "Private" and "Private Labelled" treatment groups.

In Table 1.19, we find that having the opportunity to plausibly deny that she received the amount does not affect women's allocation decisions (Panel A) and her decision on who the expenditure beneficiary would be while spending the amount (Panel C). However, we find that under plausible deniability, women spend 5.9 percentage points smaller share of the amount on necessities (Panel B, Column 1, $p < 0.05$, q value not significant) and 5.5 percentage points higher share of amount on savings and investments (Panel B, Column 5, $p < 0.05$, q value not significant). Existing empirical evidence on women's behaviour when hiding resources from their husbands or other family members suggests that women often hide resources from the rest of the family to protect against immediate consumption and for savings (Anderson and Baland, 2002; Dupas and Robinson, 2013). We observe a similar pattern in our lab setting as well. When there is an opportunity to hide the information from her husband about receiving the amount, women wish to spend more on savings and less on immediate consumption such as necessities.

1.6 Discussion and Conclusion

This study provides insights on various aspects of design and delivery of social protection programmes within a household setting. Along with improving women's control over resources, workfare substantially increases women's say in the context of the daily bargaining among couples. This adds to the evidence on the importance of women's labour force participation, especially for women with low control over money. While we find that workfare improves women's autonomy, further work is needed to understand the effect of women's workfare on other streams of household outcomes, such as overall household income, savings, and labour time use. Such work will enhance our understanding on the benefits of women's workfare over unconditional transfer as a policy approach.

Our failure to find evidence of an increase in sharing or spending on household public goods when resources labelled for household purposes are individually held by couples reveals a weakness in the dominant policy strategy of transferring resources meant for

Table 1.19: Effect of Plausible Deniability on Women's Financial Decisions

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A - Amount allocation						
	Amount share to wife		Amount share to husband		Visibility	
Plausible Deniability [A]	-0.001	-0.001	0.019	0.019	0.010	0.010
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
	[0.940]	[0.940]	[0.295]	[0.301]	[0.600]	[0.603]
	{1.000}	{1.000}	{0.993}	{1.000}	{1.000}	{1.000}
N	400	390	400	390	400	390
Allocation Game 1 Mean	0.86	0.86	0.10	0.10	0.15	0.15
Panel B - Expenditure allocation						
	Necessities		Non-necessities		Savings and Investments	
Plausible Deniability [A]	-0.059	-0.056	0.015	0.015	0.064	0.061
	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)
	[0.028]**	[0.033]**	[0.539]	[0.550]	[0.027]**	[0.043]**
	{0.143}	{0.241}	{1.000}	{1.000}	{0.143}	{0.241}
N	397	387	397	387	397	387
Allocation Game 1 Mean	0.25	0.25	0.13	0.13	0.61	0.61
Panel C - Expenditure Beneficiary						
	Wife		Husband		Collective Use	
Plausible Deniability [A]	0.033	0.029	-0.012	-0.013	-0.011	-0.006
	(0.02)	(0.02)	(0.01)	(0.01)	(0.03)	(0.03)
	[0.166]	[0.225]	[0.385]	[0.395]	[0.680]	[0.806]
	{0.633}	{1.000}	{0.993}	{1.000}	{1.000}	{1.000}
N	397	387	397	387	397	387
Household Controls	No	Yes	No	Yes	No	Yes
Allocation Game 1 Mean	0.30	0.30	0.05	0.05	0.65	0.65

Notes: Dependent variables: Columns in panel A indicate the amount allocation decisions made by women in the sample. Columns in panel B indicate share of amount female participant wishes to spend on the specific category of expenditure. Columns in panel C indicate share of amount female participant wishes to spend on individual/individuals described. Rows [A] indicate effect of plausible deniability of the receiving the amount on women's financial decisions. Percentage point changes are calculated relative to the mean the first allocation game where there women did not have opportunity to deny that she received the amount. Rows [A] involves the sample of women who did not perform the task before the first allocation game. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

household purposes to an individually held account. Individualised financial products for household purposes and joint decision-making in families need to be reexamined in detail. Furthermore, the observed heterogeneity in the effect of spousal monitoring mechanisms based on several couples' characteristics calls for a broader policy approach for female financial inclusion based on underlying intrahousehold structures when targeting families. While previous studies on household bargaining highlight that one size does not fit all, our findings emphasize on tailored mechanisms based on underlying preferences that can help women overcome barriers related to financial inclusion. The results of this study call for further research through field experiments to test the specific roles of varying levels of monitoring and joint decision-making among couples.

Appendix A: Theoretical Framework

In this section, we describe women's utility function under different strategies she could choose and the conditions under which she chooses one strategy over the other.

Under the contract described in Section 2.1, expected utility of wife is given as follows:

$$\mathbb{E}[U_F] = \begin{cases} S(1-\theta)Y, & T_M \text{ if } F \text{ transfers income to } M \\ S(1-\theta)\alpha Y - P, & V_M \text{ if } F \text{ commit to consumption for } M \\ (1-p)Y + p[S(1-\theta)Y - P - C], & T_F \text{ if } F \text{ transfers income for herself} \\ (1-\hat{p})Y + \hat{p}\{[1-\alpha(1-S(1-\theta))]Y - P - C\}, & V_F \text{ if } F \text{ commit to consumption for herself} \\ (1-\acute{p})S(1-\gamma)Y + \acute{p}\{S(1-\theta)Y - P - C\}, & V_S \text{ if } F \text{ commit to consumption for household} \\ (1-\tilde{p})\alpha Y + \tilde{p}\{S(1-\theta)\alpha Y - P - C\}, & O_S \text{ if F transfers to third person} \end{cases} \tag{1.4}$$

Agent F's preference for strategies will depend on the parameters described above.

1. F prefers strategy T_M to strategy V_M if and only if

$$P \geq (\alpha - 1)(1-\theta)SY \tag{1.5}$$

2. F prefers strategy T_M to strategy T_F if and only if

$$p \geq \frac{[(1 - S(1-\theta)]Y}{[(1 - S(1-\theta)]Y + P + C} \tag{1.6}$$

3. F prefers strategy T_M to strategy V_F if and only if

$$\hat{p} \geq \frac{[(1 - S(1-\theta)]Y}{[(1 - S(1-\theta)]\alpha Y + P + C} \tag{1.7}$$

4. F prefers strategy T_M to strategy V_S if and only if

$$\acute{p} \geq \frac{(\theta - \gamma)SY}{(\theta - \gamma)SY + P + C} \tag{1.8}$$

5. F prefers strategy T_M to strategy O_S if and only if

$$\tilde{p} \geq \frac{[(\alpha - S(1-\theta)]Y}{[(\alpha - S(1-\theta)]Y + P + C} \tag{1.9}$$

6. F prefers strategy V_M to strategy T_F if and only if

$$p \geq \frac{[(1 - (1-\theta)]Y - P}{[(1 - S(1-\theta)]Y + P + C} \tag{1.10}$$

7. F prefers strategy V_M to strategy V_F if and only if

$$\hat{p} \leq \frac{[(1 - (1-\theta)]Y - P}{[(1 - S(1-\theta)]\alpha Y + P + C} \tag{1.11}$$

8. F prefers strategy V_M to strategy O_S if and only if

$$\tilde{p} \leq \frac{[(1 - (1-\theta)]Y - P}{[(1 - (1-\theta)]Y + P + C} \tag{1.12}$$

9. F prefers strategy T_F to strategy V_F if and only if

$$p \leq \frac{\hat{p}\{[(1 - S(1-\theta)]\alpha Y + P + C\}}{[(1 - S(1-\theta)]Y + P + C} \tag{1.13}$$

10. F prefers strategy T_F to strategy O_S if and only if

$$p \leq \frac{\tilde{p}\{[(1 - \alpha S(1-\theta)]Y + P + C\}}{[(1 - S(1-\theta)]Y + P + C} \tag{1.14}$$

11. F prefers strategy V_F to strategy O_S if and only if

$$\hat{p} \leq \frac{\tilde{p}\{[(1-\alpha S(1-\theta)]Y + P + C\}}{[(1-\beta(1-\theta)]\alpha Y + P + C} \tag{1.15}$$

In our experimental setup, we also analyse male decision making under two scenarios: household resources are transferred to his individual account (Labelled for Household Purposes), and his decisions are visible to his wife (Visible). Similar to wife, husband M has six available strategies to allocate the money he could win through lottery: $\{T_F, T_M, V_F, V_M, V_S, O_S\}$, where T_F and T_M is to transfer money to F and M, respectively, V_F and V_M is to commit to consumption for F and M, respectively, V_S is to commit to consumption for collective consumption by household and O_S is to transfer all the money to someone else who is not their partner. Strategies T_F and V_F can be considered as the share of income fully controlled by wife, and strategies T_M and V_M as the share of income fully controlled by husband.

Since the financial management in household is set up in a such way that husband has the final say on decision making, there are some differences in husband's utility function under different strategies as compared to wife's. If husband chooses strategies T_M or V_M, he can keep all of Y since he dictates household decision making. If he chooses T_F, that is, to transfer the income to wife, he may get a share of Y, αY. Similarly, if he chooses V_F, he may be able to undo the committed consumption and get αY. If he chooses V_S, a shared household good voucher, he can keep γY for himself and give the rest $(1-\gamma)Y$ to household members. Similar to strategies T_F and V_F, he might be able to retrieve α of Y if he chooses to transfer the amount to a third person. The husband's preference for one strategy over the other can be easily deducted similar to the calculation of the wife's preference over strategies as above.

Appendix B: Definition of Relevant Variables

Table B1: Primary Outcomes

Variable	Definition
Share to Wife	Share of money allocated towards wife's account and female personal gift voucher
Share to Husband	Share of money allocated towards husband's account and partner's 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
Share towards Expenditure - Food and necessities	Percentage share • Percentage share - share of money participant spends on 'food and necessities'

Continued on next page

Table B1: Primary Outcomes

Variable	Definition
	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	Percentage share • 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	Percentage share • 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	Share of money participant chooses items in the follow up question on expenditure for wife.
Beneficiary of expenditure - Husband	Share of money participant chooses items in the follow up question on expenditure for husband.

Continued on next page

Table B1: Primary Outcomes

Variable	Definition
Beneficiary of expenditure - Everyone in the household	Share of money participant chooses items in the follow up question on expenditure for everyone in the household.

Table B2: 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	Standardized index and individual score of the following tests

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Table B2: Secondary Outcomes

Variable	Definition
	• Psycho-motor 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 B3: Household and Individual Controls

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
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
Years being married	Number of years of marriage

Continued on next page

Table B3: Household and Individual Controls

Variable	Definition
Individual Controls	
Age	Age of the respondent
Age at marriage	Age of the respondent at marriage
Education	Categorical; Highest level of education attained
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 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
Use of informal savings accounts	Binary (1/0) - 1 if the respondent uses informal savings products like savings group, microfinance, home, relatives, 0 otherwise

Appendix C: Comparing Treatment Effects for Wife and Husband

For the allocation game where wife makes decisions on how they allocate and spend money they earn or receive, we also record the husband's responses on how he would like his wife to allocate and spend the money she earned or received. In the following tables (Table C1 to C5), we document the differences in their responses in the context of treatment effects of the experiment. We discuss any results of importance from this analysis in the main results section of the paper.

Table C1: Effect of women's workfare on spousal decision making

	Female Spouse						Male Spouse					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A - Amount allocation												
	Amount share to wife		Amount share to husband		Visibility		Amount share to wife		Amount share to husband		Visibility	
Task [A]	0.055	0.052	-0.034	-0.033	-0.056	-0.054	0.038	0.045	-0.037	-0.043	-0.038	-0.047
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
	[0.016]**	[0.029]**	[0.086]*	[0.104]	[0.020]**	[0.026]**	[0.242]	[0.180]	[0.260]	[0.204]	[0.231]	[0.159]
	{0.099}*	{0.153}	{0.216}	{0.322}	{0.099}*	{0.153}	{0.533}	{0.356}	{0.533}	{0.356}	{0.533}	{0.356}
N	1008	987	1008	987	1008	987	1008	988	1008	988	1008	988
Gift Mean	0.84	0.84	0.12	0.12	0.16	0.16	0.52	0.52	0.47	0.47	0.47	0.47
Female - Male [A]	0.02	0.01	0.00	0.01	-0.02	-0.01						
Female=Male [A]	0.67	0.88	0.93	0.80	0.68	0.86						
Panel B - Expenditure allocation												
	Necessities		Non-necessities		Savings and Investments		Necessities		Non-necessities		Savings and Investments	
Task [B]	0.003	0.012	-0.005	-0.017	0.010	0.013	-0.015	-0.018	-0.028	-0.032	0.046	0.052
	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)
	[0.898]	[0.628]	[0.840]	[0.536]	[0.769]	[0.703]	[0.619]	[0.544]	[0.179]	[0.103]	[0.140]	[0.099]*
	{0.665}	{0.794}	{0.665}	{0.794}	{0.665}	{0.794}	{0.642}	{0.356}	{0.533}	{0.356}	{0.533}	{0.356}
N	995	974	995	974	995	974	1003	983	1003	983	1003	983
Gift Mean	0.26	0.26	0.15	0.15	0.57	0.57	0.28	0.28	0.12	0.12	0.60	0.60
Female - Male [B]	0.02	0.03	0.02	0.02	-0.04	-0.04						
Female=Male [B]	0.57	0.37	0.46	0.63	0.39	0.36						
Panel C - Expenditure Beneficiary												
	Wife		Husband		Collective Use		Wife		Husband		Collective Use	
Task [C]	0.054	0.033	-0.015	-0.016	-0.017	0.004	0.027	0.022	-0.009	-0.014	0.013	0.022
	(0.03)	(0.03)	(0.01)	(0.01)	(0.03)	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
	[0.101]	[0.268]	[0.174]	[0.197]	[0.578]	[0.888]	[0.016]**	[0.052]*	[0.507]	[0.290]	[0.386]	[0.160]
	{0.216}	{0.473}	{0.296}	{0.456}	{0.627}	{0.929}	{0.171}	{0.356}	{0.642}	{0.356}	{0.642}	{0.356}
N	995	974	995	974	996	975	1003	983	1003	983	1003	983
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Gift Mean	0.31	0.31	0.04	0.04	0.65	0.65	0.04	0.04	0.05	0.05	0.91	0.91
Female - Male [C]	0.03	0.01	-0.01	-0.00	-0.03	-0.02						
Female=Male [C]	0.40	0.72	0.76	0.94	0.36	0.58						

Notes: Dependent variables: Columns in panel A indicate the amount allocation decisions made by spouses. Columns in panel B indicate share of amount participant wishes to spend on the specific category of expenditure. Columns in panel C indicate share of amount participant wishes to spend on individual/individuals described. Columns (1) to (6) denote responses by female spouse on how she would like to allocate or spend amount she earned or received, and columns (7) to (12) denote responses by male spouse on how he would like his wife to allocate or spend amount wife earned or received Percentage point changes are calculated relative to the mean of the respective control group, which in this case is the treatment group where women receive the amount as a gift. Row Female - Male [A], Female - Male [B] and Female - Male [C] reports difference in coefficients for male and female for the corresponding coefficients in row [A], [B] and [C]. Row Female=Male [A], Female=Male [B], and Female=Male [C] reports p value from testing the hypothesis that coefficients for male and female are equal for the corresponding coefficients in row [A], [B] and [C]. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

Table C2: Effect of labelling money earned/received by women on their financial decisions

	Female Spouse						Male Spouse					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A - Amount allocation												
	Amount share to wife		Amount share to husband		Visibility		Amount share to wife		Amount share to husband		Visibility	
Labelling [A]	0.019	0.015	-0.004	-0.001	-0.010	-0.007	0.025	0.029	-0.030	-0.034	-0.040	-0.046
	(0.03)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
	[0.591]	[0.673]	[0.891]	[0.967]	[0.788]	[0.859]	[0.646]	[0.583]	[0.572]	[0.504]	[0.459]	[0.379]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Labelling&Task [B]	0.083	0.086	-0.043	-0.045	-0.080	-0.085	-0.020	-0.011	0.020	0.010	0.010	-0.003
	(0.04)	(0.05)	(0.03)	(0.04)	(0.05)	(0.05)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
	[0.063]*	[0.067]*	[0.220]	[0.235]	[0.110]	[0.113]	[0.794]	[0.884]	[0.795]	[0.890]	[0.897]	[0.967]
	{0.417}	{0.436}	{0.495}	{0.543}	{0.417}	{0.436}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Non-labelled Mean	0.87	0.87	0.09	0.09	0.14	0.14	0.53	0.53	0.47	0.47	0.47	0.47
Non-labelled&Task Mean	0.86	0.86	0.10	0.10	0.15	0.15	0.56	0.56	0.43	0.43	0.44	0.44
Female - Male [A]	-0.01	-0.01	0.03	0.03	0.03	0.04						
Female=Male [A]	0.93	0.83	0.67	0.58	0.67	0.56						
Female - Male [B]	0.10	0.10	-0.06	-0.06	-0.09	-0.08						
Female=Male [B]	0.29	0.31	0.47	0.51	0.37	0.40						
Panel B - Expenditure allocation												
	Necessities		Non-necessities		Savings and Investments		Necessities		Non-necessities		Savings and Investments	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Labelling [A]	0.005	0.002	0.010	0.022	-0.015	-0.022	-0.020	-0.028	0.021	0.014	-0.001	0.014
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.06)	(0.06)	(0.05)	(0.03)	(0.03)	(0.05)	(0.05)
	[0.898]	[0.951]	[0.791]	[0.582]	[0.768]	[0.688]	[0.712]	[0.599]	[0.446]	[0.595]	[0.987]	[0.791]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Labelling&Task [B]	-0.023	-0.014	0.016	0.019	0.017	0.006	-0.069	-0.076	0.037	0.023	0.032	0.053
	(0.06)	(0.06)	(0.06)	(0.07)	(0.08)	(0.09)	(0.09)	(0.08)	(0.04)	(0.03)	(0.07)	(0.07)
	[0.701]	[0.806]	[0.792]	[0.772]	[0.835]	[0.945]	[0.423]	[0.368]	[0.347]	[0.497]	[0.652]	[0.467]
	{0.979}	{1.000}	{0.979}	{1.000}	{0.979}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Non-labelled Mean	0.26	0.26	0.14	0.14	0.59	0.59	0.31	0.31	0.07	0.07	0.62	0.62
Non-labelled&Task Mean	0.29	0.29	0.16	0.16	0.54	0.54	0.30	0.30	0.06	0.06	0.65	0.65
Female - Male [A]	0.03	0.03	-0.01	0.01	-0.01	-0.04						
Female=Male [A]	0.68	0.63	0.83	0.88	0.84	0.62						
Female - Male [B]	0.05	0.06	-0.02	-0.00	-0.01	-0.05						
Female=Male [B]	0.63	0.50	0.77	0.96	0.89	0.63						
Panel C - Expenditure Beneficiary												
	Wife		Husband		Collective Use		Wife		Husband		Collective Use	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Labelling [A]	-0.028	-0.027	0.014	0.012	0.008	0.011	-0.005	-0.006	-0.008	-0.015	0.008	0.014
	(0.05)	(0.04)	(0.02)	(0.02)	(0.05)	(0.05)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
	[0.566]	[0.536]	[0.528]	[0.587]	[0.873]	[0.820]	[0.779]	[0.758]	[0.783]	[0.585]	[0.801]	[0.661]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Labelling&Task [B]	-0.011	-0.032	-0.051	-0.056	0.042	0.068	-0.010	-0.015	0.001	-0.016	-0.001	0.018
	(0.07)	(0.07)	(0.03)	(0.03)	(0.08)	(0.07)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)
	[0.881]	[0.633]	[0.065]*	[0.061]*	[0.603]	[0.349]	[0.741]	[0.619]	[0.988]	[0.634]	[0.983]	[0.614]
	{0.979}	{1.000}	{0.417}	{0.436}	{0.979}	{0.723}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Non-labelled Mean	0.34	0.34	0.04	0.04	0.63	0.63	0.04	0.04	0.07	0.07	0.90	0.90
Non-labelled&Task Mean	0.36	0.36	0.06	0.06	0.60	0.60	0.05	0.05	0.05	0.05	0.92	0.92
Female - Male [A]	-0.02	-0.02	0.02	0.03	0.00	-0.00						
Female=Male [A]	0.66	0.65	0.59	0.50	1.00	0.95						
Female - Male [B]	-0.00	-0.02	-0.05	-0.04	0.04	0.05						
Female=Male [B]	0.98	0.81	0.29	0.43	0.62	0.54						

Appendix D: Emotional Well-being and Mental Bandwidth

In the main results section of the paper, we report the effect of varying levels of spousal monitoring of female decisions on the standardised index created for emotional well-being and mental bandwidth. In this section, we check for the effect of spousal monitoring of female decisions on each item used in the creating index of emotional well-being and mental bandwidth. We find no significant effects on any of the individual items of the indices.

Table C3: Effect of Monitoring by the Husband on Female Allocation Decisions

	Female Spouse						**Male Spouse**					
	Amount share to wife		Amount shared together		Visibility		Amount share to wife		Amount shared together		Visibility	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Visible [A]	-0.031	-0.035	0.044	0.050	0.023	0.026	-0.001	0.013	0.006	-0.007	-0.000	-0.014
	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
	[0.444]	[0.380]	[0.167]	[0.115]	[0.547]	[0.485]	[0.979]	[0.800]	[0.894]	[0.881]	[1.000]	[0.779]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Approval [B]	-0.001	-0.006	0.020	0.026	0.005	0.009	0.030	0.026	-0.037	-0.027	-0.030	-0.026
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
	[0.971]	[0.860]	[0.498]	[0.382]	[0.895]	[0.820]	[0.480]	[0.558]	[0.385]	[0.537]	[0.483]	[0.554]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Negotiation [C]	0.001	0.015	0.006	-0.004	-0.024	-0.039	0.032	0.044	-0.022	-0.033	-0.029	-0.041
	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
	[0.984]	[0.686]	[0.846]	[0.895]	[0.508]	[0.277]	[0.502]	[0.380]	[0.644]	[0.498]	[0.533]	[0.402]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
N	808	790	808	790	808	790	808	791	808	791	808	791
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Private Mean	0.87	0.87	0.09	0.09	0.14	0.14	0.53	0.53	0.47	0.47	0.47	0.47
[B] - [A]	0.03	0.03	-0.02	-0.02	-0.02	-0.02	0.03	0.01	-0.04	-0.02	-0.03	-0.01
[B]=[A]	0.41	0.42	0.46	0.46	0.61	0.61	0.45	0.77	0.30	0.65	0.47	0.78
[C] - [B]	0.00	0.02	-0.01	-0.03	-0.03	-0.05	0.00	0.02	0.02	-0.01	0.00	-0.02
[C]=[B]	0.95	0.51	0.61	0.30	0.34	0.12	0.97	0.69	0.71	0.89	0.98	0.73
[C] - [A]	0.03	0.05	-0.04	-0.05	-0.05	-0.07	0.03	0.03	-0.03	-0.03	-0.03	-0.03
[C]=[A]	0.41	0.16	0.22	0.07	0.18	0.05	0.40	0.44	0.48	0.53	0.47	0.51
F-M [A]	-0.03	-0.05	0.04	0.06	0.02	0.04						
F=M [A]	0.63	0.45	0.50	0.32	0.70	0.51						
F-M [B]	-0.03	-0.03	0.06	0.05	0.03	0.03						
F=M [B]	0.59	0.60	0.27	0.33	0.55	0.57						
F-M [C]	-0.03	-0.03	0.03	0.03	0.01	0.00						
F=M [C]	0.62	0.64	0.63	0.60	0.93	0.97						

Notes: Row [A] is the effect of transaparency in wife's decisions, row [B] is the effect of having an-app based approval requirement from husband, row [C] is the effect of in-person negotiation with husband on decisions. All the above described rows are compared to the control group where there wife makes decisions preivately (T1). Columns (1) to (6) denote responses by female spouse on how she would like to allocate or spend amount she earned or received, and columns (7) to (12) denote responses by male spouse on how he would like his wife to allocate or spend amount wife earned or received. Percentage point changes are calculated relative to the mean of the respective control group. Rows [B]-[A], [C]-[B] and [C]-[A] reports difference in coefficients for the corresponding rows. Rows [B]=[A], [C]=[B] and [C]=[A] reports p value from testing the hypothesis that coefficients forfor the corresponding rows are equal. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. * p,q<0.10, ** p,q<0.05, *** p,q<0.01. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in parentheses.

Table C4: Effect of Monitoring by the Husband on Female Expenditure Allocation Decisions

	Female Spouse						**Male Spouse**					
	Necessities		Non-necessities		Savings and Investments		Necessities		Non-necessities		Savings and Investments	
Visible [A]	0.034	0.047	0.040	0.035	-0.069	-0.076	-0.025	-0.016	0.087	0.075	-0.062	-0.059
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.04)	(0.03)	(0.03)	(0.05)	(0.05)
	[0.394]	[0.219]	[0.311]	[0.361]	[0.199]	[0.157]	[0.594]	[0.725]	[0.003]***	[0.010]***	[0.195]	[0.205]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{0.104}	{0.352}	{1.000}	{1.000}
Approval [B]	-0.003	-0.001	-0.006	-0.003	-0.008	-0.008	-0.068	-0.073	0.004	0.008	0.053	0.055
	(0.04)	(0.03)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.02)	(0.03)	(0.05)	(0.05)
	[0.945]	[0.971]	[0.883]	[0.936]	[0.856]	[0.864]	[0.152]	[0.111]	[0.864]	[0.759]	[0.311]	[0.262]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Negotiation [C]	-0.045	-0.035	0.000	-0.003	0.055	0.049	-0.055	-0.057	0.056	0.053	-0.006	-0.001
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.03)	(0.03)	(0.05)	(0.05)
	[0.290]	[0.377]	[0.999]	[0.938]	[0.286]	[0.347]	[0.260]	[0.220]	[0.049]**	[0.063]*	[0.912]	[0.988]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
N	796	778	796	778	796	778	806	789	806	789	806	789
HH Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Private Mean	0.26	0.26	0.14	0.14	0.59	0.59	0.31	0.31	0.07	0.07	0.62	0.62
[B] - [A]	-0.04	-0.05	-0.05	-0.04	0.06	0.07	-0.04	-0.06	-0.08	-0.07	0.12	0.11
[B]=[A]	0.36	0.25	0.15	0.23	0.15	0.11	0.35	0.21	0.01	0.04	0.02	0.02
[C] - [B]	-0.04	-0.03	0.01	0.00	0.06	0.06	0.01	0.02	0.05	0.05	-0.06	-0.06
[C]=[B]	0.33	0.44	0.87	1.00	0.18	0.24	0.78	0.73	0.11	0.14	0.23	0.26
[C] - [A]	-0.08	-0.08	-0.04	-0.04	0.12	0.13	-0.03	-0.04	-0.03	-0.02	0.06	0.06
[C]=[A]	0.07	0.06	0.25	0.27	0.01	0.01	0.41	0.28	0.37	0.51	0.18	0.19
F-M [A]	0.06	0.06	-0.05	-0.04	-0.01	-0.02						
F=M [A]	0.30	0.28	0.34	0.42	0.93	0.82						
F-M [B]	0.07	0.07	-0.01	-0.01	-0.06	-0.06						
F=M [B]	0.25	0.17	0.83	0.81	0.39	0.34						
F-M [C]	0.01	0.02	-0.06	-0.06	0.06	0.05						
F=M [C]	0.84	0.66	0.24	0.24	0.39	0.47						

Notes: Row [A] is the effect of transparency in wife's decisions, row [B] is the effect of having an-app based approval requirement from husband, row [C] is the effect of in-person negotiation with husband on decisions. All the above described rows are compared to the control group where there wife makes decisions preivately (T1). Columns (1) to (6) denote responses by female spouse on how she would like to allocate or spend amount she earned or received, and columns (7) to (12) denote responses by male spouse on how he would like his wife to allocate or spend amount wife earned or received. Percentage point changes are calculated relative to the mean of the respective control group. Rows [B]-[A], [C]-[B] and [C]-[A] reports difference in coefficients for the corresponding rows. Rows [B]=[A], [C]=[B] and [C]=[A] reports p value from testing the hypothesis that coefficients for the corresponding rows are equal. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

Table C5: Effect of Monitoring by the Husband on Beneficiary of Expenditure

	Female Spouse						**Male Spouse**					
	Wife		Husband		Collective Use		Wife		Husband		Collective Use	
Visible [A]	0.024	0.011	-0.005	-0.003	-0.024	-0.013	0.021	0.011	-0.041	-0.047	0.022	0.034
	(0.04)	(0.04)	(0.02)	(0.02)	(0.05)	(0.05)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)
	[0.579]	[0.784]	[0.790]	[0.873]	[0.617]	[0.774]	[0.322]	[0.590]	[0.075]*	[0.046]**	[0.425]	[0.212]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Approval [B]	-0.036	-0.027	-0.020	-0.021	0.044	0.038	0.016	0.020	-0.039	-0.039	0.042	0.039
	(0.05)	(0.05)	(0.02)	(0.02)	(0.05)	(0.05)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)
	[0.433]	[0.562]	[0.247]	[0.216]	[0.379]	[0.447]	[0.463]	[0.365]	[0.110]	[0.115]	[0.121]	[0.145]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Negotiation [C]	0.003	-0.010	0.002	0.002	-0.009	0.002	0.026	0.025	-0.024	-0.026	0.010	0.014
	(0.04)	(0.04)	(0.02)	(0.02)	(0.05)	(0.04)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
	[0.952]	[0.822]	[0.923]	[0.897]	[0.835]	[0.967]	[0.196]	[0.220]	[0.334]	[0.299]	[0.725]	[0.618]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
N	796	778	796	778	796	778	806	789	806	789	806	789
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Private Mean	0.34	0.34	0.04	0.04	0.63	0.63	0.04	0.04	0.07	0.07	0.90	0.90
[B] - [A]	-0.06	-0.04	-0.02	-0.02	0.07	0.05	-0.00	0.01	0.00	0.01	0.02	0.01
[B]=[A]	0.22	0.42	0.30	0.23	0.15	0.27	0.87	0.72	0.88	0.65	0.38	0.82
[C] - [B]	0.04	0.02	0.02	0.02	-0.05	-0.04	0.01	0.00	0.01	0.01	-0.03	-0.03
[C]=[B]	0.45	0.74	0.13	0.10	0.29	0.48	0.70	0.86	0.45	0.52	0.22	0.30
[C] - [A]	-0.02	-0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	-0.01	-0.02
[C]=[A]	0.64	0.66	0.68	0.74	0.74	0.75	0.81	0.56	0.32	0.25	0.63	0.42
F-M [A]	0.00	0.00	0.04	0.04	-0.05	-0.05						
F=M [A]	0.93	1.00	0.26	0.18	0.35	0.33						
F-M [B]	-0.05	-0.05	0.02	0.02	0.00	-0.00						
F=M [B]	0.27	0.34	0.56	0.58	0.97	0.98						
F-M [C]	-0.02	-0.03	0.03	0.03	-0.02	-0.01						
F=M [C]	0.62	0.47	0.45	0.41	0.68	0.80						

Notes: Row [A] is the effect of transaparency in wife's decisions, row [B] is the effect of having an-app based approval requirement from husband, row [C] is the effect of in-person negotiation with husband on decisions. All the above described rows are compared to the control group where there wife makes decisions preivately (T1). Columns (1) to (6) denote responses by female spouse on how she would like to allocate or spend amount she earned or received, and columns (7) to (12) denote responses by male spouse on how he would like his wife to allocate or spend amount wife earned or received. Percentage point changes are calculated relative to the mean of the respective control group. Rows [B]-[A], [C]-[B] and [C]-[A] reports difference in coefficients for the corresponding rows. Rows [B]=[A], [C]=[B] and [C]=[A] reports p value from testing the hypothesis that coefficients forfor the corresponding rows are equal. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

Table D1: Effect of Monitoring by the Husband on Women's Emotional Well-being (Items)

	Feeling Nervous, Tense		Hard to Concentrate		Tired		Hard to Cope	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Approval[A]	-0.036	-0.038	-0.001	0.001	0.010	0.012	0.010	0.005
	(0.03)	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)	(0.02)	(0.02)
	[0.242]	[0.242]	[0.984]	[0.985]	[0.445]	[0.287]	[0.575]	[0.778]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Visible [B]	-0.056	-0.052	0.009	0.011	-0.000	-0.000	-0.005	-0.004
	(0.03)	(0.03)	(0.03)	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)
	[0.078]*	[0.106]	[0.739]	[0.701]	[1.000]	[0.996]	[0.722]	[0.789]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Negotiation [C]	-0.014	-0.010	0.017	0.024	-0.010	-0.006	-0.006	-0.005
	(0.04)	(0.04)	(0.03)	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)
	[0.721]	[0.791]	[0.520]	[0.406]	[0.428]	[0.658]	[0.653]	[0.687]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
N	807	789	805	788	805	787	807	789
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes
Private Mean	0.14	0.14	0.06	0.06	0.03	0.03	0.03	0.03

Notes: Dependent variables: The columns indicate outcome variables related to emotional wellbeing of the participant soon after the allocation game. The variables are coded as binary variable equal to 1 if the female participant felt the emotion described during the allocation game and, 0 if not. Percentage point changes are calculated relative to the mean of the treatment group where decisions are purely private. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

Table D2: Effect of Monitoring by the Husband on Women's Mental Bandwidth (Items)

	Memory		Executive Function		Abstract Reasoning		Reaction Time	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Approval[A]	-0.325	-0.176	0.110	0.152	0.135	0.234	-8.641	-8.959
	(0.25)	(0.24)	(0.21)	(0.20)	(0.13)	(0.13)	(7.98)	(8.02)
	[0.194]	[0.460]	[0.600]	[0.457]	[0.291]	[0.083]*	[0.281]	[0.267]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Visible [B]	0.155	0.143	-0.262	-0.304	0.043	0.074	-0.325	-0.367
	(0.25)	(0.24)	(0.25)	(0.24)	(0.12)	(0.12)	(11.43)	(13.10)
	[0.542]	[0.549]	[0.288]	[0.212]	[0.712]	[0.530]	[0.977]	[0.978]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
Negotiation [C]	0.247	0.232	-0.007	0.024	-0.037	-0.018	-8.535	-8.004
	(0.26)	(0.23)	(0.21)	(0.20)	(0.13)	(0.13)	(8.03)	(7.77)
	[0.335]	[0.325]	[0.973]	[0.905]	[0.772]	[0.888]	[0.290]	[0.305]
	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}
N	808	790	808	790	808	790	808	790
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes
Private Mean	4.43	4.43	14.91	14.91	3.09	3.09	9.83	9.83

Notes: Dependent variables: The columns indicate outcome variables related to mental bandwidth of the participant soon after the allocation game. Percentage point changes are calculated relative to the mean of the treatment group where decisions are purely private. Estimates with and without household controls are reported. Household controls include difference in age of husband and wife, years being married, number of children, number of adults over 60 in household number of rooms, wife employment status, wife's high school completion status, husband's income being above 10 thousand rupees per month, and couples having a joint account. Clustered standard errors by sessions in round parentheses. p values in [ ] parentheses. Anderson's q values in { } parentheses. * p,q<0.10, ** p,q<0.05, *** p,q<0.01.

Appendix E: Heterogeneous Treatment Effects

To test whether treatment effects vary heterogeneously across groups with specific individual level and intrahousehold characteristics, we re-run the empirical specification, interacting the treatment with variables of interest for heterogeneity. We carry out heterogeneous treatment effects regression based on the following characteristics and hypothesise the following mechanisms based on the heterogeneity for the outcomes on financial decision making by women.

Table E1: Dimensions of heterogeneity and related hypothesis

Variable and definition	Hypothesis
Couple has a joint account	Joint account can be considered a proxy for existing joint decision making in household. *Treatment effects of workfare* - Under workfare, if couple has a joint account, she is less likely to transfer to accounts under her control. *Treatment effects of labelling money for household purposes* - Couples who have a joint account are more likely to spend for household purposes when resources are labelled for household purposes. *Treatment effects of transparency and communication with husband* - If couples have a joint account, she may be less likely to allocate to an account she controls.
Wife has ever hidden income or expenditure indicated by a binary variable equal to 1 if wife has ever hidden income or expenditure from husband, and 0 otherwise	Indicator of less control over her money *Treatment effects of task* - more likely to allocate to accounts over which she has more control, such as her personal bank account or vouchers and allocate more expenditure to herself. Also, more likely to save than spend.

Continued on next page

Table E1: Dimensions of heterogeneity and related hypothesis

Variable and definition	Hypotheses
	Treatment effects of transparency and communication with husband - may allocate more share of money to accounts on which husband has more control.
High level of involvement in household decisions making measured as binary variable equal to 1 if wife has a score above the median score for involvement in household decision making, and 0 otherwise. Women's score for involvement in household decision making is measured as the sum of seven items which measure her involvement alone or jointly with husband on decisions regarding her own income, partner's income, minor and major purchases, children's education, visits to family and friends, and her health care.	Indicator high bargaining power of wife *Treatment effects of task* - She allocates more to accounts she controls. *Treatment effects of transparency and communication with husband* - Allocate more share of money to herself.
High willingness to pay to have control over money measured as a binary variable equal to one if wife is willing to give up some amount of money in order to have full control of the money she will receive.	Indicator of women's low control over money in household

Continued on next page

Table E1: Dimensions of heterogeneity and related hypothesis

Variable and definition	Hypotheses
Hypothetical Question: Suppose you are given an investment opportunity where you can invest 200 rupees in three different ways: (1) You will get 400 rupees in return (2) Your partner will get 800 rupees in return (3) You and your partner jointly will get 600 rupees in return. Which one would you choose? *Choices*: 400 rupees for myself 800 rupees for partner 600 rupees for me and my partner jointly	*Treatment effects of task* - may allocate less to her personal bank account or for female voucher. May also spend less on herself. *Treatment effects of transparency and communication with husband* - may allocate less to herself.
Quality of relationship between couple measured as binary variable equal to one if wife responds that she expresses her disagreement with partner's opinion frequently or sometimes, and if she agrees that wife has the right to express her opinion when she disagrees with what her husband is saying; 0 otherwise	Indicator for good level of communication between couple *Treatment effects of transparency and communication with husband* - may increase the share of amount she allocates to herself and decrease share she allocates to husband.

Continued on next page

Table E1: Dimensions of heterogeneity and related hypothesis

Variable and definition	Hypotheses
Impatient time preference measured as a binary variable equal to one if wife chooses immediate reward in two questions regarding her preference for receiving a certain amount of money *Questions:* 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?	*Treatment effects of task* - Wife may allocate less share of money towards savings/investments. *Treatment effects of labelling money for household purposes* - Participants may allocate more share of money towards savings/investments.
Risk averse measured as a binary variable equal to one if participant chooses sure outcome over lottery even when pay-out of sure outcome is less than the lottery amount Series of choice problems which finishes when she choose a lower sure amount compared to higher uncertain (50% chance amount) *Questions*: 1. Which would you prefer: 200 rupees for sure or a 50% chance to win 700? 2. "Which would you prefer: 300 rupees for sure or a 50% chance to win 700? 3. "Which would you prefer: 400 rupees for sure or a 50% chance to win 700? 4. "Which would you prefer: 500 rupees for sure or a 50% chance to win 700?	*Treatment effects of labelling money for household purposes* - may participants allocate more towards savings and household public good. *Treatment effects of transparency and communication with husband* - may allocate less towards herself.

Continued on next page

Table E1: Dimensions of heterogeneity and related hypothesis

Variable and definition	Hypotheses
High general self-efficacy measured as a binary variable equal to one if wife's score on general self-efficacy scale is higher than the median score for all women in the subject pool	*Treatment effects of task* - may assume more sense of ownership of the amount she earned. Hence, she is more likely to allocate to accounts that she controls. Also, may spend more on herself.
Items on the scale:	*Treatment effects of transparency and communication with husband* - more likely to allocate amount to account she controls.
1. I will be able to achieve most of the goals that I have set for myself 2. When facing difficult tasks, I am certain that I will accomplish them. 3. In general, I think that I can obtain outcomes that are important to me. 4. I believe I can succeed at most any endeavor to which I set my mind. 5. I will be able to successfully overcome many challenges. 6. I am confident that I can perform effectively on many different tasks. 7. Compared to other people, I can do most tasks very well. 8. Even when things are tough, I can perform quite well.	

Appendix F: Changes to Registered Pre-Analysis Plan

Analysing Effect of Labelling Money for Household Purposes and Transparency for Husbands

Even though we mentioned in our pre-analysis plan that we would record both male and female responses in the second allocation game where each partner has a 25% chance of winning 400 rupees, we did not mention the analysis we will be performing using the data. Using the data documented in the pre-analysis plan, we analyse how labelling lottery money for household purposes will affect husband's decisions compared to when money is not labelled. Additionally, we can also analyse how visibility of his decisions by wife will affect his allocation and spending decisions as compared to when his decisions are kept private from his husband. In both cases, we also compare his responses to his wife's responses under the same conditions.

Changes in the primary outcome variables used

In our pre-analysis plan, we defined our primary outcome variable as the six options the couples had to allocate the money including transfer to their own account and voucher for private consumption. Since the number of respondents who choose the option shared voucher and transfer to a third person is very less, we did not include them ass the main outcome variable in our analysis.

We also mentioned that we will include both binary and continuous variable for share towards different expenditures. However, we include only the continuous variables in our analysis for avoiding redundancy in results as both the type of variables gave similar results.

Comparing female and male responses

The empirical strategy in the pre-analysis plan describes that we would compare the female and male responses using Fishers exact test following the empirical strategy of Ashraf (2009). However, since we have a higher number of observations than Ashraf (2009), we use a linear Wald test to compare the female and male coefficients.

Chapter 2
The Contest for Household Resources: Unpacking the Relationship Between Economic Abuse and Women's Economic Autonomy

2.1 Introduction

Women's economic empowerment, defined as having access and control over financial resources, is an important component of overall female autonomy and bargaining power (Kabeer, 1999). Higher levels of women's economic autonomy have been directly linked with better household outcomes such as nutrition, women's labour force participation and well being of children (Tommasi, 2019; Field et al., 2021; Haushofer and Shapiro, 2016; Quisumbing and De La Brière, 2000). However, the theoretical literature on the interplay between female economic autonomy and intimate partner violence (IPV) is a priori ambiguous, and the empirical literature has mixed findings (Baranov et al., 2021). Recent empirical evidence suggests that women's baseline bargaining power at home mediates the effects of programs that aim to reduce violence (Hidrobo and Fernald, 2013; Heath, 2012; Angelucci, 2008; Tankard et al., 2019). Such studies propose the existence of different channels that can interact the effects of programs that aim to reduce IPV (Angelucci and Heath, 2020). However, none of the studies so far has focused on the heterogeneous effects spousal (both female and male) perception of women's bargaining power on IPV. This

paper specifically addresses this gap in the literature.

In this paper, we ascertain whether women's economic autonomy over decisions within household, measured by spousal cross-reporting, is associated with incidence of economic violence and how it, in turn, affects the success of a male-targeted gender transformative training program in reducing economic violence. To explore the association between economic abuse and patterns of women's economic autonomy in household decision making, we use novel experimental data recording male and female responses on household decision making from a male-targeted gender transformative program in the Democratic Republic of Congo (DRC). A previous study, Vaillant et al. (2020), reported zero reduction in economic abuse following this program. Here we document results from studying the role of spousal perceptions of women's economic autonomy in program's ability to reduce economic violence.

We explore the channel of disagreement and agreement over women's autonomy in household financial decision making to understand economic violence and study how exogenous changes in male perspectives through gender transformative approaches have differential effects based on spousal perceptions of female economic autonomy. Following Annan et al. (2021), we use a multidimensional approach to measure women's economic autonomy over household decision making using survey responses from male and female partners. While women's report of their own decision making power is an indicator of their autonomy, understanding the perception of their husbands about their power adds an important dimension to her empowerment.

We use the conceptual framework of Annan et al. (2021) to measure women's autonomy over household financial decisions, making a distinction between scenarios when spouses agree and disagree about women's autonomy in decision making. When both husband and wife are asked separately about household decision making, the disagreement takes two forms. One, when wife declares higher decision making power for themselves than husband reports about them. The other is when husband reports higher decision-making power for wife than she does for herself. Their joint agreement on who makes intrahousehold deci-

sions also takes two forms; when they both agree that wife is involved in decision making and when they both agree that wife has no power in decision making. While (Annan et al., 2021) captures women's empowerment in this dimension to measure its association with various household-level welfare outcomes and IPV, we extend this approach by studying the heterogeneous effect spousal contest for women's economic autonomy has on the success of a program that aims to improve gender attitudes and reduce IPV. For this study, we specifically focus on economic violence as the main outcome of interest as it is the direct outcome of women's contest for economic autonomy among the various forms of IPV. [1]

The existing theoretical literature that focuses on the link from greater economic autonomy to reduced (or increased) IPV is dominated by two main opposing channels. First, bargaining power theory in development supposes that greater economic autonomy reduces intimate partner violence through the mechanism of improved bargaining power of women within household, providing them with more outside options. Contrastingly, backlash theory suggests that a husband, feeling threatened by greater financial autonomy of his spouse, may engage in violent behaviours towards his wife to regain his control of household decisions and resources.[2] Complicating matters, it is also possible that female economic autonomy is endogenously determined by the violence she experiences, and such reverse causality can happen in two ways. Eswaran and Malhotra (2011) theorise that women who experience violence may be less likely to claim economic autonomy and, on the other hand, women may also trade off violence against the gains from resource allocation through increased autonomy. We explain the heterogeneity in effects of the program based on spousal discordance on women's economic autonomy using the non-cooperative bargaining model of household proposed by Eswaran and Malhotra (2011) and are able to test two main testable predictions of their model linking wife's economic autonomy and economic violence patterns. First, the equilibrium level of economic violence that husband decides to perpetuate will depend on how sensitive wife's economic autonomy is in response

[1] We check for the role of women's autonomy for her experience of other types of violence, such as physical, emotional, sexual and any type of violence in Table A4 and A5, and find no effects. We focus on women's contest for economic autonomy in this study since the questions related to spousal decision making were mostly based on control over economic resources.

[2] (Baranov et al., 2021) provides a detailed analysis of the theories of violence towards women.

to the frequency of economic abuse she experiences. The second testable prediction that the model puts forward is that the effects of an exogenous change in male perspective on economic violence are heterogeneous based on spousal economic contest.

So far, the empirical literature also mirrors the contrasting theoretical channels on the relationship between female economic autonomy and IPV. Some studies find that improving women's economic empowerment reduces intimate partner violence (Hidrobo et al., 2016; Hidrobo and Fernald, 2013; Haushofer et al., 2019), while some others show that such programs increase some type of violence or that the effects are not long term (Bobonis et al., 2013; Heath, 2012). Furthermore, there exists evidence on the heterogeneous effects of higher female economic autonomy on intimate partner violence conditional on her individual characteristics, her partner's characteristics, and cultural norms (Hidrobo and Fernald, 2013; Heath, 2012; Angelucci, 2008; Tankard et al., 2019).[3]

We use data from a two-armed, matched pair, cluster randomised controlled male-focused gender transformative program conducted between 2016 and 2018 in Democratic Republic of Congo (DRC). The program involved male-only discussion groups to reflect and challenge gender attitudes and reduce intimate partner violence. Our analysis consists of two main parts: first, we test the association between different patterns of wife's economic autonomy and incidence of economic violence, and second, we test for heterogeneous effects of the program on economic violence based on the levels of wife's economic autonomy in household decisions recorded at baseline. To corroborate the intuition of the model by Eswaran and Malhotra (2011), that women trade off violence for more autonomy, we check for the program's effect on the likelihood of women contesting for economic autonomy.

Simple correlations from pre-intervention data illustrate the nature of the underlying relationship between women's economic autonomy and economic violence that the husband perpetuates. We find that households where women take economic autonomy when their husbands do not acknowledge her autonomy have an associated higher likelihood of eco-

[3]For instance, Hidrobo and Fernald (2013) find that cash transfers in Ecuador reduces psychological violence for women with greater than primary school education. However, they also find that cash transfers significantly increase emotional violence for women with equal or more education than their partners.

nomic violence by 6.2 percentage points compared to households where women do not contest economic autonomy. We also document that women in households where husbands give power to wives and where spouses jointly agree on her autonomy are associated with a lesser incidence of economic violence. We find that wife contesting for economic autonomy is significantly worse for economic violence than two other patterns of decision making; when spouses agree that she is involved in decision making and when husband gives her more autonomy than she takes. This is consistent with the status inconsistency theory of IPV that contesting for autonomy in decision making in households may result in worse outcomes for women, in our case, more incidence of economic violence (Eswaran and Malhotra, 2011). In other words, economic violence is the cost women who contest for autonomy pay to align the household allocation according to her preferences. This pattern is also recorded in other contexts such as sub-Saharan Africa (Annan et al., 2021), Mexico (Bobonis et al., 2013) and Turkey (Erten and Keskin, 2018).

We find that the male-focused gender-transformative program reduce the incidence of economic violence by 6.7 percentage points in households where wife contests economic autonomy compared to households where wife did not. The program also led to a marginal reduction in the incidence of economic violence in households where wife and husband agreed that she has decision making power. Our results indicate that engaging men in the process of women's rights have differential effects based on the decision making patterns that exist in the household. When men find violence reprehensible as a result of gender transformative training, the effects are significant only in environments of higher levels of spousal economic contest and violence.[4] The results from our analysis provide evidence for the heterogeneity in effects of female empowerment programs implied by the theoretical model of Eswaran and Malhotra (2011).

This paper contributes to the literature on how intra-household decision making, specifically financial decision making, affects the outcomes of programs and policies. We study

[4](Vaillant et al., 2020) provides evidence that program resulted in attitude change among men in treatment group on IPV. Using the same data, they found post-intervention that men in the treatment group reported significant reductions in intention to commit violence and decreased their agreement with any reason that justifies wife beating.

how engaging men in the process of women's empowerment can have differentiated effects based on how women contest for economic autonomy in household. To our knowledge, this is the first study that tests the impact of women's contention for power in the household on the success of a program that aims to reduce violence. While studies have focused on how women's self-reported bargaining power or bargaining power proxied by their education levels and age of marriage can influence the effects of female empowerment program (Kotsadam and Villanger, 2020; Heath, 2012; Hidrobo and Fernald, 2013), this is the first to take into account the implications of difference in spouse's perceptions of autonomy for the success of such programs. This paper makes progress in the direction of understanding that couples can disagree on their respective role in household financial decision making, and such disagreement can have consequences for programs and policies. Knowledge of such heterogeneity would be important to design effective interventions for women's empowerment and reducing possible backlash from these interventions.

We also contribute to the often understudied topic of economic violence. In some contexts, improving women's economic opportunities and autonomy is associated with husbands using violent behaviours to extract financial resources from their wives. Such violence is in line with the extractive theory of violence, where husband uses violence to extract resources from wife directly. This paper contributes to understanding this link by providing evidence on the heterogeneous impacts a male-targeted gender transformative program has on the incidence of economic violence.

The paper advances as follows. Section 2 provides background on the economic violence and women's economic autonomy literature. Section 3 presents the theoretical framework we use, section 4 discusses data and empirical strategy, and section 5 presents the results. Section 6 concludes.

2.2 Related Literature

Economic violence can be defined as violence involving negative behaviours that affect a person financially and undermine their economic independence. Bloch and Rao (2002); Calvi et al. (2021); Eswaran and Malhotra (2011); Haushofer et al. (2019) and others provides evidence on the existence of different motives for spousal violence. Economic violence can be considered a part of instrumental form of intimate partner violence whereby perpetrators engage in violence to extract resources from wife and to align household distribution of resources to his preferences [5]. Developing a scale for economic abuse, Adams et al. (2008) notes that abusive partners may exercise power by limiting wives' access to household resources or by denying access to money for essentials. This, in turn, affects the bargaining power of the victim in the household resource allocation. This type of violence is different from the expressive form of violence where perpetrators engage in violence as a strategy to assert dominance in the relationship and obtain direct utility from violence (Farmer and Tiefenthaler, 1997; Tauchen et al., 1991; Haushofer et al., 2019).

Examining the association between economic violence and other types of intimate partner violence, Adams et al. (2008) find higher levels of economic abuse and exploitation associated with higher levels of physical and psychological abuse. The simultaneity in the occurrence of other forms of IPV and economic violence also reduces the option of the wife to leave the abusive relationship as economic exploitation by husband increases her economic dependency (Fawole, 2008; Kim and Gray, 2008; Barnett, 2000). Despite the aforementioned research, compared with physical violence, economic violence remains an understudied form of intimate partner violence (Stylianou, 2018).

Several studies have documented the effects of programs that aim to improve women's autonomy through financial resources on reducing intimate partner violence. Studying the effects of a cash, in-kind and food transfer program in Northern Ecuador using a ran-

[5] Economic violence can also be considered as an extractive form of violence where the perpetrator directly extracts the resources from victim (Bloch and Rao, 2002). We focus on economic violence as extractive instrumental violence where husband uses extraction of resources from wife to control household resource allocation.

domised control trial, Hidrobo et al. (2016) find that all types of transfer were effective in significantly reducing intimate partner violence. A study on the effects of female-targeted conditional cash transfer in Mexico provides evidence of a reduction in physical violence in the short run, but the effects disappeared in the long run, after five to nine years of the program (Bobonis and Castro, 2010). Haushofer et al. (2019) find a reduction in physical and sexual violence following cash transfers to women in Kenya.

Although having autonomy over financial resources promotes women's empowerment, there can be unintended consequences of such measures, such as an increase in the levels of intimate partner violence. For example, Angelucci (2008) finds that while small transfers to women under a conditional cash transfer in Mexico reduced alcohol related aggressive behaviours significantly, large transfers increased such behaviours in households where husband has low education levels and large spousal age gap. Using data from the same conditional cash transfer in Mexico, Bobonis et al. (2013) finds that beneficiary women were more likely to receive violent threats with no associated physical abuse.

A strand of literature on reducing IPV presents evidence that women's initial level of bargaining power is vital for the success of such programs in reducing violence, and the effects can be heterogeneous based on her initial level of bargaining power. Theoretical models that explain the relationship between women's bargaining power and violence show that depending on women's initial level of bargaining power; violence can increase or decrease following an empowerment program (Tauchen et al., 1991; Eswaran and Malhotra, 2011). The empirical literature on heterogeneous effects of improving women's economic autonomy uses her and her partners' education levels or her age at marriage as proxies for her baseline bargaining power. From a cash transfer program to mothers in Ecuador, Hidrobo and Fernald (2013) find that the program effects were dependent on a woman's own education and her education relative to her partner's. The cash transfer program significantly reduced emotional violence and controlling behaviours only for women with primary schooling or more. For women with primary school education or less, however, the effect of cash transfer depended on her relative education compared to her partner. If her partner reported fewer schooling years than her, cash transfers increased emotional

violence for women with a primary school education or less. In Bangladesh, Heath (2012) documents that women's labour force participation and domestic violence are positively correlated only for women with less education and who were younger at first marriage. However, to our knowledge, no studies focus on the heterogeneous effects of such programs based on women's initial level of bargaining power proxied by her role in household decision making as reported by both female and male partners.

Finally, there exists observational studies that link women's bargaining power, proxied by her role in household decision making, to broader welfare outcomes. Using Nepal DHS, Allendorf (2007) finds that women's autonomy is strongly related to her use of health care services when spouses agree that the wife has autonomous decision making power than when spouses disagree about her autonomy. Story and Burgard (2012) finds that discordant reports about who makes decisions related to large purchases and health in households are negatively associated with reproductive health care use. Ambler et al. (2021) finds that spouses agreeing that their decision making is joint is significantly associated with women's well-being. They also find that men recognising women's involvement in decision making yields better outcomes for women than the case when men do not. They also develop a model which predicts that these patterns of disagreement and agreement within households suggest the presence of asymmetric information about decisions and assets in household. Annan et al. (2021) looks beyond the agreement between spouses on decision making and uses a novel approach in measuring intra-household contention over decision making. Using DHS data from 23 sub-Saharan countries, they find that women contesting for power in household is associated with health outcomes for women and children but is negatively associated with her experience of emotional violence. We carry out similar measurement strategies as Annan et al. (2021) to find the association between economic autonomy and economic abuse and to find the heterogeneous effects of a gender transformative program based on spousal concordance in reporting of women's role in financial decision making.

2.3 Theoretical Framework

In this section, we use a non-cooperative model of intra-household allocation proposed by Eswaran and Malhotra (2011) to explain economic violence. In the model of household decision making they propose, higher economic autonomy by women may increase economic violence, and economic violence may, in turn, affect her decision to exercise her control.

Suppose utility function of wife and husband is denoted as $U_w(x, v)$ and $U_h(x, v)$, respectively where they consume x units of public good X and v is the incidence of economic violence inflicted by husband on wife. We assume that their utilities are increasing and quasiconcave in x and decreasing and concave in v. Husband's utility is decreasing in v since the amount of violence he inflicts on his wife can lead to loss of intimacy and trust in their relationship.

Suppose wife's utility take the form:

$$U_w(x, v) = \alpha_1 lnx - \delta_1 v, \alpha_1 > 0, \delta_1 > 0 \tag{2.1}$$

and husband's utility takes the form:

$$U_h(x, v) = \alpha_2 lnx - \delta_2 v, \alpha_2 > 0, \delta_2 > 0 \tag{2.2}$$

We assume that wife's and husband's preference for good X is different, leading to contention in the household decision making process, hence $\alpha_1 \neq \alpha_2$. Husband uses economic violence, v, to align the household resource allocation with his preferences. δ_1 and δ_2 denote the marginal disutility that wife and husband experiences from economic violence. We assume that wife's marginal disutility from violence is greater than husband's, that is, $\delta_1 > \delta_2$, as economic violence reduces wife's share or control over resources which also has implications on her well-being. Suppose $\overline{U_w}$ and $\overline{U_h}$ be the reservation utilities of wife and husband, respectively, which should be at least ensured to both of them to continue

in the relationship. Let price of X be unity and total household income, pooled by wife and husband, be denoted by M.

In the model of household decision making proposed, wife allocates the resources and decides on her degree of economic autonomy given the frequency of economic violence she faces from her husband.[6] Household decision making occurs as a two-stage game. In the first stage, husband decides the frequency of economic violence he will inflict on the wife. In the second stage, observing the frequency of economic abuse by husband, wife chooses her degree of economic autonomy in household resource allocation. Her economic autonomy will determine the extent to which the allocation will reflect her preferences. This can be interpreted as her bargaining power in the household, which we denote by γ. γ lies between 0 and 1, and 1-γ is the weight she puts on husband's preferences while allocating household resources. Since wife determines her level of economic autonomy by observing the frequency of economic abuse she faces, we denote incidence of economic violence proportional to the control over resources she exercises. That is, $v = \gamma a$ where a is the frequency of economic abuse inflicted by the husband.

Since the choices mentioned above are made by the husband and wife sequentially, we work backwards to solve for equilibrium levels of economic violence. In the second stage, wife solves the following household allocation problem in which she decides on how much control to exercise on resources and the allocation of public good X by solving the following optimisation problem.

$$\begin{aligned} \underset{x,\gamma}{Max} \;\; & \gamma U_w(x, \gamma a) + (1-\gamma) U_h(x, \gamma a) \\ s.t. \;\; & x \leq M, U_h(x, \gamma a) \geq \overline{U_h} \end{aligned} \tag{2.3}$$

$\overline{U_h}$ is the reservation utility of husband that the wife has to deliver in the household al-

[6]This phenomenon is true in developing countries where gender norms dictate women be responsible for managing household resources and do not necessarily assign control over those resources. For instance, in the data we use for the empirical work of this paper, around 88% women and 68% men agree with the statement that "A women's most important role is to take care of her home and cook for her family". In such cases, although women are responsible for managing household resources, women may not have the control to take decisions over the resources (Pahl, 1995).

location process. Given that husband uses economic violence to increase his share in the household allocation process, wife's economic autonomy is decreasing in the frequency of economic abuse she faces, that is, $\gamma^*(a) < 0$. Let the solution to problem (2.3) be denoted as $(x^*(a), \gamma^*(a))$.

In the first stage, husband chooses the frequency of economic abuse solving,

$$\begin{aligned} \underset{a}{Max} \;\; & U_h(x^*(a), \gamma^*(a)a) \\ s.t. \;\; & U_w(x^*(a), \gamma^*(a)a) \geq \overline{U_w} \end{aligned} \tag{2.4}$$

Let the solution to problem (2.4) be denoted by a^+. Wife chooses her level of economic autonomy endogenously given the economic abuse frequency a^+. Hence, at equilibrium, her level of control over resources is then given by $\gamma^*(a^+)$. In that case, equilibrium level of economic violence is given by $v^+ = \gamma^*(a^+)a^+$.

Now we look at how the equilibrium level of economic violence that husband chooses is determined by the economic autonomy she exercises, observing frequency of economic abuse by husband. As seen before, wife's control over resources is decreasing in frequency of economic abuse, $\frac{d\gamma^*(a^+)}{da^+} < 0$. But how this correlates with equilibrium levels of economic violence depends on the elasticity of γ^* with respect to a^+. We explain this below. The equilibrium level of economic violence, $v^+ = \gamma^*(a^+)a^+$, as a function of frequency of economic abuse can be written as:

$$\begin{aligned} \frac{dv^+}{da^+} &= \frac{d\gamma^*(a^+)}{da^+}a^+ + \gamma^*(a^+) \\ &= [\frac{d\gamma^*(a^+)}{da^+}\frac{a^+}{\gamma^*(a^+)} + 1]\gamma^*(a^+) \\ &= [\epsilon(a^+) + 1]\gamma^*(a^+) \end{aligned}$$

where $\epsilon(a^+)$ is the elasticity of economic autonomy wife chooses to exercise with respect to frequency of economic abuse she experiences from her husband.

From above, the equilibrium level of economic violence that husband chooses to inflict will depend on the value of elasticity of economic autonomy she chooses to exercise (γ^*) with respect frequency of economic abuse by husband (a^+). This leads us to the first theoretical prediction of the model we test using data from a program in DRC engaging men to foster gender equitable behaviours.

Theoretical Prediction 1: *The equilibrium level of economic violence will depend on how sensitive wife's economic autonomy is to frequency of economic abuse by husband.*

If the absolute value of elasticity of economic autonomy she exercises with respect to frequency of economic abuse is less than one, it means wife's economic autonomy changes proportionally less than change in frequency of economic abuse. This implies that she chooses to take economic autonomy even when husband uses economic abuse to restrict her power in the household decision making. In the empirical section of this paper, we categorise these women as wives who "take power", which we discuss in detail in the next section. Hence, for households where absolute value of $\epsilon(a^+)$ is less than unity, equilibrium level of violence is increasing in frequency of economic abuse that husband perpetuates, $\frac{dv^+}{da^+} > 0$. In this case, an increase in equilibrium level of violence can be viewed as the cost wife pays to compensate for the economic autonomy she exercises.

When the absolute value of $\epsilon(a^+)$ is greater than unity, wife chooses to give up her economic autonomy more than proportionally in case of increased economic abuse by husband. In such a case, equilibrium level of violence is decreasing in frequency of economic abuse that husband inflicts, $\frac{dv^+}{da^+} < 0$ [7]. Suppose the absolute value of $\epsilon(a^+)$ equals unity. In that case, wife reduces her autonomy in household expenditure decisions in equal proportion to the increase in frequency of economic abuse husband inflicts. In this case, equilibrium level of violence is a constant function of frequency of economic abuse. When wife's control over resources remains unchanged at any frequency of economic abuse, that is, when $\epsilon(a^+) = 0$, equilibrium level of violence is non-decreasing in frequency of economic abuse. We discuss the above four cases in detail in the empirical section of this paper.

[7] In the case where $|\epsilon(a^+)| > 1$, the only possible case is $\epsilon(a^+) < -1$ since $\frac{d\gamma^*(a^+)}{da^+} < 0$.

We now enquire how a change in the marginal disutility of violence for husband, say, through a gender transformative program, affects equilibrium levels of violence for the above categories of households. Suppose husband finds economic abuse more reprehensible as a result of a gender transformative training session. This would mean an increase in the parameter δ_2 in (2.2), which will lead to a shift in husband's utility, decreasing the frequency of economic abuse by husband, a^+. Hence, $\frac{da^+}{d\delta_2} < 0$. The change in equilibrium level of violence with an increase in marginal disutility of violence for husband will then depend on the sign of $\frac{dv^+}{da^+}$. When husband has a more liberal view towards economic violence, one would expect equilibrium level of violence to decrease. But following from theoretical prediction 1, when marginal disutility for economic violence increases for husband, changes in equilibrium levels of violence will depend on how sensitive wife's control over resources is to frequency of economic abuse by husband[8]. Hence, the model predicts heterogeneous effects following an increase in the marginal disutility for violence based on the sensitivity of wife's economic autonomy to frequency of economic abuse.

From the model, we can also assess how a change in the marginal disutility of violence for the husband affects the wife's pattern of economic autonomy. In the absence of economic abuse, we would expect that wife decides $\gamma < 1$ since an allocation of resources completely in favour of her preferences is likely to generate a utility for husband below his reservation utility. In solving (2.3), wife has to ensure that husband's utility is at least equal to his reservation utility. When husband's reservation utility increases, as in the case of him acquiring more enlightened views on economic violence, wife would have to allocate resources more in line with his preferences in order to keep him at his reservation utility, which could lead to a decrease in her bargaining power or economic autonomy. We record the above observations in the following theoretical prediction.

Theoretical Prediction 2: *The change in the equilibrium level of economic violence due to increase in husband's marginal disutility for violence depends on how sensitive wife's*

[8]Change in equilibrium level of violence as a result of change in marginal disutility of violence can be represented by, $\frac{dv^+}{d\delta_2} = \frac{dv^+}{da^+}\frac{da^+}{d\delta_2}$. Since $\frac{da^+}{d\delta_2} < 0$ and the sign of $\frac{dv^+}{da^+}$ depend on elasticity of wife's control over resources with respect to frequency of economic abuse (theoretical prediction 1), the result follows.

control over resources is to frequency of economic abuse by husband. Also, wife's control over resources may be non-increasing in husband's marginal disutility for violence.

In the framework we use in this paper to explain women's economic autonomy and economic violence, husband uses violence to impinge on female economic autonomy, and wife curtails her power in the household to reduce the amount of violence she faces. When husband finds using economic violence less acceptable, we expect him to engage in zero levels of economic violence. But since economic violence is a mechanism to restrict her autonomy, we expect that an increase in the disutility of violence for the husband will only benefit women who curtailed their autonomy the least as a response to increased economic violence at baseline. From a policy perspective, we interpret that an intervention that aims to change men's view on using violence to extract resources from wives can be expected to reduce economic violence the most for those households where wife's exercise of economic autonomy is less sensitive to the economic abuse she undergoes. In this paper, we use data from a male-focused gender transformative training program seeking to reduce harmful behaviours and increase gender equality at home. In the next section, we discuss in detail about the program and our empirical strategy to test the two theoretical predictions discussed in this section.

2.4 Data and Empirical Strategy

We use data from a study conducted in the Democratic Republic of Congo (DRC), which aimed to test impacts of a male-targeted gender transformative program in communities on intimate partner violence, gender inequitable attitudes and other related outcomes. The intervention and experimental design used in this paper are discussed in detail in Vaillant et al. (2020). We summarise the study briefly in the subsection below.

2.1.1 Intervention

The data we use in this paper is from a two-armed, matched-pair, cluster randomised controlled trial led by the World Bank's Africa Gender Innovation Lab between 2016 and 2018 in North and South Kivu provinces, DRC, across 28 communities (14 control and 14 treatment). Pre-intervention, 1387 men and 1220 women were interviewed. 97% of men and 96% of women were retained at endline.[9] In the sample we use for our analysis, 1318 men and 1181 women are at endline.

The study was conducted among men who volunteered to participate in a men's activity in communities, either the gender transformative training program or the control activity. They did not know which intervention would be rolled out in their community at the time of recruitment; hence, the allotment of treatment or control activity was random. Inclusion criteria included men to be 18 years or older, having lived in the community for at least six months with plans to continue living there for at least an additional six months, having the ability to participate in the group actively, non-involvement with an ongoing evaluation of adolescent girl programming that was operational in some sites and committing not to perpetrate violence for the duration of the intervention. Female partners of men were also interviewed if they were above 15 years of age. For polygamous households, the first wife was interviewed.

Men in treatment villages participated in weekly discussions under the Engaging Men in Accountable Practice (EMAP) programme, focusing on gender equitable behaviours at home and in the community. EMAP is a sixteen-week group-based discussion series intended to reduce harmful behaviours and increase gender equality at home and in communities. The sessions were approximately three hours long and were led by male-trained facilitators. Topics covered during the sessions included concepts of gender and masculinity; types, causes and consequences of violence against women and girls; and being an ally to girls and women. Table A1 summarises the weekly topics covered by the programme.

[9]The most common reason for attrition was inability to locate the respondent, followed by refusal and having moved to a different location.

Men in the control villages participated in non-gender norms-related livelihood intervention. The activities under livelihood intervention included rabbit and chicken raising, driving classes and enhanced farming methods, among others. All the coefficients we report in this study are compared to the couples in the group where men received livelihood training intervention. There is a possibility that livelihoods training affect the incidence of IPV through stress theory under which skill training of husband could reduce his mental stress by providing him more employment opportunities or more income. However, based on the data we collected at endline on days worked by men in a typical month in the last year and their income last year, we do not find evidence that the livelihood intervention increased their employment status or income Table A2. Hence, the effects we report can be considered a true estimation of the effects of the male-focused gender transformative program.

All data were collected electronically on tablets equipped with Survey CTO software and by gender-matched enumerators. Audio computer-assisted self-interviews were used for sensitive outcomes such as violence to limit potential under-reporting.

2.2.2 Variables

For this study, we focus on the intrahousehold decision making and economic violence questions in the survey. To build measures of perception of women's economic autonomy in household, we use cross-reporting of a question asked to both spouses: "Who makes final decision regarding...?". The question in the survey was in relation to various domains of household decision making such as husband's earnings, wife's earnings, major and minor purchases in household, own health care, visits to family and friends, and school expenditure. For our empirical analysis, we use data on decision making regarding wife's earnings, major and minor purchases at home, and school expenditures. We choose these domains of decision making for our analysis since it involves control of economic resources, which is the focus of this paper. The following options were given for the question on who makes

final decisions regarding various domains in household: (a) respondent, (b) husband/wife, (c) respondent and husband/wife jointly, (d) someone else, (e) other. We build our analysis only based on the option of respondent, husband/wife, and respondent and partner jointly.[10]

Following Annan et al. (2021), we define women's economic autonomy by characterising households based on their decision making pattern. Table 2.1 summarises the characterisation of households based on their pattern of response regarding household financial decision making. We define a household where "wife takes power" when wife says she is the main or joint decision maker and her husband says he is the main decision maker. We denote "wife takes power" as a binary variable equal to one if she contests for power in at least one of the domains of decision making that we include in our analysis. That is, household is categorised as "wife takes power" if wife gives herself more power than husband gives her in decisions regarding her earnings, major purchases, minor purchases or school expenditures. Drawing parallels from our theoretical framework, these households can be characterised as the ones where wife's decision to take control over resources is less sensitive to the frequency of economic abuse she experiences, $|\epsilon(a^+)| < 1$. That is, the associated reduction in women taking autonomy in this category is less than proportional to the increase in economic abuse they face.

We define household as "wife is given power" if the husband says wife is the main or joint decision maker whereas wife says husband is the main decision maker. In this case, wife's economic autonomy can be characterised as being highly elastic to the frequency of economic abuse she experiences, $|\epsilon(a^+)| > 1$. That is, her reduction in taking autonomy is more than proportional to the economic abuse that her husband perpetuates. We define the third category of households as households where wife and husband agree that decision making is either joint or by wife. That is, husband and wife agree on her economic autonomy, and her decision to take control is equally proportional to the frequency of economic abuse she experiences, $|\epsilon(a^+)| = 1$. The fourth category for our analysis is where husband

[10]We use only these three options for our analysis since this paper studies spouses' disagreement patterns on who among them controls decisions. Hence, all the other options are irrelevant to this study.

and wife agree that husband is the final decision maker and that wife has no say in decision making. In this case, wife decides to exercise no economic autonomy at any frequency of economic abuse, that is, $|\epsilon(a^+)| = 0$.

Table 2.1: Characterization of households based on disagreement pattern

Who takes final decision on...	Wife's response			
		Husband	Joint	Wife
Husband's response	Wife	Wife is given power	Wife is given power	Both agree
	Joint	Wife is given power	Both agree	Wife takes power
	Husband	Both agree	Wife takes power	Wife takes power

Our outcome of interest is reports of wife about economic violence perpetuated by the husband. We measure economic violence as a binary variable where we code it as one if the wife reports at least one instance of economic abuse by her husband in the past 12 months, which is defined as any of the following items: took her earned money against her will, refused to give her money for household needs even when he had money to do so, and forced her to give money earned by respondent to his own family. We code the primary outcome variable as 0 if none of the items occurs and missing if one item is missing and all others are 0.

Table 3.1 provides descriptive statistics of the decision making pattern in household concerning different domains and instances of economic abuse pre-intervention. We observe that for all domains of decision making, spouses are more likely to disagree than agree. This feature of households in our sample highlights the importance of studying patterns of disagreement and agreement among spouses and its implications on household outcomes. Pre-intervention, the proportion of households which report as "wife taking power" and "wife being given power by husband" in at least one of the domains of decision making are the same, 59.1%. 43.6% of spouses in the sample agree that wife is either the main or joint

decision maker in at least one of the decision making spheres, and 47.8% of spouses agree that wife has no decision making power, either alone or jointly. Before the intervention, 24.3% of women report having experienced at least one instance of economic abuse, such as taking her income against her will, refusing to give money for household needs even when husband had money, or forcing to give money to his own family.

We check for balance of basic household characteristics between treatment and control groups of the program for each of the categories of households described above, using the test of joint orthogonality. We run the following regression for each of the types of households where $Treatment$ indicates if the household is in treatment or control group and X_i's represents the basic household characteristics we check the balance for. We then check if the coefficients $\beta_1 = \beta_2 = \beta_3 = .. = 0$.

$$Treatment = \beta_0 + \beta_1 * X_1 + \beta_2 * X_2 + \beta_3 * X_3 + \ldots + u \tag{2.5}$$

From Table 2.3, the joint test of orthogonality shows a balance between treatment and control groups for all groups except for a marginal difference for the category of households where women take power (p=0.065). That is, at a 5% significance level, we cannot reject the null hypothesis that the coefficients β_i's are all equal to zero. As an additional check of balance. we test if any such differences between treatment and control groups for various groups of households are significantly large by calculating normalised differences of household characteristics of treatment and control groups in Table 2.4. We observe that all the normalised differences are equal or below the value of 0.25, which indicates a good balance of household characteristics between treatment and control groups for categories of varying levels of spousal contention.[11]

[11]Imbens and Rubin (2015) shows that normalised differences of 0.25 or less between treatment and control group in a random assignment indicate a good balance.

Table 2.2: Descriptive statistics of variables of interest

	Mean	SD	Count
Wife gives herself more power than husband gives her			
Wife's earnings	0.285	0.452	1148
Major purchases	0.314	0.464	1179
Minor purchases	0.322	0.467	1184
School expenditures	0.216	0.412	924
Atleast one domain of decision	0.599	0.490	1207
Husband gives wife more power than she gives herself			
Wife's earnings	0.281	0.450	1148
Major purchases	0.280	0.449	1179
Minor purchases	0.301	0.459	1184
School expenditures	0.280	0.449	924
Atleast one domain of decision	0.587	0.493	1207
Wife and husband agree wife is main/joint decision maker			
Wife's earnings	0.202	0.402	1148
Major purchases	0.186	0.389	1179
Minor purchases	0.191	0.393	1184
School expenditures	0.210	0.407	924
Atleast one domain of decision	0.433	0.496	1207
Wife and husband agree that wife has no role in decision making			
Wife's earnings	0.232	0.422	1148
Major purchases	0.221	0.415	1179
Minor purchases	0.187	0.390	1184
School expenditures	0.293	0.456	924
Atleast one domain of decision	0.476	0.500	1207
Economic Violence			
Took her income against her will	0.115	0.319	1227
Refused to give money for HH needs even when he had	0.187	0.390	1225
Forced to give money for his family	0.055	0.229	1226
Atleast one incidence of economic violence	0.248	0.432	1223

Table 2.3: Test of balance for each category of household

	Wife takes power	Wife is given power	W and H agree that she has power	W and H agree that she has no power
	(1)	(2)	(3)	(4)
Household Size	0.006	0.005	-0.007	0.002
	(0.008)	(0.008)	(0.007)	(0.008)
Age of Wife	-0.001	0.001	0.002	0.002
	(0.003)	(0.003)	(0.004)	(0.004)
Age of Husband	0.001	-0.001	-0.004	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)
Wife's Years of Education	-0.002	-0.002	0.001	-0.012*
	(0.007)	(0.004)	(0.006)	(0.006)
Husband's Years of Education	-0.011*	-0.004	-0.007	0.001
	(0.006)	(0.006)	(0.007)	(0.007)
Interview in Swahili	-0.144	-0.053	-0.162	-0.036
	(0.143)	(0.093)	(0.170)	(0.107)
Interview in Mashi	-0.686*	-0.606	-0.670**	-0.614
	(0.389)	(0.371)	(0.322)	(0.394)
N	653	630	473	511
F statistic	2.21	0.67	0.93	1.61
p-value	0.065	0.693	0.503	0.174

Notes: Dependent variables: Dummy variable 1 if participant is in treated group of EMAP intervention, 0 if participant is in control group of EMAP intervention. F statistic and p-value reported from test for joint orthogonality which tests balance between treatment and control group for each category of household used in the analysis. * p<0.1, ** p<0.05, *** p<0.01.

2.3.3 Econometric Approach

To test the relationship between wife's economic autonomy and economic violence, we use the following empirical specification:

$$Y_i = \beta_0 + \beta_1 * \mathrm{DM}_i + \beta_2 * X_i + \epsilon_i \tag{2.6}$$

Outcome variable Y_i is a binary variable equal to one if wife in household i experiences at least one incidence of economic violence, X_i are set of household characteristics, and ϵ_i is the error term. DM_i is the measure of perceptions of power assigned by spouses. For instance, to measure the association between "wife taking power" and economic violence, DM_i is a binary variable equal to 1 if "wife takes power" in household financial decision making and 0 if she does not. We define similarly "wife is given power by husband", "both agree that decision making is joint or solely by wife," and "both agree that wife has no role in decision making". The coefficient β_1 identifies the correlation between the respec-

Table 2.4: Normalized differences between treatment and control group

	Wife takes power	Wife is given power	W and H agree that she has power	W and H agree that she has no power
Household Size	0.06	0.06	-0.05	0.05
Age of Wife	0.06	0.06	0.03	0.15
Age of Husband	0.06	0.06	-0.00	0.10
Wife's Years of Education	-0.08	-0.09	0.01	-0.14
Husband's Years of Education	-0.17	-0.08	-0.05	-0.05
Interview in Swahili	-0.08	0.02	-0.10	-0.03
Interview in Mashi	-0.05	-0.06	0.07	-0.01
Interview in Kinyarwanda	0.14	0.04	0.03	0.05

Notes: The numbers in the table represent normalized difference of household characteristics between treatment and control group households for each type of households.

tive spousal patterns of household decision making, and we explain in comparison to their respective reference category for all our interpretations. The household characteristics, X_i, include household size, age and years of education of male and female partners and the language of the interview.

To understand the heterogeneous impacts of male-focused gender transformative programs on households characterised by perceptions of women's economic autonomy by couples, we use the following ANCOVA regression:

$$Y_{i1} = \beta_0 + \beta_1 * T_i * \text{DM}_{i0} + \beta_2 * T_i + \beta_3 * \text{DM}_{i0} + \beta_4 * Y_{i0} + \beta_5 * X_{i0} + \epsilon_i \tag{2.7}$$

Y_{i1} and Y_{i0} are the outcome variables at endline and baseline, respectively. $\beta_1 + \beta_2$ is the coefficient of interest which explains the heterogeneous treatment effect of the program based on the respective pattern of female economic autonomy. We control for outcome variables at baseline, a binary variable indicating missing baseline outcome variable value

and, household characteristics. For all specifications, we cluster standard errors at the site level, and we control for site pairs dummies in all regressions[12].

2.5 Results

For presenting the empirical results, we begin by documenting the relationship between wife's economic autonomy patterns in decision making and incidence of economic violence. Table 2.5 presents correlation results from specification (2.6) based on pre-intervention data. Wife giving herself more autonomy than husband gives her ("wife takes power") is associated with an increase in incidence of economic violence by 6.2 percentage points ($p < 0.05$) compared to when she does not. Contesting for economic autonomy by wife is negatively associated with her experience of economic violence. As discussed in the theoretical framework, women who contest for economic autonomy in the household decision making process are characterised less sensitive to the frequency of economic violence by husbands. As implied by theoretical prediction 1, we find that equilibrium level of economic violence is increasing in the frequency of economic abuse for women who contest for autonomy in household. Wife's decision to take control over resources is a function of the frequency of economic abuse she experiences. In the case where "wife takes power", wife's decision to take control over resources is less sensitive to the frequency of economic abuse. Hence, equilibrium level of violence is higher in such a case. The higher levels of economic violence she experiences could be perceived as the cost she pays to compensate for the economic autonomy she decides to exercise over household decision making.

Women in households where husband gives more power than she gives herself are associated less incidence of economic violence by 4.6 percentage points ($p < 0.1$) as compared to households where husband does not. We also find that women in households where husband and wife agree that wife is the main or joint decision maker is 3.6 percentage points less likely to experience economic violence. Women who do not contest for power

[12]Sites are areas which were selected for either control or treatment activity. Within each pair of sites, one site was randomised to be in treatment arm and other in control

would be willing to give up their control over decision making either equally or more than proportionally to the economic violence she experiences. In such a case, as predicted by our theoretical framework, we find that equilibrium levels of economic violence are significantly lower.

We also perform tests for equality of coefficients for different categories of perceptions of economic autonomy in households. We find that incidence of economic violence is significantly higher for "wife who takes power" as compared to "wife who is given power by husband" ($p < 0.01$). Also, "wife who takes power" is more likely to experience economic violence than wife whose husband agrees with her on her decision making role ($p < 0.01$). Exploring the agreement patterns in household, we find that, when controlling for household characteristics, wife and husband agreeing that she has a role in household financial decision making is marginally better for reduced economic violence than when spouses agree that she has no decision making power ($p < 0.01$). Also, wife and husband agreeing that wife has no decision making power are worse for economic violence than when husband gives her autonomy more than she gives herself.

We find that the association between wife's economic autonomy and incidence of economic violence is determined by how sensitive her exercise of control over resources is towards frequency of economic abuse. Contesting for more economic autonomy than the husband allocates increases the risk of economic violence, whereas, claiming less economic autonomy than husband's acknowledgement of her power or agreement with husband on her economic autonomy significantly reduces women's risk of economic violence. The results are consistent with other correlational studies that find that contesting for power in household can lead to increased risk of IPV for women (Annan et al., 2021; Angelucci and Heath, 2020) and scenarios where husband acknowledging her power reduces the risk of violence (Ebrahim and Atteraya, 2019; Donald et al., 2021). These different directions of correlations between patterns of female economic autonomy and economic abuse suggest that programs aimed at reducing spousal violence may have differential effects based on the underlying decision making patterns.

Table 2.5: Association between spousal decision making patterns and experience of economic violence

	Took her income against her will		Refuse to give money for HH needs		Forced to give her income to his own family		Economic Violence	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
W gives herself more power than husband gives her [A]	0.034	0.034	0.060***	0.048**	0.028	0.027	0.062**	0.059**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
H gives W more power than she gives herself [B]	-0.025	-0.024	-0.035	-0.024	-0.027**	-0.027**	-0.046*	-0.039*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)
W and H agree she is main/joint decision maker [C]	-0.053***	-0.050***	-0.038*	-0.045*	-0.014	-0.017	-0.036*	-0.043*
	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)
W and H agree she has no decision making power [D]	0.032*	0.031	0.008	0.017	0.017	0.022	0.015	0.025
	(0.02)	(0.02)	(0.02)	(0.03)	(0.01)	(0.01)	(0.03)	(0.03)
N	1205	1087	1203	1086	1204	1086	1201	1085
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes
Control Mean[A]	0.10	0.10	0.16	0.16	0.04	0.04	0.23	0.23
Control Mean[B]	0.14	0.14	0.21	0.21	0.07	0.07	0.28	0.28
Control Mean[C]	0.15	0.15	0.22	0.22	0.07	0.07	0.28	0.28
Control Mean[D]	0.09	0.09	0.18	0.18	0.04	0.04	0.23	0.23
[A]=[B]	0.10	0.06	0.00	0.02	0.01	0.02	0.01	0.01
[B]=[C]	0.13	0.14	0.91	0.38	0.34	0.52	0.68	0.89
[C]=[D]	0.00	0.01	0.14	0.11	0.09	0.10	0.12	0.09
[D]=[A]	0.96	0.93	0.06	0.33	0.62	0.83	0.21	0.39
[A]=[C]	0.01	0.01	0.00	0.00	0.07	0.08	0.00	0.00
[B]=[D]	0.03	0.07	0.12	0.21	0.00	0.01	0.03	0.07

Notes: Dependent variables: Binary variable indicating wife experienced act of economic violence during the last 12 months as reported by the wife at baseline. Percentage point changes are calculated relative to the of the respective control group. Clustered standard errors at the site level in parentheses. Controls include a set of household characteristics, and site pair. Regressions with and without household controls are reported. Observations in the regression with household controls are approximately 10% lower than in the case without the household controls due to non responses from couples on questions relating to years of education of husband, age of wife and age of husband. * p<0.10, ** p<0.05, *** p<0.01.

Next, we explore how the relative measures of power assignation by spouses determine the effects of the male-targeted gender transformative program, EMAP. Table 2.6 shows the treatment effects of EMAP for households with different patterns of wife's economic autonomy. The coefficients in Table 2.6 reports the effect of EMAP on economic violence for each type of households ($\beta_1 + \beta_2$ of equation (2.7)). We find that the intervention reduced economic violence by 6.7 percentage points for women who contest for autonomy, compared to households where the wife did not contest for economic autonomy ($p < 0.01$). From Table 2.5, we observe that women who take economic autonomy undergo significantly more economic abuse as compared to other categories of spousal decision making. In other words, women who take power pay the highest cost for controlling household financial decision making. Corroborating this with results from Table 2.6, we can then interpret that EMAP reduced economic violence significantly for women who paid the highest cost for taking control over household expenditure decisions. We also find a decrease in economic violence for women in households where spouses agree at baseline that she has financial decision making power by 6 percentage points ($p < 0.05$). However, the result is only marginally statistically significant when we control household characteristics ($p < 0.1$).

Our finding that heterogeneous effects exist for a male-targeted gender transformative program based on levels of female economic autonomy is consistent with the theoretical models that predict differential effects of women empowerment programs (Eswaran and Malhotra, 2011; Tauchen et al., 1991). It also mirrors existing empirical studies which find that improving wife's autonomy can have differential effects based on their baseline characteristics (Angelucci, 2008; Heath, 2012; Hidrobo et al., 2016). We expected that a male-targeted gender transformative program reduce incidence of economic violence for all households since the training increases the marginal disutility he receives from using economic violence. However, we find a statistically significant reduction in economic violence only for households of high contention of power by women and abuse. We also find a reduction in economic abuse for households where spouses agree on wife's economic autonomy and least economic abuse. This result adds to the evidence of different channels that may affect the program outcomes aiming to reduce intimate partner violence.

Table 2.6: Effect of EMAP on economic violence based on spousal decision making patterns

	Took her income against her will		Refuse to give money for HH needs		Forced to give her income to his own family		Economic Violence	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment & W gives herself more power than H gives her [A]	-0.069***	-0.069***	-0.035**	-0.042**	-0.021	-0.018	-0.067***	-0.073**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.03)
Treatment & H gives W more power than she gives herself [B]	-0.031*	-0.037*	-0.010	0.004	-0.031***	-0.032**	-0.017	-0.011
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.03)	(0.03)
Treatment & W and H agree she is main/joint decision maker [C]	-0.046***	-0.048***	-0.059***	-0.056***	0.008	0.010	-0.060**	-0.053*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.03)
Treatment & W and H agree she has no decision making power [D]	-0.048**	-0.048**	-0.010	-0.002	-0.027	-0.031*	-0.009	-0.007
	(0.02)	(0.02)	(0.03)	(0.04)	(0.02)	(0.02)	(0.04)	(0.04)
N	1085	979	1085	979	1085	979	1085	979
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes
Control Mean[A]	0.13	0.13	0.19	0.19	0.05	0.05	0.28	0.28
Control Mean[B]	0.09	0.09	0.14	0.14	0.04	0.04	0.22	0.22
Control Mean[C]	0.09	0.09	0.15	0.15	0.02	0.02	0.22	0.22
Control Mean[D]	0.14	0.14	0.20	0.20	0.05	0.05	0.28	0.28

Notes: Dependent variables: Binary variable indicating wife experienced act of economic violence during the last 12 months as reported by the wife at endline. Percentage point changes are calculated relative to the mean of the respective category in the control group. Clustered standard errors at the site level in parentheses. Controls include dependent variable at baseline, dummy variable for missing baseline values of outcome variable, a set of household characteristics and site pair. Regressions with and without household controls are reported. Observations in the regression with household controls are approximately 10% lower than in the case without the household controls due to non responses from couples on questions relating to years of education of husband, age of wife and age of husband. * p<0.10, ** p<0.05, *** p<0.01.

Additionally, we check the effect of the program on the patterns of female autonomy in households. This analysis will help us understand the underlying tradeoff between patterns of women's economic autonomy and economic violence within a gender transformative program. From Table 2.7, we observe that there is no significant change in proportion of households where wife takes economic autonomy. As mentioned in theoretical prediction 2, since wife pays for the autonomy through economic abuse, a reduction in the economic abuse as a result of EMAP may not necessarily be complemented with an increase in her ability to "take power" in household decision making. This confirms the assumption in the model by Eswaran and Malhotra (2011) that women may trade off higher bargaining power in household decision making through economic abuse. We also find that the proportion of households where husband gives more economic autonomy than wife gives herself has increased significantly by 11.1 percentage points. We also find that the proportion of households where wife and husband agree that she has no decision making power has decreased significantly by 11.1 percentage points. Both these effects can be associated with the program which shifted spouses' views on wife's role in household decision making.

Table 2.7: Effect of EMAP on spousal decision making patterns

	Wife takes power		Wife is given power		W and H agree she is main/joint decision maker		W and H agree she has no decision making power	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	0.021	0.043	0.110***	0.107***	0.044	0.039	-0.110***	-0.122***
	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)
N	1055	929	1055	929	1055	929	1055	929
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes
Control Mean	0.57	0.57	0.55	0.55	0.41	0.41	0.49	0.49

Notes: Dependent variables: Variable indicating perception of wife's economic autonomy by spouses at endline. Standard errors are clustered at the site level. Clustered standard errors at the site level in parentheses. Controls include dependent variable at baseline, a set of household characteristics and site pair. Regressions with and without household controls are reported. Observations in the regression with household controls are approximately 10% lower than in the case without the household controls due to non responses from couples on questions relating to years of education of husband, age of wife and age of husband. * p<0.10, ** p<0.05, *** p<0.01.

2.1.1 Checking for Alternative Mechanisms

Apart from spousal discordance about women's decision making power, there exists a number of alternative theories in the literature that explain why IPV occurs. In this section, following Donald et al. (2021), we check for stability of our estimates by sequentially adding covariates that may be mediating the observed relationship in our analysis. We introduce variables at baseline that capture three key dimensions that may be driving our results: couple's attitude towards violence, their alignment of preferences, and marital capital. Couples' attitudes towards violence are measured using questions which ask spouses in which situations beating one's wife is justified. We construct a categorical variable equal to one, if neither husband nor wife condones violence in any situation; two, if only husband condones violence; three, if only wife condones violence and; four when both condone violence. We measure couples' alignment of preferences using information about their choice of minimum marriage age desired for girls. The variable is constructed as equal to one, if both husband and wife report same age; two if wife reports a lower desired age than husband; and three if husband reports higher desired age than wife. Our measure of marital capital includes years of marriage, total number of children the couple has and whether the couple is in a polygamous marriage.

In Table 2.8, we introduce the above mentioned sets of indicators categorically to the main empirical specification measuring the role of spousal decision making for the success of a male targeted gender transformative program. Columns (1) and (2) document the result from our main empirical specification (2.7) on the effect of the program on economic violence based on different patterns of spousal decision making. From columns (3) to (8), we sequentially add the theoretical dimensions of attitudes towards violence, preferences and marital capital that may be mediating our results. We find that none of the alternative mechanisms meaningfully alter the results we find linking spousal decision making patterns and treatment effects of a gender transformative program. The results suggest that our estimates are stable to the inclusion of variables representing the alternative mechanisms.

Table 2.8: Alternative mechanisms for effect of EMAP on economic violence based on spousal decision making patterns

	Economic Violence							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment & W gives herself more power than H gives her [A]	-0.067***	-0.072**	-0.066***	-0.069**	-0.066***	-0.070**	-0.073***	-0.078**
	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)
Treatment & H gives W more power than she gives herself [B]	-0.016	-0.010	-0.015	-0.007	-0.015	-0.007	-0.014	-0.014
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Treatment & W and H agree she is main/joint decision maker [C]	-0.060**	-0.052*	-0.062**	-0.055*	-0.062**	-0.056*	-0.070***	-0.066**
	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)
Treatment & W and H agree she has no decision making power [D]	-0.008	-0.006	-0.009	-0.006	-0.009	-0.007	-0.013	-0.005
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
N	1125	988	1075	970	1075	970	970	911
Attitude towards Violence	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Alignment in Preferences	No	No	No	No	Yes	Yes	Yes	Yes
Marital Capital	No	No	No	No	No	No	Yes	Yes
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes
Control Mean[A]	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Control Mean[B]	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Control Mean[C]	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Control Mean[D]	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28

Notes: Dependent variables: Binary variable indicating wife experienced violence/abuse during the last 12 months as reported by the wife at endline. Percentage point changes are calculated relative to the mean of the excluded category in the treatment group. Clustered standard errors at the site level in parentheses. Controls include dependent variable at baseline, dummy variable for missing baseline values of outcome variable, a set of household characteristics and site pair. Regressions with and without household controls are reported. Observations in the regression with household controls are approximately 10% lower than in the case without the household controls due to non responses from couples on questions relating to years of education of husband, age of wife and age of husband. * p<0.10, ** p<0.05, *** p<0.01.

2.6 Conclusion

While there is evidence of the association between women's economic autonomy and violence she experiences, the direction of this association is often ambiguous. Hence, it becomes difficult to understand the potential effects of policies and programs that seek to reduce spousal violence. This paper explores the association between spousal contention of power in household financial decision making and economic violence. Specifically, we investigate whether the effects of a male-targeted gender transformative program depend on baseline spousal contention. Using data from a male-targeted gender transformative program in the Democratic Republic of Congo, we find that the program reduces the likelihood of economic abuse significantly by 6.7 percentage points for women who give herself more power than her husband.

The result is consistent with household bargaining models that predict differential effects for programs that aim to reduce spousal violence. Our baseline finding that women who contest for power are at a higher risk of economic abuse is consistent with instrumental theories of violence that violence is a tool to align household allocation more closely to husbands' preferences. The paper's main finding that the male-targeted gender transformative program reduced economic abuse for women who experienced the most economic abuse at baseline (women who contest for economic autonomy) is informative for future programs to target and tailor the program better for specific groups. The results of this study also add to the evidence on the need for studying heterogeneous effects of programs on spousal violence. There might be different channels that increase or decrease violence as a result of programs. Focusing on certain groups would be helpful to develop specific policies for women at a higher risk or to avoid negative consequences from programs.

2.7 Appendix

Table A1: EMAP men's group weekly session topics

Session title	Goals
Section 1: Understanding gender, power and accountability to women and girls	
1. Introduction	Introduce EMAP; discuss goals and expectations for the group; think about the society we live in.
2. Understanding gender	Explore what the lives of women would look like in a community where no violence, discrimination and disrespect against women and girls existed; explore how men and women are socialised to think and act.
3. Gender roles in my home	Understand the different tasks that women, men, girls and boys are expected to do during a day; understand how to have respectful discussions with women in our lives.
4. Stages of change	Understand and practise accountable discussions; commit to changes in the home; begin making a personal action plan for change.
5. Violence and manhood	Understand how violence impacts ideas of manhood.
6. Understanding power and rights	Understand the different types of power; understand how status and privilege operate in the community; explore the concept of rights.
7. Understanding power in the home	Understand power in the home; analyse one's own use of power; practise accountable discussions.
Section 2: Understanding violence against women and girls	
8. Understanding violence against women and girls	Understand the different types and root causes of VAWG.
9. Sexual violence	Understand what sexual assault and rape are; explore harmful beliefs and myths about sexual violence.
10. Intimate partner violence (IPV)	Understand why IPV occurs; explore root causes of IPV; understand that IPV is selective.
11. Taking responsibility	Recognise our thoughts, feelings and emotions; take responsibility for our emotions and actions.
12. Consequences of violence	Understand the consequences of violence on individuals, families and communities; reflect on why talking about violence may be difficult.
Section 3: Being an ally to women and girls	
13. Supporting survivors of violence	Discuss victim blaming and how to support survivors of violence; understand what it means to be an ally to women and girls.
14. Healthy relationships	Explore the characteristics of healthy versus unhealthy relationships; reflect on discussions with women.
15. Being an ally in the community	Understand what it means to be an ally in the community; reflect on helpful behaviours; identify key actions for change.
16. Reflections	Reflect on what we have learnt and the changes we have committed to over the group; identify ways to continue being accountable to women and girls.

Table A2: Difference between treatment and control group men on employment and income outcomes

Variable	(1) Control group N	Mean/SE	(2) Treatment group N	Mean/SE	T-test Difference (1)-(2)
Days worked in a typical month-Male	659	24.234	662	23.474	0.759
		(0.402)		(0.393)	
Total income - Male	625	89.852	632	90.053	-0.201
		(5.070)		(5.271)	
Friends husband talk to about relationship	744	3.294	745	3.315	-0.021
		(0.065)		(0.067)	

Notes: The value displayed for t-tests are the differences in the means across the groups. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

Table A3: Effect of EMAP on economic violence

	Took her income against her will		Refuse to give money for HH needs		Forced to give her income to his own family		Economic Violence	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	-0.043***	-0.048***	-0.023	-0.016	-0.023**	-0.020*	-0.031	-0.034
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.03)
N	1125	988	1125	988	1125	988	1125	988
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes
Mean of excluded category	0.11	0.11	0.18	0.18	0.05	0.05	0.25	0.25

Notes: Dependent variables: Binary variable indicating wife experienced act of economic violence during the last 12 months as reported by the wife at endline. Clustered standard errors at the site level in parentheses. Controls include dependent variable at baseline, dummy variable for missing baseline values of outcome variable, a set of household characteristics and site pair. Regressions with and without household controls are reported. Observations in the regression with household controls are approximately 10% lower than in the case without the household controls due to non responses from couples on questions relating to years of education of husband, age of wife and age of husband. * p<0.10, ** p<0.05, *** p<0.01.

Table A4: Association between the decision-making pattern in household and experience of violence

	Physical Violence		Emotional Violence		Sexual Violence		At least one form of Violence	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Wife gives herself more power than husband gives her [A]	0.034	0.043	0.019	0.025	0.041	0.049	0.014	0.025
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)
Husband gives wife more power than she gives herself [B]	-0.041*	-0.029	-0.038	-0.034	-0.038	-0.032	0.001	0.009
	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)
Wife and husband agree she is main/joint decision maker [C]	-0.032	-0.015	-0.033	-0.026	-0.014	-0.011	-0.033	-0.029
	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)
Wife and husband agree she has no decision making power [D]	0.055**	0.036	0.078**	0.078**	0.008	0.002	0.051	0.039
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
N	1123	1021	1140	1032	1152	1038	1155	1048
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes
Control Mean[A]	0.36	0.36	0.42	0.42	0.30	0.30	0.71	0.71
Control Mean[B]	0.41	0.41	0.45	0.45	0.35	0.35	0.72	0.72
Control Mean[C]	0.41	0.41	0.45	0.45	0.34	0.34	0.74	0.74
Control Mean[D]	0.32	0.32	0.36	0.36	0.31	0.31	0.68	0.68
[A]=[B]	0.06	0.08	0.23	0.20	0.05	0.06	0.72	0.66
[B]=[C]	0.82	0.74	0.92	0.87	0.46	0.55	0.28	0.30
[C]=[D]	0.02	0.29	0.03	0.05	0.62	0.79	0.09	0.13
[D]=[A]	0.63	0.88	0.22	0.32	0.42	0.28	0.40	0.73
[A]=[C]	0.11	0.17	0.18	0.23	0.18	0.13	0.19	0.14
[B]=[D]	0.02	0.14	0.01	0.03	0.25	0.44	0.24	0.50

Notes: Dependent variables: Binary variable indicating wife experienced act of violence during the last 12 months as reported by the wife at baseline. Percentage point changes are calculated relative to the mean of the relative comparison category. Clustered standard errors at the site level in parentheses. Controls include a set of household characteristics, and site pair. Regressions with and without household controls are reported. Observations in the regression with household controls are approximately 10% lower than in the case without the household controls due to non responses from couples on questions relating to years of education of husband, age of wife and age of husband. * p<0.10, ** p<0.05, *** p<0.01.

Table A5: Effect of EMAP on IPV for households with different levels of decision making patterns

	Physical Violence		Emotional Violence		Sexual Violence		At least one form of Violence	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment & Wife gives herself more power than husband gives her [A]	-0.027	-0.028	-0.028	-0.036	-0.002	-0.010	-0.017	-0.003
	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)
Treatment & Husband gives wife more power than she gives herself [B]	-0.011	0.008	-0.012	-0.007	-0.029	-0.016	-0.026	-0.016
	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)
Treatment & Wife and husband agree she is main/joint decision maker [C]	-0.039	-0.038	0.023	0.013	0.033	0.043	0.051	0.057
	(0.05)	(0.04)	(0.04)	(0.04)	(0.06)	(0.06)	(0.04)	(0.05)
Treatment & Wife and husband agree she has no decision making power [D]	-0.023	-0.013	-0.050	-0.048	-0.009	-0.006	-0.032	-0.016
	(0.04)	(0.04)	(0.06)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
N	1031	928	1040	934	1032	931	1046	943
Household Controls	No	Yes	No	Yes	No	Yes	No	Yes
Control Mean[A]	0.39	0.39	0.49	0.49	0.36	0.36	0.73	0.73
Control Mean[B]	0.35	0.35	0.46	0.46	0.34	0.34	0.72	0.72
Control Mean[C]	0.35	0.35	0.42	0.42	0.29	0.29	0.66	0.66
Control Mean[D]	0.43	0.43	0.52	0.52	0.38	0.38	0.74	0.74

Notes: Dependent variables: Binary variable indicating wife experienced violence/abuse during the last 12 months as reported by the wife at endline. Percentage point changes are calculated relative to the mean of the respective category in the control group. Clustered standard errors at the site level in parentheses. Controls include dependent variable at baseline, dummy variable for missing baseline values of outcome variable, a set of household characteristics and site pair. Controls include a set of household characteristics, and site. Regressions with and without household controls are reported. Observations in the regression with household controls are approximately 10% lower than in the case without the household controls due to non responses from couples on questions relating to years of education of husband, age of wife and age of husband. * p<0.10, ** p<0.05, *** p<0.01.

Chapter 3
Income Shocks and Intrahousehold Resource Allocation: Evidence from rural Ethiopia

3.1 Introduction

In the absence of private insurance markets and adaptive social insurance programmes, households in agrarian economies use a variety of strategies to manage income variability, including risk sharing through informal networks, selling assets and temporary labour market solutions (Grimard, 1997; Harrower and Hoddinott, 2005; Hoddinott, 2006; Kochar, 1995). Informed by the unitary model of the household (Becker, 1991), these studies typically consider the household as one unit without considering the possibility of non-uniform effects within the household. As a result, a large literature on household risk-coping mechanisms focuses on the impacts of shocks measured at the household level and does not take into account how individuals within the household are affected by shocks and how these individuals, in turn, cope with shocks. However, more recently, Brown et al. (2021, 2019) and D'Souza and Tandon (2019) have highlighted the importance of within household inequalities. For instance, Brown et al. (2019) estimate that roughly three-quarters of underweight women and undernourished children in Sub-Saharan Africa are not found in the poorest 20% of households, and around half are not found in the poorest 40%, implying the presence of poor individuals in non-poor households.

Contributing to the within-household inequality strand of the literature, we estimate

how household income shocks affect intrahousehold consumption patterns in agricultural economies and what role labour supply opportunities play in managing household shocks. Our paper complements recent literature that has highlighted the existence of within-household gender-specific disparities in the effects of income shocks on education, labour and asset holdings (Björkman-Nyqvist, 2013; Afridi et al., 2021; Quisumbing et al., 2018). These studies indicate the impact of household-level shocks is gender-specific, and the responses to coping with these shocks are also gendered. Despite the growth of this literature, there is little evidence on the impact of income shocks on female and male expenditures. This study attempts to bridge the knowledge gap in intrahousehold allocation by examining the gender-differentiated effect of income shocks on female and male expenditures in rural Ethiopia.

To capture the causal effect of a negative household income shock on gender-specific expenditures, we exploit the exogenous variation in household farm income caused by rainfall shocks. Rural households in developing countries face a high risk of income volatility due to high dependence on rain-fed agriculture. In such contexts, harvest failure due to drought, floods, storm damage and other climatic events leads to income variability (Morduch, 1995). We use high-resolution rainfall data from TAMSAT (Tropical Application of Meteorology Using Satellite Data and Ground-Based Observations) to measure rainfall shock that acts as an exogenous negative income shock and then merge it with the Living Standard Measurement Survey (LSMS) from rural Ethiopia for three panel years 2011-12, 2013-2014, and 2015-16. The panel data allows us to account for household-level unobserved heterogeneity and establish the causal link between household-level negative income shock and the gender gap in expenditures.

We focus on non-food expenditure to identify gender-differentiated effects on expenditure for two main reasons. First, it rules out the relative price effect channel in identifying the causal relationship between rainfall shock and gender-specific expenditures. Rainfall variability may determine the price of food items; hence, the consumption may change due to the price change. But the price of non-food expenditures measured in this study, such as gender-assignable clothing and shoes, are not directly affected by a rainfall shock, allowing

us to establish a causal relationship between income shock and individual expenditure. Second, individually assignable food expenditures are unavailable even in a rich dataset such as LSMS. LSMS provides data on non-food expenditures like clothing, fabric, and shoes for adult females and males, which allows for finding gender-differentiated effects among adults within the household. This approach of calculating individually assignable expenditures was previously used by several studies on intrahousehold consumption, such as Browning et al. (1994); Dunbar et al. (2013); Calvi et al. (2023)and Lechene et al. (2021).

We investigate the possibility of changes in spousal labour supply decisions with rainfall shocks as a mechanism to explain the intrahousehold gender-differentiated effects in expenditure decisions. We examine both the intensive and extensive margins of spouses' participation in various income-generating activities after a household-level income shock. Given the importance of off-farm labour for women in our context for her welfare outcomes (Buehren et al., 2019), we investigate the heterogeneous effect of wife's participation in off-farm activities on any gender differential that exists in intrahousehold expenditure allocation. Additionally, exploring the nuances of spousal control and management of resources within a collectively-held household farm, we analyse the role of spouses' involvement in farm activities for gender-specific income shock absorption.

Our results indicate gender-differentiated effects of negative income shock on the intrahousehold allocation of expenditures. A negative income shock leads to a decrease in female non-food expenditures by 31.4% relative to male non-food expenditures. The higher budget elasticity of women's expenditure compared to men's expenditure in the intrahousehold allocation of resources implies a higher risk absorption by women than men within a household. Our finding adds to the literature on women's higher susceptibility to impacts of negative income shock than men (Hoddinott, 2006; Quisumbing et al., 2018; Mottaleb and Erenstein, 2018).

We find evidence of spouses' using off-farm employment as an income-smoothing mechanism during a negative household income shock and observe a gender differential in such labour supply adjustments. We find that, relative to the husband, the wife spends 15.5%

more hours on household non-farm activities and spends 10.6% fewer hours on temporary wage employment following an income shock. Relative to their partners, the husbands increase hours spend towards temporary wage employment outside the household, and in contrast, wives increase their hours on non-agricultural activities within the household. We attribute the observed gender differential in labour supply responses after an income shock to women's limited access to off-farm employment outside their homes in Ethiopia due to factors such as cultural, religious, technical and financial constraints, as documented in several studies such as Van den Broeck and Kilic (2019); Amare and Belaineh (2013); Buehren et al. (2019).

Given the importance of off-farm employment in women's empowerment in Sub-Saharan Africa, especially rural areas (Van den Broeck and Kilic, 2019), we further analyse the heterogeneous effect of income shock on gender-specific expenditures based on the wife's participation in non-agricultural activities within the household and outside the household. We observe that the gender-differentiated changes in expenditure following a negative income shock are driven by households where the wife did not engage in any household off-farm employment, such as small-scale business or temporary wage employment. This adds to the existing evidence on the role of off-farm employment in improving women's bargaining power in household decision-making (Maligalig et al., 2019; Anderson and Eswaran, 2009). Both types of employment provide women with an independent income which, in turn, contributes to closing the gender gap in household-level income shock absorption.

Additionally, we explore if the underlying gender-specific control of household farm activities affects the gender differential in household resource allocation during an income shock. We examine if the gender gaps in expenditure change due to farm productivity shock are determined by whether the husband spends more hours per week on household agricultural activities. We find that the wife absorbs the productivity shock when the husband spends more time on household agricultural activities. No gender gap exists in expenditures when the wife is involved in farm activities as much or more than the husband. This is in conjunction with how control of household plots determines the gender differential effect of a farm-related income shock, previously observed in West-African con-

texts, as demonstrated by Duflo and Udry (2004) in Cote d'Ivoire.

A number of caveats to the analysis are noteworthy. First, even though several other coping mechanisms exist, our gender-specific data availability allows us to explore only the spousal labour responses. For instance, the lack of data on gender-specific asset ownership limits our analysis to explore if selling assets owned by a specific gender within the household is a coping mechanism that household use. Second, unlike the West African context, where separate plots exist for females and males, farm production is jointly managed and controlled by men and women in Ethiopia. Hence, we perceive the farm productivity shock through rainfall variability as a household-level shock. However, as we can not decipher precisely the gender-specific contributions to the farm and hence claims to its returns, our results should be seen in the light of the particular setting of rural Ethiopia.

This paper adds to the literature on intrahousehold effects of a negative income shock (Björkman-Nyqvist, 2013; Afridi et al., 2021; Quisumbing et al., 2018). While the existing literature focuses on household-level consumption smoothing, this study estimates individual-level expenditure shifts using novel gender-assignable data. The presence of gender differential in expenditure in the presence of a negative income shock implies the vulnerability of women within the household during income shock and points to the need for specific targeting strategies for women. Moreover, results from our heterogeneous analysis based on spousal control and management of farm activities reveal the importance of women's on-farm participation for gender-equitable absorption of farm productivity shocks.

This paper also contributes to the literature on the role of off-farm employment in rural agricultural economies (Van den Broeck and Kilic, 2019; Dercon, 2002). In addition to being a coping mechanism for poor households, off-farm employment can help address the intrahousehold gender gaps that may arise during income shocks. Our finding that gender differences in expenditure do not exist for households where women engage in off-farm activities implies that off-farm employment mitigates the risk of gender disparities in intrahousehold allocation. This study bridges the gap in understanding the link between women's labour response to shocks and its impact on their relative expenditure compared

to men.

This study generates some policy-relevant insights. Our findings add to the understanding of whom to target for anti-poverty programmes that aim to mitigate income shock effects on households (Chant, 2008). While most programmes target households as a whole for anti-poverty programmes, our findings recommend more finely targeted policies that improve outcomes for the most affected. Adding to the literature on what works for women empowerment (Buvinić and Furst-Nichols, 2016), our finding on the gender gap in women's and men's off-farm opportunities within and outside the household underlines the need for designing gender-specific social protection schemes to help households cope with farm income shocks. Such an approach would account for individual poverty traps within the household and hence promote gender equality within the household.

The paper is structured as follows: section 2 describes the conceptual framework of this study and reviews the associated literature, section 3 explains the study's context and data, and section 4 explains the methodology for the empirical analysis. we discuss the results in section 5 and carry out robustness checks in section 6. Section 7 concludes.

3.2 Conceptual Framework

While it is an empirical question as to how gender-specific expenditures change ex-ante an income shock, in this section, we provide an outline of household decision-making conceptualising the estimation of the gender gap using a simple model. We illustrate that the gender gap in the effect of income shock on expenditure would depend on the expenditure elasticities of demand for gender-specific goods. Drawing heavily on the existing literature on the implications of income shock on intrahousehold resource allocation and gender-specific coping strategies, we hypothesise the existence of a gender gap in managing risks in our context.

Suppose the household comprises two individuals, female and male, who make decisions

on their consumption c_f and c_m, respectively and their labour supply towards farm production L_f and L_m, respectively, that can be traded on a competitive market at wage w_f and w_m. Suppose the production function of the household farm is given by $F(L_f, L_m, r)$, where r is the rainfall variation that affects farm production.

The utility maximisation problem for an individual in the household can be given by

$$\underset{c_i, L_i}{Max}\ u_i(c_i) \tag{3.1}$$

subject to

$$p\ .\ (c_i) \leq F(L_f, L_m, r) - w_f L_f - w_m L_m$$

Assuming that preferences over leisure are separable from preferences over other consumption, problem (3.1) is equivalent to

$$\underset{c_i}{Max}\ u_i(c_i) \tag{3.2}$$

subject to

$$p\ .\ (c_i) \leq \pi^*(r)$$

where

$$\pi^*(r) \equiv \underset{L_f, L_m}{Max}\ F(L_f, L_m, r) - w_f L_f - w_m L_m \tag{3.3}$$

Rainfall, r, affects the individual utility function only through its effect on farm production and hence on budget constraint and, therefore, affects the household's total expenditure.

Suppose total expenditure, $x = p\ \ (c_f + c_m)$, then for $i = f, m$

$$c_i = c_i(p, x) \tag{3.4}$$

Assuming that relative prices of non-food items are not related to rainfall realisations ($\frac{\partial p}{\partial r} = 0$), the above Equation (3.4) implies that the effect of rainfall realizations on expenditure on any particular commodity depends only on the expenditure elasticity of demand for that commodity and on the effect of rainfall on overall expenditure. That is, for any individual i,

$$\frac{dc_i}{dr} = \frac{\partial c_i}{\partial x} * \frac{\partial x}{\partial r} \tag{3.5}$$

A negative productive shock to the farm reduces the income from the farm $\pi^*(r)$, and hence one can expect that $\frac{\partial x}{\partial r} < 0$. We focus on the gender gap of the effect of rainfall shock on individual expenditures, expressed as

$$\frac{dc_f}{dr} - \frac{dc_m}{dr} = (\frac{\partial c_f}{\partial x} - \frac{\partial c_m}{\partial x}) * \frac{\partial x}{\partial r} \tag{3.6}$$

The gender differential effect of negative income shock in households would depend on the magnitude and sign of $\frac{\partial c_f}{\partial x} - \frac{\partial c_m}{\partial x}$. That is, the gender gap in the effect of rainfall shock on expenditure towards a particular commodity depends on the gender differential expenditure elasticities of demand for that particular commodity. However, it is a priori ambiguous the gender differential in expenditure elasticities of individual specific goods. Hence, we describe the existing literature that sheds light on such gender differential elasticities below.

There is substantial evidence in the literature on the systematic difference in the allocation of resources within households by gender. Through a semi-parametric estimation of the Engel curve for households in rural Pakistan, Bhalotra and Attfield (1998) finds that adult males consume more than adult females while there is no gender differential in consumption among children. Using a novel approach to identify individual-level consumption within a collective household model to estimate intrahousehold inequality, Calvi et al. (2023) find that men consume a larger share of the budget relative to women, who in turn consume relatively more than boys and girls. Based on a reference household comprising one man, one woman, one girl and one boy, they compute that the man consumes 36 percent of the total budget, the woman consumes 30 percent, and the boy and girl

each consume 17 percent, respectively. They also find that even in households which have per capita expenditure above the poverty line, women and children face high probabilities of living in poverty. Using data from thirty countries in sub-Saharan Africa, Brown et al. (2019) documents that even non-poor households have high shares of undernourished women and children, implying the gender gap in resource sharing in households.

Given there exists a gender gap in the distribution of household resources, it is possible that a gender differential exists in the presence of a household income shock. Most of the work on gender differential effects of income shocks on household outcomes have focused on outcomes such as labour time allocation, the value of asset holdings, children's educational outcomes, and health.[1] But studies that examine the gender gap in individual-level expenditures are almost absent. One exception would be Mottaleb et al. (2015) which provides evidence from Bangladesh on the gender-differentiated effect of negative income shock on children's educational expenditure. They find that boys' schooling expenditure was reduced following a cyclone, and girls' schooling expenditure did not. To the best of our knowledge, none of the studies explores the gender differential effect of income shock on adult expenditures.

Within the literature on the effect of income shock that examines consumption and expenditure changes by gender, the focus has been mainly on male-headed and female-headed households. Overall, the evidence so far points out that female-headed households are more vulnerable to income shocks than male-headed counterparts. Using panel data from Malawi, Asfaw and Maggio (2018) documents that adverse welfare effects following a weather shock were more severe for households where women solely managed land. Mottaleb and Erenstein (2018) finds that female-headed households in Bangladesh reduced food and non-food consumption more than male-headed households as a result of commodity price shocks. Kumar and Quisumbing (2013) uses a similar strategy by comparing female and male-headed households in the presence of a food price crisis in rural Ethiopia. They find that female-headed households are more vulnerable to food price changes and

[1] (Afridi et al., 2021; Agamile et al., 2021; Maitra and Tagat, 2019) for labour time allocation, (Quisumbing et al., 2018; Rakib and Matz, 2016; Goh et al., 2012) for asset holdings, (Björkman-Nyqvist, 2013; Chaudhury et al., 2006) for children's educational outcomes, (Neumayer and Plümper, 2007) for health.

are more likely to have experienced a food price shock.

While gender plays a significant role in the effect of an income shock on individual consumption in a household setting, it is also an important characteristic of the coping mechanisms used to smooth consumption. There exists a rich literature on how households in developing countries with borrowing constraints cope with income shocks through diversifying crops (Hassan and Nhemachena, 2008), diversifying income sources such as working in non-farm sector (Colmer, 2021; Beegle et al., 2006), selling household assets (Hoddinott, 2006; Andersson et al., 2011), and migration (Minale, 2018; Morten, 2019). However, little is known about individual-specific responses to shocks and the role that gender plays in the coping process. Factors such as social norms and power dynamics within the household may affect gender inequalities in coping capability against income shocks. Using data from rural Ethiopia, Kumar and Quisumbing (2013) compare the coping strategies of female and male-headed households in the presence of food price shock. They find that female-headed households ration food consumption during good months to cope with food price shock. Afridi et al. (2021) highlights a gender gap in an individual's ability to cope with agricultural productivity shock within a household. They find that women are less likely to work outside their village in response to droughts, explained by gender norms constraining women's access to non-farm work opportunities. Beck et al. (2019) indicates higher sensitivity of female wage employment to fluctuations in coffee prices such that in periods of high prices, women are less likely than men to undertake wage employment. In this study, we focus on the coping strategy of income diversification through labour supply adjustments among couples. We explain below the individual labour adjustment mechanism from the aforementioned simple household model.

From the first order conditions of Equation (3.3), we get

$$\frac{\partial F(L_f, L_m)}{\partial L_i} = w_i, i = f, m \tag{3.7}$$

The opportunity cost of an additional unit of time spent on the production of farm goods is the spouses' wage in any non-farm activity. A rainfall shock changes the marginal

productivity of on-farm labour and its returns. In that case, the marginal productivity of labour from household agriculture is less than wage in non-farm activities. According to the first order condition of farm profit maximisation, the spouse i would spend less time working for the household agriculture and more for leisure or other temporary non-farm employment. Constraints such as availability of alternative employment, mobility, and social norms often determine such changes in labour even though the equilibrium conditions imply that spouse i would allocate less time towards farm activities and more time towards leisure or non-farm labour. We illustrate the gender gap in labour supply adjustments following a productivity shock by analysing the differences in individual labour supply decisions.

3.3 Context and Data

3.1.1 Context

The setting for this study is Ethiopia, a low-income, agrarian and drought-prone country in Sub-Saharan Africa. As of 2021, agriculture constitutes 37.6% of the GDP in Ethiopia and is the sector which employs about 67% of the total population.[2] 78% of the population in Ethiopia live in rural areas whose main livelihood is agriculture.[3]

Rainfall is an important component for agriculture in Ethiopia as in the other Sub-Saharan African countries (Miguel et al., 2004; Alem et al., 2010; Demeke et al., 2011). It plays a vital part in income generation and has welfare impacts at the household and individual levels. Segele and Lamb (2005),Bewket (2009), and Alemayehu and Bewket (2016) show that variability in agricultural production in Ethiopia is significantly correlated with rainfall variability. The experience of drought has been increasing over the last decades in Ethiopia, and so has the proportion of the population affected by it (Adenew, 2004). With little temperature variation within years and across years, rainfall remains an impor-

[2]World Bank estimates
[3]World Bank estimates

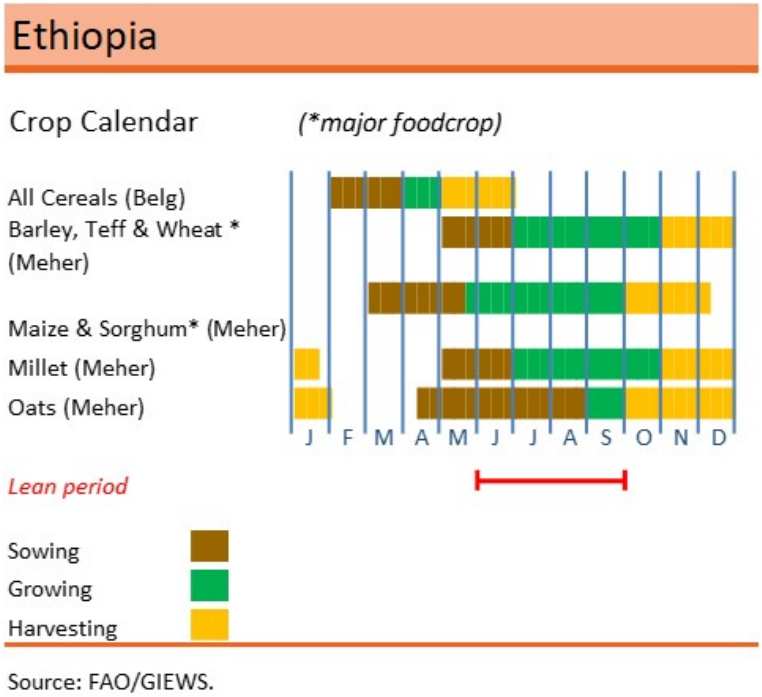
tant dimension of weather variation in Ethiopia. Hence, in such a context, understanding how income variation proxied by rainfall shocks affects the intrahousehold allocation of resources by gender would be of crucial consequence for building resilient livelihoods.

Ethiopia has two main growing seasons, *Belg*, from February to September, and, *Meher*, from March to December in a typical year. *Meher* is the main growing season for crops such as barley, teff, wheat, maize and sorghum. Figure 3.1 presents the sowing, growing and harvesting months for both *Belg* and *Meher* season. The surveys used in this study were conducted soon after the harvest season of *Meher* for the three rounds for all households across the country. For the purpose of this study, we use the rainfall shocks during the *Meher* season due to the timing of the survey.[4] The timing of the survey at the same time of the year for every panel year ensured no measurement error of consumption and labour supply as these outcomes tend to vary within a year in such settings (Paxson, 1993; Dercon and Krishnan, 2000; Skoufias, 1993). Figure 3.2 represents the timing of survey for a typical panel year.

Even though the Ethiopian population is heavily dependent on agriculture, temporary or casual off-farm labour is also prevalent, with 78.1% of paid employees in the age group of 15-64 years engaged in temporary labour in rural areas (ILO, 2013). Off-farm employment is found to contribute towards income smoothing and poverty reduction in Ethiopia (Van Den Berg and Kumbi, 2006; Bezu et al., 2012). Within the sector of off-farm employment, there exists a gender difference in off-farm casual wage employment where 4 percent of women and 11 percent of men participate in temporary off-farm labour (Van den Broeck and Kilic, 2019). While some studies indicate that women's low participation in off-farm paid employment in such settings to the fact that women most naturally seek employment in the farm sector (Bhalotra and Umana-Aponte, 2010), others point to the low demand and cultural barriers that women face for engaging in off-farm employment (Buehren et al., 2019).

[4] As an alternative specification, we define income shocks as rainfall shocks during the entire year in Appendix C, and is able to demonstrate that the productivity shock during *Meher* determine for gender gap in expenditures ex-ante an income shock.

Figure 3.1: Crop Calendar in Ethiopia



3.2.2 Data

This study uses data from Living Standard Measurement Study-Integrated Surveys on Agriculture (LSMS-ISA) Ethiopian Rural Socioeconomic Survey (ERSS) for the panel years 2011-2012, 2013-14 and 2015-16.[5] The first round of Ethiopian LSMS-ISA covers 3,969 rural households across 18 districts of Ethiopia, out of which follow up surveys of 3,776 households are available for the second round, and 3,699 are available for the third round. By sampling households in all nine regions of Ethiopia, the data is representative of all rural areas in Ethiopia (see Figure 3.3). To investigate intrahousehold responses, we keep only households with information on both the head of household and their spouse on all three rounds of the survey and households who recorded farm activity during the current season. Hence, the final sample of the study is 1589 households, each observed thrice.[6] The survey contains detailed and comprehensive information at the household level on expenditures (including some individual assignable expenditures), household agriculture, and

[5]For more details, visit: `https://microdata.worldbank.org/index.php/catalog/2053`

[6]We keep only households who recorded farm activity during the current season since we consider only exogenous productivity shock due to rainfall variations.

individual level on labour time allocation, health and education details. Figure 3.2 outlines a typical panel year which records the household survey on expenditure and labour supply at the end of the harvest of *Meher* season.

Table 3.1 presents descriptive statistics on some basic characteristics of households in this study.[7] Almost all the households in the sample are male-headed, with an average household size of 6. The average age of the husband is 45, and the average age of the wife is 37. 38.2% of husbands have attended school, and 18.9% of wives have attended school. On average, 17% of households have self-reported to have faced drought during the panel years. This is similar to the proportion of households that faced negative rainfall shock as per our rainfall data calculation.

The consumption module of the survey contains non-food expenditure details made towards clothing, kitchen equipment, furniture, ceremonial expenses, transport, tobacco and so on. Individually assignable expenditures are only available for clothes, shoes and fabric. Even though this could be a limitation of our study, previous work on household and individual expenditures suggest that these could be a good indicator of individual expenditures (Browning et al., 1994; Dunbar et al., 2013; Calvi et al., 2023; Lechene et al., 2021). We categorise such expenditures as expenses for adult females and adult males. The recalling period for the gender-specific expenditures made is one year, which is a standard practice in survey methodology for non-food goods which are purchased with less frequency Deaton and Grosh (2000). On an average year, out of the total non-food expenditures, households spend 10.3% on female expenditure, 13.6% on male expenditure, 15% on children, 22.1% on minor purchases, 6.3% on major purchases and 20.2% on ceremonies. The summary statistics show that the share of non-food expenditures spent towards male expenditures is more than female expenditures. The total yearly non-food expenditure is an average of around 3880 Birr, and the total weekly food expenditure is around 139 Birr.

A significant majority of women (50.5%) and men (75%) are employed in household agricultural activities. 14.9% of wives and 12.1% of husbands engage in non-agricultural household

[7] Detailed description of the variables used are available in Appendix E.

activities. A very low proportion of households engage in work outside the household, and men are more likely to work in those sectors. 6.6% of husbands engage in temporary wage employment, while only 3.4% of wives engage in temporary wage employment. Similarly, 3.1% of husbands and 1% of wives work in permanent wage labour. In intensive margins of labour participation, women spend an average of 10 hours per week on household farm activities, and men spend an average of 20 hours per week on household farms.[8] Wives spend, on average, 3.5 hours per week on household non-agriculture activities and 0.4 hours per week on temporary wage labour outside the household, compared to 2.3 hours per week and 1.1 hours per week, respectively, for men.

Rainfall data used in this study, which is considered a proxy for household income, is collected from TAMSAT (Tropical Application of Meteorology Using Satellite Data and Ground-Based Observations).[9] TAMSAT has high-resolution data of 4km x 4km (0.0375 degrees) recorded using satellite data and ground-based observation. In the LSMS survey, geo-referenced information on households is available at the level of enumeration area of the survey. An enumeration area is the primary sampling unit in the survey, and each enumeration area contains approximately 12 households. In order to use rainfall shocks as the exogenous variation on household income, we use monthly rainfall data available for each enumeration area. Figure 3.3 represents the enumeration areas for which the rainfall data is calculated within each district (*Woreda*) in Ethiopia.

Following the literature which uses rainfall data to assess the effect on various household level outcomes (Maccini and Yang, 2009; Björkman-Nyqvist, 2013; Rocha and Soares, 2015), we calculate rainfall deviation as the difference between the natural log of rainfall and the natural log of long term average of ten years of rainfall during the current season. Rainfall deviation for household h during season t is constructed as below:

$$Rainfall\ Deviation_{ht} = lnr_{ht} - ln\overline{r_h}$$

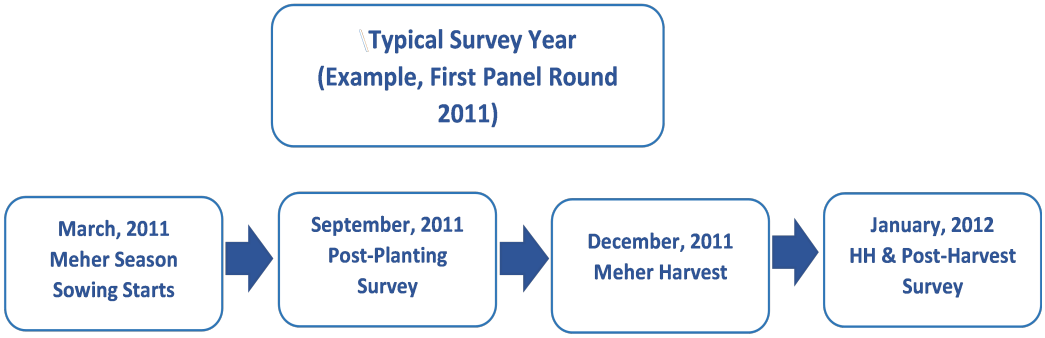
[8] It is worth noting that these numbers are based on post-harvesting weeks.

[9] For more details: `http://www.tamsat.org.uk/index.php/data`, Maidment et al. (2017); Tarnavsky et al. (2014); Maidment et al. (2014)

Based on the above, a negative sign in the rainfall deviation would mean that the current season rainfall is less than the long-term average and vice versa for the positive sign. For example, a negative value of 0.15 of rainfall deviation means 15% less rainfall than the long-term average.

We define a household experiencing a negative rainfall shock as a binary variable equal to one if the deviation in rainfall that the household experiences during the main agricultural season are more than one standard deviation away to the left from the average rainfall deviation that households in the sample experience. Figures 3.4, 3.5, and 3.6 presents the enumeration areas that experienced a negative rainfall shock during the panel years.[10] It can be observed that the distribution of rainfall shock is heterogeneous spatially and across the years. This shows the exogenous nature of rainfall shocks in Ethiopia; hence, rainfall shocks are a good proxy for income shocks for rural rain-dependent agricultural households. In Table 3.1, we report the proportion of households that experienced a negative rainfall shock during the panel years. 10.1% of households in the sample experienced a negative rainfall shock during the *Meher* season of 2011, 16.8% in 2013 and 18.7% in 2015.

Figure 3.2: A Typical Panel Year

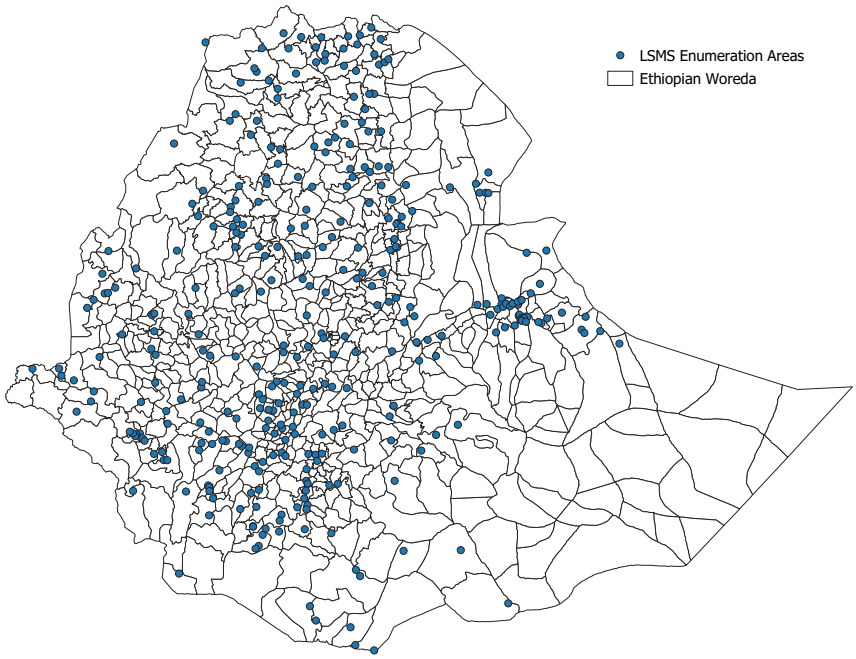


[10]Out of 1489 households surveyed in three panel years, 929 did not experience negative rainfall shock during any of the years, 441 households experienced rainfall shocks during one year and 357 experienced during two years.

Table 3.1: Descriptive statistics

	Mean	SD	Count
Household Characteristics			
Household Head is Male	0.998	0.042	4460
Household Size	5.923	1.998	4465
Husband's Age	45.396	14.225	4467
Wife's Age	36.668	11.284	4467
Husband Attended School	0.382	0.486	4467
Wife Attended School	0.189	0.391	4465
Household Faced Drought	0.170	0.376	4467
Negative Rainfall Shock			
Negative Rainfall Shock in 2011	0.101	0.302	1489
Negative Rainfall Shock in 2013	0.168	0.374	1489
Negative Rainfall Shock in 2015	0.187	0.390	1489
Expenditure Shares			
Female Expenditure	0.103	0.096	4467
Male Expenditure	0.136	0.128	4467
Children's Expenditure	0.150	0.133	4467
Minor purchases	0.221	0.158	4467
Major purchases	0.063	0.079	4467
Ceremonies	0.202	0.191	4467
Total Non-food Expenditure (previous 1 year, in Birr)	3879.540	3731.168	4467
Total Food Expenditure (previous 7 days, in Birr)	138.819	874.821	4467
Labour Participation - Intensive Margin, previous 7 days			
Household Agriculture - Wife	10.131	14.896	4444
Household Agriculture - Husband	19.465	18.220	4458
Household Non-agriculture - Wife	3.533	10.824	4443
Household Non-agriculture - Husband	2.265	8.271	4436
Temporary Wage Labour - Wife	0.424	3.368	4436
Temporary Wage Labour - Husband	1.127	5.829	4439
Permanent Wage Labour - Wife	0.080	1.702	4437
Permanent Wage Labour - Husband	0.799	6.286	4438
Labour Participation - Extensive Margin, previous 7 days			
Household Agriculture - Wife	0.505	0.500	4467
Household Agriculture - Husband	0.750	0.433	4467
Household Non-agriculture - Wife	0.149	0.356	4467
Household Non-agriculture - Husband	0.121	0.326	4467
Temporary Wage Labour - Wife	0.034	0.180	4467
Temporary Wage Labour - Husband	0.066	0.249	4467
Permanent Wage Labour - Wife	0.010	0.101	4467
Permanent Wage Labour - Husband	0.031	0.172	4467

Figure 3.3: Districts and Enumeration Areas Covered Under LSMS Ethiopia Survey



3.4 Empirical Strategy

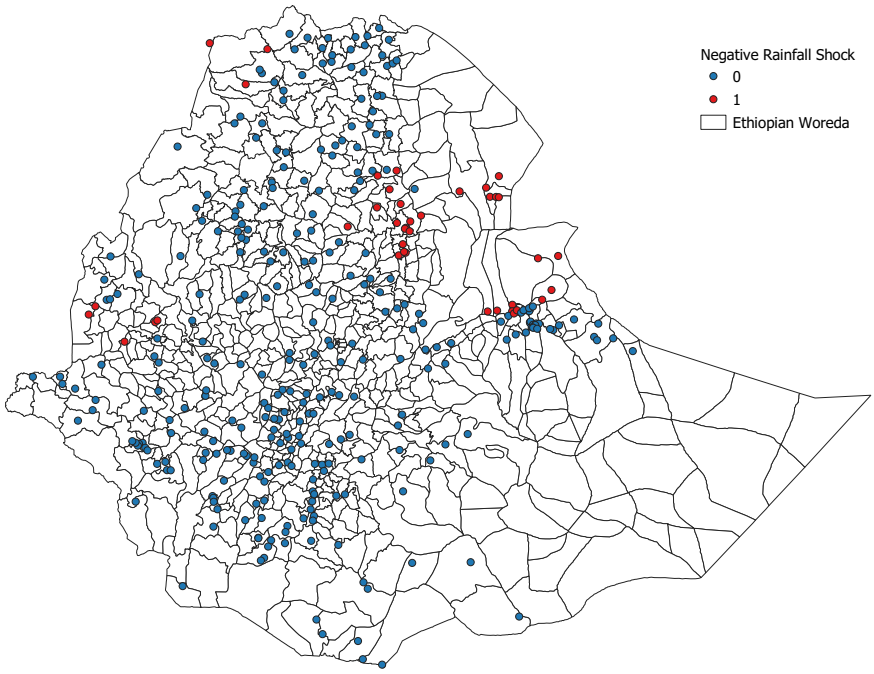
In order to test for gender-differentiated effects of a household-level income shock on resource allocation, we use the following estimation equation:

$$Y_{ht}^{i} = \alpha_{ht}^{i} + \beta_{ht}^{i} Income\ \ Shock_{ht} + \gamma_h + \delta_t + \epsilon_{ht}^{i} \tag{3.8}$$

where Y_{ht}^{i} represents expenditure made towards individually assignable goods for individual i in household h during year t. *Income Shock* is an indicator variable equal to one if household h experiences a negative rainfall shock during year t, and zero otherwise.[11] The dependent variables used in this study, female and male expenditures, are log-transformed, and we interpret regression coefficients as a percentage change in the outcome variable due to rainfall shock. Although the main focus of this paper is to understand individual-level

[11]Besides this core explanatory variable, we also check with two other rainfall shock measures, in Appendix B. One, rainfall deviations of at least one standard deviation to the right of the long-term mean, and two, rainfall deviations of at least one standard deviation to the right or the left of the long-term mean.

Figure 3.4: Negative Rainfall shock during *Meher* 2011



expenditure changes by gender, we additionally report the effect of negative income shock on expenditures observable only at the household level, such as food, major expenses, and expenditure towards ceremonies in Appendix D. We observe no changes in household-level expenditures ex-ante a negative income shock.

γ_h represents household fixed effects that control for unobserved, time-invariant, household-level factors that may affect expenditure allocation in a household.[12] As a robustness check later in the study, we also include community fixed effect to control for unobserved community characteristics that may affect the household distribution of resources. δ_t is a linear time trend, and ϵ^i_{ht} is the error term. The standard errors are clustered at the enumeration area level since the rainfall shock measure is defined at the enumeration area level, and shocks within enumeration areas are assumed to be correlated. In all our specifications, we account for sampling weights used for selecting households in the survey.

[12]We check our empirical strategy with individual level fixed effect as well to account for any individual time-invariant characteristics. We find the same results as when accounting for household-level fixed effects.

Figure 3.5: Negative Rainfall shock during *Meher* 2013

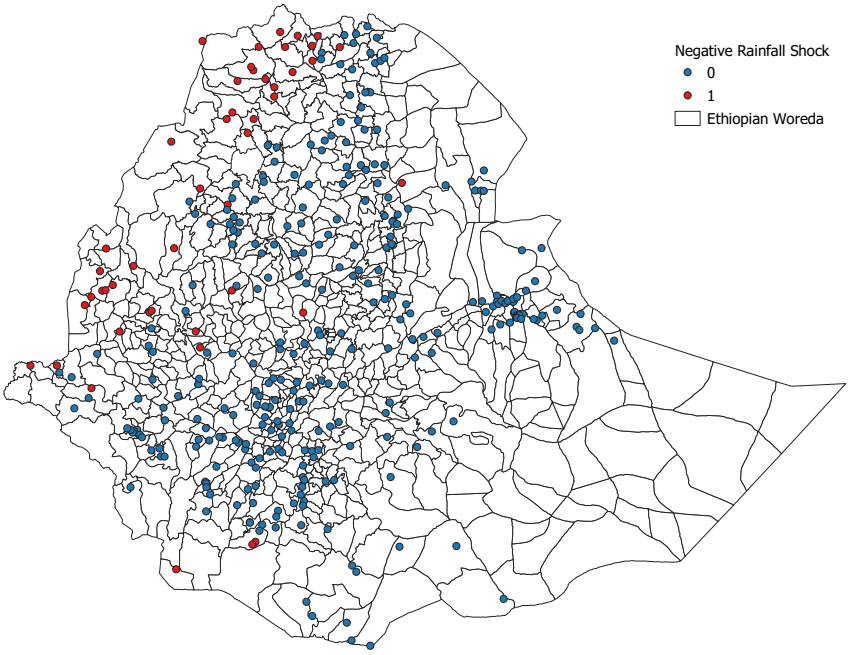
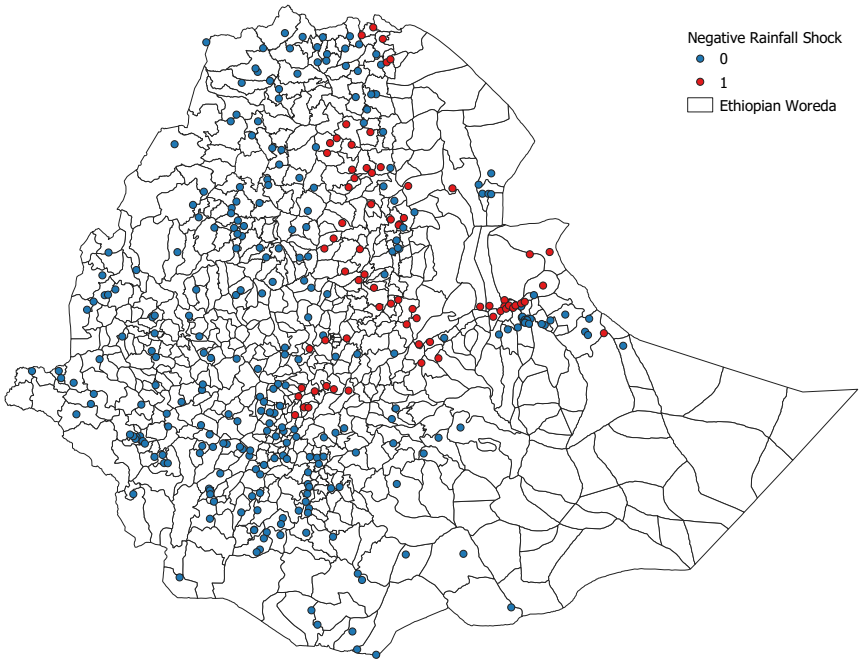


Figure 3.6: Negative Rainfall shock during *Meher* 2015



β^i_{ht} estimates the effect of income shock on expenditure decisions under the assumption that rainfall shock is exogenous and is hence uncorrelated with other shocks to the demand or supply of non-food items. In Figure A3.1, we show that a negative rainfall shock has a significant negative effect on the revenue from crop sales for households in the data. This provides confidence for using negative rainfall shock as a proxy for household income in our setting.[13] As in Afridi et al. (2021), our leading coefficient of interest is the difference between β^i_{ht} for female assignable expenditures and male assignable expenditures, which estimates the impact of income shock on women relative to men for non-food expenditures. We use a similar specification as Equation (3.8) to understand the gender differences in the coping mechanism of individual labour supply adjustments where Y^i_{ht} indicates the labour force participation of individual i towards other income generating activity.

3.5 Results

3.1.1 Gender Differentiated Effect of Income Shock on Expenditures

We begin by presenting our findings on the gender-differentiated effects on expenditures following a negative income shock in the household. In Table 3.2, we document the effect of income shock on female and male non-food expenditures, followed by the effect on women's expenditures relative to men's. We find that a negative rainfall shock does not significantly change expenditure towards female or male-specific non-food expenditures. However, we find that female-specific expenditures in households reduced significantly by 31.4% relative to men in the presence of a negative income shock, pointing to a gender gap in intrahousehold resource allocation. Linking to the conceptual framework Equation (3.6), the empirical finding indicates that the demand elasticity for female-specific goods is higher relative to male-specific goods during an income shock.

[13] Rainfall shocks also affect livestock production, which is an income source for households in our setting Abay and Jensen (2020). Due to data limitations on calculating income from livestock production, we are able to show only the effect of negative rainfall shock on crop sales.

The higher budget elasticities of women's expenditure compared to men's expenditure implies more absorption of household-level income shock by women relative to men. Our findings mirror the existing empirical literature on gender-differentiated effects of household income shock, such as Hoddinott (2006) and Quisumbing et al. (2018) among others. For instance, Hoddinott (2006) finds that women's Body Mass Index (BMI) fell following a drought in Zimbabwe, whereas men's BMI was unaffected. Analysing the effect of household shocks on asset holdings in Uganda, Quisumbing et al. (2018) finds that drought reduces the wife's non-land assets more relative to the husband's. The results from our analysis add to the literature on women's higher susceptibility to impacts of negative income shock than men.

Table 3.2: Effect of Income Shock on Individual Expenditures

	Female		Male		Difference	
	(1)	(2)	(3)	(4)	(5)	(6)
Negative Income Shock	-0.138	-0.136	0.177	0.181	-0.314***	-0.317***
	(0.148)	(0.144)	(0.188)	(0.184)	(0.118)	(0.118)
N	4467	4462	4467	4462	4467	4462
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Other HH Controls	No	Yes	No	Yes	No	Yes

Notes: Dependent variables: Log transformed expenditure on different assignable non-food household items during the current year. The columns 'Female' and 'Male' indicates the effect of income shock on female and male non-food expenditures, respectively. Columns 'Difference' represents the impact of income shock on women's expenditure relative to men's. All specifications control for year and household fixed effects. Estimations without and with household controls are presented. Standard errors clustered at the enumeration level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

3.2.2 Labour Supply as a Mechanism to Cope with Income Shocks

Given that we find gender-differentiated effects on expenditures during an income shock, we check if the mechanism of labour supply could plausibly explain a part of the effect. An assumption we made in our simple household model while calculating the impact of income shock on expenditure is that leisure is separable from other consumption. However, it could be that the effect of income shock on individual expenditures is mediated by the

effect of income shock on individual labour supply decisions. If the rainfall affects labour supply decisions, it may, in turn, affect expenditures made towards certain members of the household. In this subsection, we analyse if a negative income shock due to rainfall shock affects female and male labour supply towards different activities.

Results from Table 3.3 provide evidence on the mechanism of labour supply adjustments for the gender differential in expenditures following an income shock. We find that there exists a gender differential of 10.6% where the husband spends significantly more labour hours in temporary off-farm employment as compared to the wife. In the presence of an income shock, we find that the wife and the husband increase their weekly number of hours spent on temporary off-farm labour by 9.5% and 20.2%, respectively. We also observe a 15.5% increase in the number of hours the wife spends on household non-farm activities relative to the husband. We do not find changes in the labour hours that couples allocate to any other income-generating activity. Relative to the husband, the wife spends more hours on household non-farm activities and less on temporary wage employment during an income shock.

As outlined in Dercon (2002), adjusting labour supply towards different income-generating activities is a prominent mechanism that rural households in Ethiopia use in the face of income shocks. Such coping strategies often include women's participation in off-farm activities in the form of self-employment or wage employment (Porter, 2012). Based on results from Van den Broeck and Kilic (2019), participation in self-employment is more common than in wage employment for women in Ethiopia, similar to other Sub-Saharan countries like Nigeria and Tanzania. This concurs with our finding that the wife engages more in non-farm activities such as small-scale business within the home and spends fewer hours towards wage employment outside the home relative to the husband.

The findings on the increase in hours spent by the wife and the husband towards non-farm activities indicate the role that off-farm employment, such as self-employment and productive safety net schemes, play in order to adjust to household income shocks among

rural poor (Ba et al., 2021; Adjognon et al., 2017; Mathenge and Tschirley, 2015).[14] The results also imply that husbands are able to increase their labour hours towards activities outside the home in the form of wage employment relative to their wives. In contrast, women increase their labour hours relative to their husbands to work within the household on non-agricultural activities. This particular effect in gender differential labour supply could be explained by women's limited access to off-farm employment outside their homes in Ethiopia due to factors such as cultural, religious, technical and financial constraints, as documented in several studies such as Van den Broeck and Kilic (2019); Amare and Belaineh (2013); Buehren et al. (2019).

Table 3.3: Effect of Income Shock on Labour Participation (Intensive Margins)

	HH Farm Female	HH Farm Male	HH Non Farm Female	HH Non Farm Male	Temporary Labour Female	Temporary Labour Male	Permanent Labour Female	Permanent Labour Male
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Negative Income Shock	-0.079	0.013	0.183	0.029	0.095*	0.202**	0.006	-0.046
	(0.162)	(0.186)	(0.112)	(0.065)	(0.051)	(0.079)	(0.007)	(0.036)
Difference		-0.093		0.155*		-0.106*		0.053
		(0.213)		(0.085)		(0.057)		(0.038)
N	4443	4458	4443	4436	4436	4439	4437	4438
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Dependent variables: Log transformation of number of hours spent in the last seven days by wife and husband on the income generating activity. The first row indicates the effect of negative income shock on the number of hours spent spent in the past week by wife and husband on each activity. Row 'Difference' represents the impact of income shock on number of hours women spend working on the activity relative to men. All specifications control for year and household fixed effects. Standard errors clustered at the enumeration level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

We also investigate if there exists a gender gap in labour supply adjustments at an extensive margin in Table 3.4, and find no significant effects. At an extensive margin, we observe a 5.4 percentage points increase in the husband's rates of participation towards off-farm temporary labour and a 2.4 percentage point decrease in his participation towards perma-

[14]Temporary off-farm wage employment in rural Ethiopia includes farm worker for pay, labourer, domestic servant, unskilled worker, skilled labourers such as builders, flour mill operator, driver and mechanic (Beyene, 2008). Household non-farm activities include small trading, selling fuelwood, making charcoal, selling fruit, making pottery and handicrafts and stone mining (Woldehanna, 2002).

nent salaried employment. However, the participation of the wife relative to the husband in off-farm employment is not significantly different when a household experiences income shock.

Table 3.4: Effect of Income Shock on Labour Participation (Extensive Margins)

	HH Farm Female	HH Farm Male	HH Non Farm Female	HH Non Farm Male	Temporary Labour Female	Temporary Labour Male	Permanent Labour Female	Permanent Labour Male
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Negative Income Shock	-0.018	0.016	0.044	0.007	0.027	0.054*	-0.006	-0.024**
	(0.049)	(0.041)	(0.035)	(0.024)	(0.021)	(0.029)	(0.006)	(0.011)
Difference		-0.035		0.037		-0.027		0.018
		(0.060)		(0.027)		(0.020)		(0.012)
N	4467	4467	4467	4467	4467	4467	4467	4467
Mean Y	0.51	0.75	0.15	0.12	0.03	0.07	0.01	0.03
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Dependent variables: Dichotomous variable equal to one if individual worked in the last seven days on the income generating activity listed and 0 otherwise. The first row indicates the effect of negative income shock on the participation of wife and husband towards each activity. Row 'Difference' represents the impact of income shock on patricipation of women towards the activity relative to men. All specifications control for year and household fixed effects. Standard errors clustered at the enumeration level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

3.3.3 Women's Off-farm Employment as a Mediation to the Gender Gap in Shock Absorption

In the spirit of existing literature that underlines the importance of off-farm employment in women's empowerment in Sub-Saharan Africa, especially rural areas (Van den Broeck and Kilic, 2019), we investigate if wife's participation in off-farm activities mediates observed gender gap in expenditure changes during household income shock. As observed above, a gender gap exists in labour supply changes with respect to non-agricultural activities within the household and temporary wage employment outside the household. We follow up this finding to further analyse the heterogeneous effect of income shock on gender-specific expenditures based on the wife's participation in non-agricultural activities within the household and temporary wage employment outside the household.

From Table 3.5 and Table 3.6, we observe that the gender-differentiated changes in expenditure following a negative income shock are driven by households where the wife did not engage in any household off-farm employment or temporary wage employment. We define the wife being engaged in household off-farm activities and temporary wage employment as dichotomous variables equal to one if she spends more than zero hours in the activity in the past week at the time of the survey and equal to zero if she spends zero hours in temporary labour.[15] The results in Panel B of Table 3.5 and Table 3.6 indicate that, in households where the wife did not engage in household-level off-farm employment nor temporary wage employment, female expenditures reduced significantly by 28.6% and 29.9%, respectively, relative to male expenditures. However, there is no statistically significant evidence of a gender-differentiated effect on expenditures following a negative income shock in households where the wife participated in household-level off-farm activities or temporary wage employment. But it is worth noting that the point estimates are larger for the wives engaged in non-agricultural household activities but imprecisely estimated due to the low share of women who are engaged in non-agricultural household activities (15%) and temporary wage employment (3.4%).

As an extension to our heterogeneity analysis of the effect of household income shock on the gender gap in expenditures based on the wife's participation in temporary wage employment outside the home, we analyse the specific effect based on the wife's participation in a safety net program in Ethiopia, called Productive Safety Net Programme (PSNP). PSNP is a programme aimed at reducing food insecurity by providing economic opportunities through cash transfers, public works, and nutritional feeding programmes. Based on Table 3.7, the gender gap in expenditures ex-ante an income shock was only observed in households where the wife did not participate in the safety net program (Panel B, Columns 5 and 6). But, note that similar to the results of household non-agricultural activities wage employment, the point estimates for women who are employed in PSNP

[15]Rural agriculture labour participation may be seasonal and these effects may be driven by the timing of the survey. However, each round of the survey was conducted around the same period of the year, that is, after the harvest of crops from the main growing season. This provides confidence in our labour participation estimations.

are large but imprecisely estimated due to the low share of women in the sample who participated in the program (3.3%). The analysis can still be considered as an indication that women's participation in safety net programs in rural Ethiopia helps them to absorb the gender gap in expenditure changes during household income shocks.

The estimates on the heterogeneous effects of negative rainfall shock based on the wife's involvement in off-farm employment within the household and outside the household implies that off-farm employment help offset possible gender differentiated effect of income shock in rural settings. Both types of employment provide women with an independent income which, in turn, contributes to closing the gender gap in household-level income shock absorption. Additionally, working outside the household farm can be deemed as an indicator of improvement in women's bargaining power, which could improve her relative position in the household for the allocation of resources. This finding is consistent with studies related to women's employment outside the home, such as Anderson and Eswaran (2009), which provides evidence for distinctive effects of household-based employment and employment outside the home.[16]

3.4.4 Heterogeneity based on Time Spent by Couples on On-farm Activities

In Ethiopia, family plots are owned and managed jointly by husband and wife, unlike the West African countries where wife and husband manage separate plots Slavchevska et al. (2021). Nevertheless, one spouse may have more control over farm-related decisions than the other. In that case, an income shock through farm-related productivity may affect individual expenditures based on who controls and manages the farm and its outputs. In this subsection, we check if the change in female expenditures relative to males due to farm productivity shock differs based on who controls the farm production. We proxy the number of hours the partner spends on farm activities as an indication of the control

[16]Using data from rural Bangladesh, Anderson and Eswaran (2009) finds that working outside the family farm improves women's autonomy as compared to working on the family farm.

Table 3.5: Gender Differentiated Effect on Expenditures based on Wife's Participation in Non-Agricultural Household Activites

	Female		Male		Difference	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A - Wife engaged in non-agricultural household activites						
Negative Income Shock	0.108	0.154	0.605	0.644	-0.497	-0.490
	(0.477)	(0.464)	(0.413)	(0.417)	(0.437)	(0.441)
N	4467	4462	4467	4462	4467	4462
Panel B - Wife not engaged in non-agricultural household activites						
Negative Income Shock	-0.190	-0.197	0.096	0.096	-0.286***	-0.293***
	(0.174)	(0.170)	(0.206)	(0.201)	(0.108)	(0.107)
N	4467	4462	4467	4462	4467	4462
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Other HH Controls	No	Yes	No	Yes	No	Yes

Notes: Dependent variables: Log transformed expenditure on different assignable non-food household items during the current year. The columns 'Female' and 'Male' indicates the effect of income shock on female and male non-food expenditures, respectively. Columns 'Difference' represents the impact of income shock on women's expenditure relative to men's. Panel A indicates the effect of negative income shock on the non-food expenditures if wife participated in non-agricultural household activites after the harvest season and panel B indicates the effect of negative income shock on non-food expenditures if wife did not. All specifications control for year and household fixed effects. Estimations without and with household controls are presented. Standard errors clustered at the enumeration level in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table 3.6: Gender Differentiated Effect on Expenditures based on Wife's Participation in Temporary Employment

	Female		Male		Difference	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A - Wife engaged in temporary off-farm labour						
Negative Income Shock	-0.422	-0.280	0.244	0.336	-0.665	-0.616
	(0.468)	(0.482)	(0.515)	(0.517)	(0.432)	(0.446)
N	4467	4465	4467	4465	4467	4465
Panel B - Wife not engaged in temporary off-farm labour						
Negative Income Shock	-0.130	-0.138	0.169	0.171	-0.299**	-0.309**
	(0.153)	(0.150)	(0.196)	(0.193)	(0.123)	(0.123)
N	4467	4465	4467	4465	4467	4465
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Other HH Controls	No	Yes	No	Yes	No	Yes

Notes: Dependent variables: Log transformed expenditure on different assignable non-food household items during the current year. The columns 'Female' and 'Male' indicates the effect of income shock on female and male non-food expenditures, respectively. Columns 'Difference' represents the impact of income shock on women's expenditure relative to men's. Panel A indicates the effect of negative income shock on the non-food expenditures if wife participated in temporary labour after the harvest season and panel B indicates the effect of negative income shock on non-food expenditures if wife did not. All specifications control for year and household fixed effects. Estimations without and with household controls are presented. Standard errors clustered at the enumeration level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table 3.7: Gender Differentiated Effect on Expenditures based on Wife's Participation in PSNP

	Female		Male		Difference	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A - Wife Engaged in Safety Net Program (PSNP)						
Negative Income Shock	-1.799***	-1.719***	-0.408	-0.323	-1.391	-1.395
	(0.536)	(0.521)	(0.819)	(0.816)	(0.968)	(0.967)
N	4461	4459	4461	4459	4461	4459
Panel B - Wife not Engaged in Safety Net Program (PSNP)						
Negative Income Shock	-0.073	-0.077	0.202	0.206	-0.275**	-0.282**
	(0.148)	(0.146)	(0.193)	(0.190)	(0.109)	(0.109)
N	4461	4459	4461	4459	4461	4459
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Other HH Controls	No	Yes	No	Yes	No	Yes

Notes: Dependent variables: Log transformed expenditure on different assignable non-food household items during the current year. The columns 'Female' and 'Male' indicates the effect of income shock on female and male non-food expenditures, respectively. Columns 'Difference' represents the impact of income shock on women's expenditure relative to men's. Panel A indicates the effect of negative income shock on the non-food expenditures if wife did not participate in safety net program (PSNP) during the previous year and panel B indicates the effect of negative income shock on non-food expenditures if wife did not. All specifications control for year and household fixed effects. Estimations without and with household controls are presented. Standard errors clustered at the enumeration level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

they have over on-farm activities. Hence in Table 3.8, we examine if the gender gaps in expenditure changes as a result of farm productivity shock depend on whether the husband spends more hours per week on on-farm activities. We find that the gender-differentiated effect of income shock on expenditures is only significant in households where the husband manages the plots. When the husband is in charge of the decisions of the farm, the wife absorbs the productivity shock. An ex-ante income shock reduces female expenditures by 33.3% relative to male expenditures in households where the husband spends more time in farm activities than the wife. There exists no gender gap when the wife is involved in farm activities as much or more than the husband. This result explains how control of household plots determines the gender differential effect of a farm-related income shock, previously observed in studies such as Duflo and Udry (2004) which demonstrates the gender-differentiated effect through female and male managed plots in Cote d'Ivoire.

Table 3.8: Gender Differentiated Effect on Expenditures based on Couples' Participation in On-farm Activites

	Female		Male		Difference	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A - Husband Spends More Time in On-farm than Wife						
Negative Income Shock	0.020	0.034	0.353*	0.374*	-0.333**	-0.340**
	(0.187)	(0.183)	(0.206)	(0.204)	(0.131)	(0.132)
N	4467	4465	4467	4465	4467	4465
Panel B - Wife Spends More or Same Time in On-farm than Husband						
Negative Income Shock	-0.398*	-0.418**	-0.116	-0.133	-0.282	-0.285
	(0.208)	(0.209)	(0.266)	(0.266)	(0.257)	(0.261)
N	4467	4465	4467	4465	4467	4465
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Other HH Controls	No	Yes	No	Yes	No	Yes

Notes: Dependent variables: Log transformed expenditure on different assignable non-food household items during the current year. The columns 'Female' and 'Male' indicates the effect of income shock on female and male non-food expenditures, respectively. Columns 'Difference' represents the impact of income shock on women's expenditure relative to men's. Panel A indicates the effect of negative income shock on the non-food expenditures if husband spends more hours per week than wife on on-farm activities and panel B indicates the effect of negative income shock on non-food expenditures otherwise. All specifications control for year and household fixed effects. Estimations without and with household controls are presented. Standard errors clustered at the enumeration level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

3.6 Robustness Checks

In this section, we analyse if our findings on the gender-differentiated effect of household income shock are robust to alternate specifications such as controlling for lagged rainfall shock, household having children above age ten, community-specific trends and extreme values of dependent variables. We explain each of the checks in detail below.

3.1.1 Inclusion of lagged rainfall shock

Contrary to the simple model of household decision-making, where consumption in the current period is affected by income shocks during the current period, consumption in the current period may be affected by income shocks in the previous period. This could be the case when expenditure is spread across multiple years. In Table 3.9, we control for lagged rainfall shock of the previous season in addition to the contemporaneous value to test if the current expenditure of individuals in the household is also affected by income shock during the previous season. This allows us to separate the contemporaneous effect of the shock from the lagged effect. The results of gender-differentiated effects on expenditures remain similar. Even accounting for the effects previous years' income shock can have on expenditures, we find a gender differential in favour of men by 33%. Our main results are stable after accounting for the effect of previous years' rainfall shock on expenditure.

3.2.2 Controlling for Household having Children over Age Ten

Another mechanism through which households cope with shocks is using child labour in times of economic distress. In order to check if the use of child labour alters the gender-differentiated expenditure patterns in households facing income shock, we add a control variable in our main analysis, which indicates if the household has children over the age of 10. In 3.10, we find that controlling for the household having children who are older than years does not change the main results. The gender gap in income shock effects on

Table 3.9: Effect of Income Shock, Controlling for Lagged Rainfall Shock

	Female		Male		Difference	
	(1)	(2)	(3)	(4)	(5)	(6)
Negative Income Shock	-0.177	-0.177	0.153	0.160	-0.330***	-0.337***
	(0.151)	(0.149)	(0.189)	(0.186)	(0.114)	(0.114)
N	4467	4465	4467	4465	4467	4465
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Other HH Controls	No	Yes	No	Yes	No	Yes

Notes: Dependent variables: Log transformed expenditure on different assignable non-food household items during the current year. The columns 'Female' and 'Male' indicates the effect of income shock on female and male non-food expenditures, respectively , additionaly controlling for an indicator variable if household experienced rainfall shock in the previous year. Columns 'Difference' represents the impact of income shock on women's expenditure relative to men's, additionaly controlling for an indicator variable if household experienced rainfall shock in the previous year.. All specifications control for year and household fixed effects. Estimations without and with household controls are presented. Standard errors clustered at the enumeration level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

expenditures is 30.7% and is statistically significant.

3.3.3 Community specific trends

In the empirical analysis of this study, we control for household-level fixed effects to take into account any time-invariant household characteristics that may affect the result. It could also be the case that community-specific socio-economic factors that affect how households cope with income shocks confound the results. In this subsection, we check if the results are robust after controlling for Kebele-specific (equivalent to community-level) linear trends. Based on Table 3.11, we can conclude that the results remain stable when community-level fixed effects are accounted for. As a result of negative income shock, female expenditures decreased by 31.4% as compared to male expenditures.

3.4.4 Winsorsing Expenditures at 5%

Due to measurement error or misreporting, there may be extreme values of individual expenditures reported, which drive the empirical findings of this study. To overcome the extreme values bias, we winsorise the expenditure data by 5%. This means the bottom

Table 3.10: Effect of Income Shock on Individual Expenditures, Controlling for Children above 10

	Female		Male		Difference	
	(1)	(2)	(3)	(4)	(5)	(6)
Negative Income Shock	-0.140	-0.143	0.167	0.172	-0.307***	-0.315***
	(0.149)	(0.147)	(0.188)	(0.186)	(0.117)	(0.117)
N	4467	4465	4467	4465	4467	4465
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Other HH Controls	No	Yes	No	Yes	No	Yes

Notes: Dependent variables: Log transformed expenditure on different assignable non-food household items during the current year. The columns 'Female' and 'Male' indicates the effect of income shock on female and male non-food expenditures, respectively , , controlling for household having atleast one child above the age of 10. Columns 'Difference' represents the impact of income shock on women's expenditure relative to men's, additionaly controlling for an indicator variable if household experienced rainfall shock in the previous year.. All specifications control for year and household fixed effects. Estimations without and with household controls are presented. Standard errors clustered at the enumeration level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table 3.11: Effect of Income Shock, Controlling for Community Specific Trends

	Female		Male		Difference	
	(1)	(2)	(3)	(4)	(5)	(6)
Negative Rainfall Shock	-0.138	-0.138	0.177	0.183	-0.314***	-0.321***
	(0.149)	(0.147)	(0.189)	(0.186)	(0.118)	(0.119)
N	4467	4465	4467	4465	4467	4465
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Other HH Controls	No	Yes	No	Yes	No	Yes

Notes: Dependent variables: Log transformed expenditure on different assignable non-food household items during the current year. The columns 'Female' and 'Male' indicates the effect of income shock on female and male non-food expenditures, respectively , additionally controlling for community specific linear trends. Columns 'Difference' represents the impact of income shock on women's expenditure relative to men's, additionally controlling for community specific linear trends. All specifications control for year and household fixed effects. Estimations without and with household controls are presented. Standard errors clustered at the enumeration level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

and the top 5 per cent of the cases in expenditure variables are recoded as the values corresponding to the 5th and the 95th percentile, respectively. From Table 3.12, we find that our main empirical finding of the gender-differentiated effect of income shock on expenditures still holds after winsorising the main outcome variables. An ex-ante income shock reduces female expenditure by 28.9% more relative to male expenditure.

Table 3.12: Effect of Income Shock on Individual Expenditures (Expenditures winsorised at 10%)

	Female		Male		Difference	
	(1)	(2)	(3)	(4)	(5)	(6)
Negative Income Shock	-0.137	-0.137	0.169	0.176	-0.289***	-0.296***
	(0.148)	(0.146)	(0.187)	(0.185)	(0.104)	(0.105)
N	4467	4465	4467	4465	4467	4465
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Other HH Controls	No	Yes	No	Yes	No	Yes

Notes: Dependent variables: Log transformed expenditure on different assignable non-food household items during the current year, winsorised at the 10% level. The columns 'Female' and 'Male' indicates the effect of income shock on female and male non-food expenditures, respectively. Columns 'Difference' represents the impact of income shock on women's expenditure relative to men's. All specifications control for year and household fixed effects. Estimations without and with household controls are presented. Standard errors clustered at the enumeration level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

3.7 Conclusion

Rural households in developing countries, mainly dependent on rain-fed agriculture, face substantial risks due to income shock from rainfall variability. Little is known about the effects of such shocks on individuals within households, and subsequently, policies that help households cope with shocks are often targeted at the household level. This paper attempts to progress towards identifying intrahousehold gender-differentiated effects of a household-level income shock.

Using detailed information on households in rural Ethiopia, we show that income shocks can have different impacts on men and women within the household, with women being more vulnerable. Our results contradict the underlying assumptions of policies that all individu-

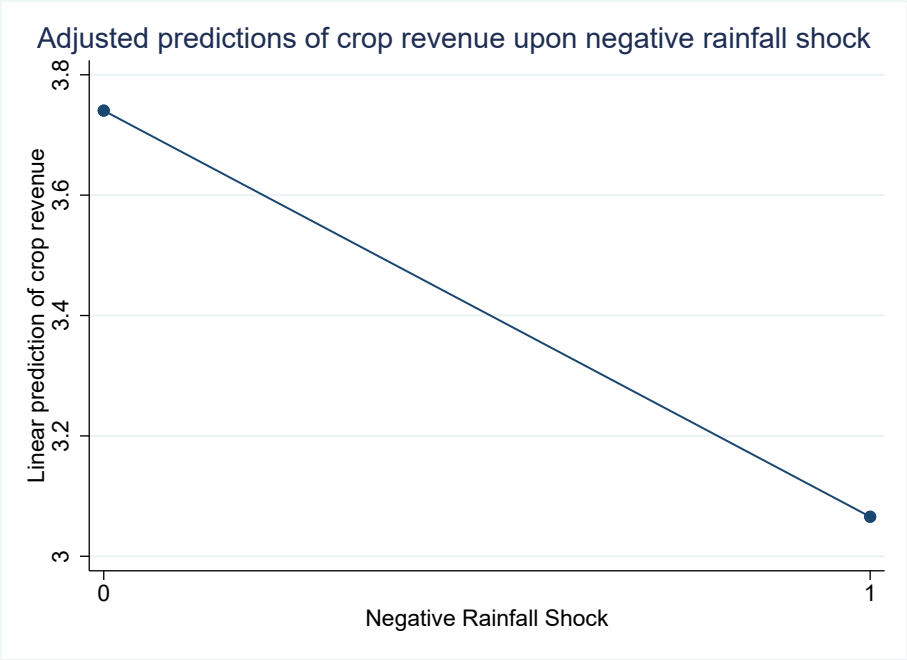
als in the households absorb the effects equally. Hence, in order to address individual-level poverty, more fine-tuned gender-based targeting would be necessary. Gender-sensitive targeting to address the specific needs of women and ensure that they have access to resources in times of income shocks can help to ensure that women are able to cope with income shocks.

Our findings on the gender gap in labour supply adjustments that households adapt to cope with income shocks provide important insights on designing social protection schemes that help build more resilient households and individuals. Furthermore, independent income from non-agricultural household activities and temporary wage employment contributes to closing the gender gap in expenditures during an income shock. This points to the relevance of encouraging off-farm employment opportunities such as small-scale business, skill training, and safety net programs for rural women to ensure them better welfare outcomes. Addressing technical, cultural and social barriers that limit women's participation in the labour force would be key to building stability for women within households.

Appendix A: Effect of Rainfall Shock on Crop Revenue

In this subsection, we show evidence to support the approach of using rainfall shock, defined as rainfall deviation in the current year is more than one standard deviation to the left from the long-term average, as a proxy for negative income shock. Figure A3.1 show that a negative rainfall shock reduces revenue from the crops significantly by 67.5% ($p < 0.05$). This provides confidence in our approach of defining rainfall shock and using negative rainfall shock as a proxy for a determinant of variation in household income.

Figure A3.1: Adjusted linear prediction of crop revenue based on negative rainfall shock



Appendix B: Alternative Definitions of Rainfall Shock

In this section, we check for gender differentiated effect of income shock based on some alternative definitions of rainfall shocks. Other rainfall shock measures used are rainfall deviations of at least one standard deviation to the right of the long-term mean and rainfall deviations of at least one standard deviation either to the right or the left of the long-

term mean. According to Table B1, there exists no gender differentiated effect of income shock when rainfall during the current year is more than one standard deviation to the right of the long-term mean. This could be due to the marginal effects that high rainfall shock has on crop revenue (Table B3). High levels of rainfall did not significantly affect crop revenue compared to low levels of rainfall. This could be why we do not observe the gender gap in expenditure changes after a negative income shock from high levels of rainfall as much as low levels of rainfall. By defining rainfall shock as rainfall deviations of at least one standard deviation either to the right or the left of the long-term mean, we find marginal gender differentiated effect in expenditures. The marginal significance in effect could be driven by the negative rainfall shock, which is the main focus of our study.

Table B1: Effect of Income Shock on Individual Expenditures

	Female		Male		Difference	
	(1)	(2)	(3)	(4)	(5)	(6)
Positive Rainfall Shock	-0.241	-0.210	-0.238	-0.221	-0.004	0.011
	(0.189)	(0.186)	(0.195)	(0.190)	(0.155)	(0.155)
N	4467	4465	4467	4465	4467	4465
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Other HH Controls	No	Yes	No	Yes	No	Yes

Notes: Dependent variables: Log transformed expenditure on different assignable non-food household items during the current year. The columns 'Female' and 'Male' indicates the effect of income shock, proxied by positive rainfall shock, on female and male non-food expenditures, respectively. Columns 'Difference' represents the impact of income shock, proxied by positive rainfall shock, on women's expenditure relative to men's. All specifications control for year and household fixed effects. Estimations without and with household controls are presented. Standard errors clustered at the enumeration level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Appendix C: Alternative Reference Period for Measuring Rainfall Shock

In the main analysis of this paper, we study the effect of negative rainfall shock experienced during the main agricultural season, *Meher*. Hence, the *Meher* season, from March to December, is the reference period of measuring income shock due to rainfall variability.

Table B2: Effect of Income Shock on Individual Expenditures

	Female		Male		Difference	
	(1)	(2)	(3)	(4)	(5)	(6)
Positive/Negative Rainfall Shock	-0.213*	-0.197	0.002	0.014	-0.215*	-0.211*
	(0.128)	(0.123)	(0.162)	(0.159)	(0.110)	(0.110)
N	4467	4465	4467	4465	4467	4465
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Other HH Controls	No	Yes	No	Yes	No	Yes

Notes: Dependent variables: Log transformed expenditure on different assignable non-food household items during the current year. The columns 'Female' and 'Male' indicates the effect of income shock, proxied by positive or negative rainfall shock, on female and male non-food expenditures, respectively. Columns 'Difference' represents the impact of income shock, proxied by positive rainfall shock, on women's expenditure relative to men's. All specifications control for year and household fixed effects. Estimations without and with household controls are presented. Standard errors clustered at the enumeration level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table B3: Effect of Rainfall Shock on Crop Revenue

	Rainfall deviation is more than 1 SD to the left from long term average	Rainfall deviation is more than 1 SD to the right from long term average	Rainfall deviation is more than 1 SD (both side) from long term average
	(1)	(2)	(3)
Revenue from crop sales	-0.675**	-0.604*	-0.758***
	(0.290)	(0.319)	(0.219)
N	4467	4467	4467
Year fixed effect	Yes	Yes	Yes
Household fixed effect	Yes	Yes	Yes

Notes: Dependent variables: Crop revenue during the current agricultural season. Columns (1) and (2) presents the effect of negative and positive rainfall shock on crop revenue, respectively. Column (3) indicates the effect of a negative or positive rainfall shock on crop revenue. All specifications control for year and household fixed effects. Standard errors clustered at the enumeration level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

As an alternative specification for negative rainfall shock, we check if our main results change significantly if we calculate rainfall shock during the entire year instead of *Meher* season. From Table C1, we find that there exists no significant gender differentiated effect of negative rainfall shock during the previous year on expenditures. This means that in our context we can attribute the productivity shock during the main agricultural season to be the determinant for gender gap in expenditures ex-ante an income shock.

Table C1: Effect of Income Shock on Individual Expenditures

	Female		Male		Difference	
	(1)	(2)	(3)	(4)	(5)	(6)
Negative Income Shock	-0.291	-0.260	-0.219	-0.204	-0.072	-0.056
	(0.198)	(0.195)	(0.206)	(0.202)	(0.154)	(0.154)
N	4467	4465	4467	4465	4467	4465
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Other HH Controls	No	Yes	No	Yes	No	Yes

Notes: Dependent variables: Log transformed expenditure on different assignable non-food household items during the current year. The columns 'Female' and 'Male' indicates the effect of income shock proxied by negative rainfall shock during the current year, on female and male non-food expenditures, respectively. Columns 'Difference' represents the impact of income shock on women's expenditure relative to men's. All specifications control for year and household fixed effects. Estimations without and with household controls are presented. Standard errors clustered at the enumeration level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Appendix D: Effect of Income Shock on Other Household-level Observable Expenditures

While the main focus of the study is to understand gender-based expenditure changes ex-ante an income shock, we additionally analyse the effect on expenditures observed household-level to gain an all-round understanding of household consumption smoothing. We examine the effect of negative income shock on household-level expenditures such as food, expenses for children, major and minor purchases, and ceremonies. Food expenditures include only money households spend to buy food items and do not include food produced on the farm which was consumed. From Table D1, we observe that no category of expenditure observed at the household level changes significantly during an income shock.

However, due to a lack of gender-disaggregated data, it remains an open question as to whether a gender gap exists for these expenditure changes.

Table D1: Effect of Income Shock on Other Expenditures (Household level)

	Food		Children		Major Purchases		Minor Purchases		Ceremonies	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Negative Income Shock	-0.007	-0.011	-0.109	-0.150	-0.281	-0.317*	-0.015	-0.010	-0.001	-0.037
	(0.086)	(0.085)	(0.127)	(0.132)	(0.176)	(0.175)	(0.082)	(0.081)	(0.284)	(0.283)
N	4467	4464	4467	4464	4467	4464	4467	4464	4467	4464
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other HH Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

Notes: Dependent variables: Log transformed expenditure on different household items during the current year, for which the data is available only per household and is not assignable by gender. All specifications control for year and household fixed effects. Estimations without and with household controls are presented. Standard errors clustered at the enumeration level in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Appendix E: Variable Definitions

Table E1: Variable Definitions

Variable	Definition
Household Head is Male	Dichotomous variable indicating if the household head is male
Household Size	Number of people residing in household at the time of interview
Husband attended school	Dichotomous variable indicating if the husband attended school
Wife attended school	Dichotomous variable indicating if the wife attended school

Continued on next page

Table E1: Variable Definitions

Variable	Definition
Household faced drought	Dichotomous variable indicating if the household farm experienced drought during the panel years (2011, 2013, 2015, self-reported)
Negative Rainfall Shock (2011,2013, 2015)	Binary variable equal to 1 if the deviation in rainfall that the household experiences during the main agricultural season are more than one standard deviation away to the left from the average rainfall deviation that households in the sample experience, 0 otherwise.
Expenditure Shares - Female	Share of total non-food expenditure spent during the year on average towards female clothing, shoes and fabric
Expenditure Shares - Male	Share of total non-food expenditure spent during the year on average towards male clothing, shoes and fabric
Expenditure Shares - Children	Share of total non-food expenditure spent during the year on average towards children's clothing, shoes and fabric
Expenditure Shares - Minor purchases	Share of total non-food expenditure spent during the year on average towards matches, batteries, candles, laundry soap, hand soap, other personal care goods, charcoal, firewood, and kerosene

Continued on next page

Table E1: Variable Definitions

Variable	Definition
Expenditure Shares - Major purchases	Share of total non-food expenditure spent during the year on average towards kitchen equipment, linen, furniture, and lamp
Expenditure Shares - Ceremonies	Share of total non-food expenditure spent during the year on average towards ceremonial expenses and donations to church
Total Non-food expenditures	Total expenditure spent towards non-food items during a year on average
Total Food expenditures	Total expenditure spent towards food items during a year on average (excluding the consumption of food produced on-farm)
Labour Participation - Extensive Margin	
Household Agriculture - Wife	Dichotomous variable indicating if the wife worked in household agricultural activities during the past 7 days
Household Agriculture - Husband	Dichotomous variable indicating if the husband worked in household agricultural activities during the past 7 days
Household Non-agriculture - Wife	Dichotomous variable indicating if the wife worked in household non-agricultural activities during the past 7 days

Continued on next page

Table E1: Variable Definitions

Variable	Definition
Household Non-agriculture - Husband	Dichotomous variable indicating if the husband worked in household non-agricultural activities during the past 7 days
Temporary Wage Labour- Wife	Dichotomous variable indicating if the wife worked in temporary wage employment during the past 7 days
Temporary Wage Labour- Husband	Dichotomous variable indicating if the husband worked in temporary wage employment during the past 7 days
Permanent Wage Labour - Wife	Dichotomous variable indicating if the wife worked in permanent wage employment during the past 7 days
Permanent Wage Labour - Husband	Dichotomous variable indicating if the husband worked in permanent wage employment during the past 7 days
Labour Participation - Intensive Margin	
Household Agriculture - Wife	Number of hours spent by the wife in household agricultural activities during the past 7 days
Household Agriculture - Husband	Number of hours spent by the husband in household agricultural activities during the past 7 days
Household Non-agriculture - Wife	Number of hours spent by the wife in household non-agricultural activities during the past 7 days

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Table E1: Variable Definitions

Variable	Definition
Household Non-agriculture - Husband	Number of hours spent by the husband in household non-agricultural activities during the past 7 days
Household Temporary Wage Labour- Wife	Number of hours spent by the wife in temporary wage employment during the past 7 days
Household Temporary Wage Labour- Husband	Number of hours spent by the husband in temporary wage employment during the past 7 days
Household Permanent Wage Labour - Wife	Number of hours spent by the wife in permanent wage employment during the past 7 days
Household Permanent Wage Labour - Husband	Number of hours spent by the husband in permanent wage employment during the past 7 days

Conclusion

This thesis examines intrahousehold decision making process in the context of India, Democratic Republic of Congo (DRC) and Ethiopia. Each chapter provides insights into the household decision making process by focusing on both female and male members of the household and aim to inform public policy to promote gender equality and improve household welfare.

The first chapter provides insights on various aspects of design and delivery of social protection programmes within a household setting. Our first set of findings highlight the importance of women's labour force participation on her financial control and enhance the knowledge sphere on the benefits of women's workfare over unconditional transfer as a policy approach. Nonetheless, we advocate further work to understand the effect of women's workfare on other streams of household outcomes, such as overall household income, savings, and labour time use. The first chapter also sheds light on the need to re-examine individualised financial products for household purposes and to study joint decision making in families in detail. Our focus on how couples manage their financial resources under various iterations of joint decision making is an important addition to understanding the comparative effectiveness of different delivery mechanisms of policy interventions. In particular, our results on heterogeneous effects of spousal transparency and communication based on the underlying spousal control structures acknowledges the need to improve the match between couples and financial products.

In the second chapter, we take into account the implications of difference in spouse's perceptions of autonomy for the success of women empowerment programs. We focus on a two-armed, matched pair, cluster randomised controlled male-focused gender transformative program conducted in DRC to study the consequences of spousal agreement disagreement patterns on programs and policies. The heterogeneity in effects of the pro-

gram based on spousal discordance adds to the evidence on the need to take into account ex-ante bargaining power of women to design effective policy interventions. Knowledge of such heterogeneity can help develop specific policies for women at a higher risk or avoid negative consequences from programs.

Finally, the third chapter emphasises on the need to fine-tune programs based on intrahousehold inequality in vulnerable rural households. The third chapter's finding related to the gender gap in expenditure shifts when household faces income shock is relevant to understanding whom to target for anti-poverty programmes that aim to mitigate income shock effects on households. While most programmes target households as a whole for anti-poverty programmes, our findings recommend more finely targeted policies that improve outcomes for the most vulnerable. Our results also emphasises the gender dynamics in coping strategies used by households to cope with income shocks. The existence of gender differences under the income smoothing strategy of increased labour hours towards off-farm activities underlines the need for gender-sensitive safety net programs to help rural women cope with farm income shocks.

Overall, the thesis highlights the importance of dynamics among couples for women's well-being. While women's personal perception of her empowerment is significant, her relative power compared to other household members is of significance to success of programs and policies. The findings of the thesis proposes that any policy intervention that modifies the framework of household decision making should consider the differential impacts it could have based on household decision making arrangements. We recommend further work on exploring the power relations within household relevant for women's empowerment.

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