A House for Two: Empowering Women with Property Rights

(Job Market Paper)

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Abstract

Formal property ownership may not empower women unless those that they interact with also recognize it. I study the effect of improving awareness about property rights on women's empowerment through a field experiment in rural Maharashtra. I work in a setting where following a recent policy change married women are documented owners but only 26% recognize it. I randomize an awareness campaign across 1,783 households that informs both spouses that women co-own their property and delivers a physical copy of their ownership document. The campaign improves knowledge that women hold property rights, increases expenditure on women-specific goods by 40%, and reduces men's alcohol consumption by 33%, though it has no overall effect on domestic violence. I develop and test an intrahousehold bargaining model, which highlights that the effect of the campaign may differ depending on who already knows. Consistent with the model's predictions, the strongest consumption effects are observed in households with the lowest initial knowledge about women's ownership, while reductions in domestic violence occur in households where the husband did not know but the wife did. This study highlights how shifting beliefs about women's rights is essential to realizing the full impact of large-scale government programs.

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1 Introduction

Women account for less than 30% of property owners across Asia and Africa (Doss et al., 2015; Agarwal et al., 2021; Kieran et al., 2015). Strengthening property rights has become a widely adopted policy strategy to enhance women's empowerment, which is both a driver of economic development and a critical goal for achieving gender equality (Kabeer, 1999; Duflo, 2012).

However, evidence on the impact of strengthening women's property rights is mixed. Observational studies and analyses of natural experiments stemming from reforms that enhance women's documented property rights have reported varying outcomes: some have found an increase in violence (Anderson and Genicot, 2015), while others have observed a decrease (Grabe et al., 2015). Additionally, changes in decision-making power have been reported in both positive and negative directions (Doss et al., 2014; Wang, 2014; Calvi, 2020; Bahrami-Rad, 2021), and in some cases, there was no change at all (Fertig et al., 2022). In these studies, the reforms serve as proxies for shifts in women's intrahousehold bargaining power, which theoretically should lead to greater empowerment.

Having documented rights may not lead to impacts on economic outcomes unless it translates into effective rights: ownership must be recognized by the woman and others, particularly her husband, to influence decision-making. Evidence shows that policy changes often fail to bring about effective rights.[1] Furthermore, discrepancies in the perception of formal rights can also explain the mixed outcomes observed in empirical studies. If the wife's rights are only internalized by herself and not her husband, household bargaining dynamics could be altered in ways that worsen her outcomes.

This paper studies the effect of bridging the gap from documented to effective rights on women's empowerment through a field experiment in rural Maharashtra, India. The experiment design takes advantage of a government reform that added names of married women to the homeownership document if the home was listed in the husband's name. One year after the reform, within my sample, 100% of women are documented owners of their homes, but I find that only 26% recognize themselves as owners at baseline. Furthermore, beliefs about women's ownership vary within couples. I randomize an awareness campaign among 1,783 households, introducing exogenous variation in these beliefs. I combine the experiment with an intrahousehold bargaining model that formalizes the relationship between beliefs about women's property rights and their empowerment.

In the treatment group, both husbands and wives receive information about changes in women's property rights, as well as a paper copy of the ownership document clearly showing the owners' names. Couples in the control group receive no information regarding changes in their property ownership. Five months post-intervention, I measure the change in both husbands' and wives' beliefs about women's effective ownership rights and the impact on women's empowerment, captured via household consumption and domestic violence. In line with the framework outlined in the seminal paper by Kabeer (1999), these measures are good proxies for women's empowerment, as they reflect both bargaining power (agency)

[1] See Fertig et al. (2022), Meinzen-Dick et al. (2019), Ali and Deininger (2024), Agarwal et al. (2021), Klugman et al. (2014), and Deininger et al. (2008), among others

and the material outcomes (achievements) of that power.

In the first part of the paper, I consider effects among households where neither partner at baseline recognizes the wife as an owner i.e. cases where effective rights are essentially absent. Starting from a baseline of low recognition allows me to isolate the effect of transitioning from documented to effective rights. Making the distinction in initial beliefs is especially important, as the model, described below, illustrates that disparities in spouse's initial beliefs regarding women's rights can lead to different effects on household consumption and, particularly, domestic violence. Households in this "neither-informed" group represent 65% of my sample.[2]

For the "neither-informed" group, treatment raises the share of women who report themselves as owners by 54 percentage points and husbands who recognize their wives as owners by 40 percentage points. Although the treatment shows a strong first-stage effect in changing beliefs, these figures fall short of full recognition, particularly among husbands. This finding underscores how deep-rooted patriarchal norms can limit the full recognition of women's documented property rights, potentially tempering the impact on empowerment outcomes.

I analyze the consumption of private goods as a robust measure of how resources are allocated across different household members (following Browning and Chiappori (1998), Browning et al. (2013), Calvi et al. (2023), Wang (2014), Dunbar et al. (2013), Deaton (1989)).[3] For women I measure the change in expenditure on their clothes, cosmetics, jewellery, and women-specific tobacco.[4] For men, I look at their expenditure on clothes, tobacco and alcohol. I find that treated women in the "neither-informed" households experience a 40% increase in their share of private consumption relative to the control houses. Further, I find a significant 33% decrease in men's alcohol consumption. The decline in men's alcohol consumption is particularly noteworthy, given the well documented negative correlation between alcohol consumption and women's well-being (Foran and O'Leary, 2008).

Domestic violence is another critical outcome of the intrahousehold bargaining process, as it can be seen as the result of a breakdown in negotiations over household resources. While I find that the information campaign does not affect the incidences of domestic violence in the "neither-informed" households, the apparent null effect might be masking opposing forces. On the one hand, husbands may respond to women gaining better outside options by offering a larger share of resources to preserve marital stability (as documented in Grabe (2010) and Panda and Agarwal (2005)). On the other hand, a rise in women's bargaining power may heighten interpersonal tensions since women's demands for a greater share of resources may provoke conflict, as suggested by Anderson and Genicot (2015).

In the second part of the paper, I disentangle these opposing forces and incorporate the role of

[2]Since the intervention and baseline surveys were conducted in the same session, stratifying based on baseline beliefs was not feasible.

[3]This approach makes it possible to assess bargaining without needing to know how other public good consumption (such as expenditure on food or health) in the household is split. Using health-related expenditure to gauge changes in women's empowerment over a short time span, as is the case in the current study, is hard, since the type of expenditure is based on need. In the literature, commonly used health outcomes for women are related to reproductive health or anthropometric measures, both of which were not feasible in the surveys conducted.

[4]In the local setting, the tobacco product that women consume, called misri, differs from that which men consume.

differences in pre-existing spousal beliefs by developing and testing a model of household decision-making that links effective ownership rights to household consumption and domestic violence. I build on the noncooperative intrahousehold bargaining model in Anderson and Genicot (2015) with two modifications: (1) allowing husbands and wives to hold differing beliefs about women's ownership rights, (2) introducing a probabilistic bargaining procedure to capture the wife's ability to voice her preferences. The difference in spousal beliefs allows me to map the model to the four household types observed at baseline, where I interpret not reporting the wife as an owner as having low initial beliefs about her property rights. Following Anderson and Genicot (2015), I interpret the incidence of domestic violence as indicative of breakdowns in negotiations over household resources, which can lead to conflict.

The two elements (divergent spousal beliefs and randomized first mover) generate two channels through which the treatment affects the bargaining process. The *exit* channel captures how changes in perceptions of women's ownership rights in the event of separation influence sharing of resources.[5] The *voice* channel reflects how increased awareness of property rights can enhance women's confidence and ability to assert their preferences, thereby strengthening women's roles in decision-making within marriages.[6]

The model yields two main results. First, both *voice* and *exit* channels contribute to an increase in women's share of household consumption. Increased awareness about women's rights raises the wife's ability to voice her preferences, ensuring her a greater share. Additionally, if either spouse perceives the wife to have a stronger claim over the house in the event of separation, her improved exit threat point allows her to secure a larger share of resources. Second, the effect of the *exit* and *voice* channels on the probability of conflict is ambiguous. As the wife's belief in her rights increases, she demands a higher share of resources, thus raising the likelihood of rejection and conflict. An increase in the husband's belief reduces the likelihood of conflict as he becomes more inclined toward maintaining marital stability. The direction of the *voice* channel's effect depends on each spouse's valuation of marriage, with the difference averaging to zero. These two results generate three testable predictions, which I take to the experiment.

The first prediction focuses on the treatment effects across households with different baseline beliefs. For women in "neither-informed" households, the effect on consumption is expected to be largest, as the *exit* channel is most potent in these households. Indeed, I find that women in neither-informed households experience the greatest increase in consumption, while other groups show no significant effects. For domestic violence, the model predicts a decline in domestic violence in households where wives were already aware of their property rights ("wife-informed" households) and a potential increase in households where the husbands were already aware of their wives' rights ("husband-informed" households). This is supported in the data: women in "wife-informed" households experience a significant reduction in domestic violence, while no noticeable effect on violence is observed in "husband-informed" households.

[5]Changes in beliefs provide a useful perspective on how individuals perceive threat points without needing to observe actual separations, which are often less visible. Although divorce rates in India are low, separations and cases of husbands deserting their wives are becoming more common. In fact, separations occur at roughly three times the rate of divorces, bringing the rate of marital dissolution in India closer to global norms (Jacob and Chattopadhyay, 2016).

[6]Datta (2006) documents that women who received joint titles in Chandigarh, India, reported higher self-esteem and greater confidence in the legitimacy of their preferences. See Appendix E for quotes from focus group sessions, where women expressed how owning property in their name affects their sense of agency.

The second set of model predictions concerns correlations between baseline beliefs and consumption and violence outcomes. I find suggestive evidence that women in "both-informed" households, where both spouses recognize the wife as an owner, have a higher share of private consumption than those in other households. For domestic violence, the model predicts that women in "wife-informed" households should report higher incidences at baseline, while those in "husband-informed" households should experience less violence. The data supports this, showing significantly higher levels of domestic violence reported by women in "wife-informed" households at the baseline.

The third prediction allows me to test if the treatment effects depend on which spouse updates their beliefs after the intervention. The model predicts that households where both spouses update will see the largest increase in women's consumption, while violence worsens if only the wife updates but improves if only the husband does. However, testing this is econometrically challenging due to selection. Which spouse(s) update(s) is an endogenous response to the information campaign, governed by unobserved household and spouse traits. The randomized campaign provides me with one instrument for the three possible treatments – only man updates, only woman updates, and both update, and so a simple two-stage least squares (2SLS) approach is insufficient. To address this, I employ two strategies. First, I conduct a heterogeneity analysis based on baseline characteristics that predict which spouse(s) will update, revealing that effects on consumption and domestic violence are concentrated in households located in village centers and among younger couples, both of which are strongly linked to responsiveness to information. Second, I apply the econometric framework from Lee and Salanié (2018) which allows me to directly capture heterogeneity by who updates. The results of the analysis bolster the above findings showing that improvements in husband's beliefs reduces violence while improvements in wife's beliefs increases its incidence.

This paper contributes to the literature on the effects of changing women's property rights on their empowerment. Most research in this area focuses on improving women's agricultural land rights and their impact on credit (Persha et al., 2017; Santos et al., 2014), investments (Goldstein et al., 2016; Ali et al., 2014), intrahousehold bargaining (Fertig et al., 2022; Allendorf, 2007; Brulé, 2010; Menon et al., 2014), and empowerment (Panda and Agarwal, 2005; Grabe, 2015; Grabe et al., 2015; Anderson and Genicot, 2015). Many of these studies are observational or natural experiments. However, these natural experiments have limitations, as implementation of laws does not always translate into documented and effective rights.[7] Studies in economics examining the impact of enhancing women's housing ownership are rare. The closest study to this research is Wang (2014), which investigates the effects of strengthening male and female housing ownership in an urban setting and finds that increasing women's ownership reduces consumption of male-specific goods without affecting female consumption.

I diverge from existing studies by focusing on house ownership in a rural setting. Unlike transfers and employment, owning a house offers a tangible and visible exit option from adverse situations, empowering the woman while also influencing her husband's perceptions. Unlike cash transfers that might need to

[7]Refer to Meinzen-Dick et al. (2019) for a comprehensive review of the effects of improving women's land rights on various female-oriented outcomes.

be hidden, home ownership is a recognized right that can boost a woman's confidence and self-esteem. Two observational studies highlight the pivotal role played by home ownership in changing women's empowerment: Garikipati (2008) find that microfinance loans may not empower women if they do not own household assets, such as the family home. In contrast, Panda and Agarwal (2005) report that the impact of property ownership on women's empowerment is strongest when they own both house and land, followed by house ownership alone and then land ownership. Furthermore, I document the differences in perceptions of female ownership within couples and explore how these differences influence women's empowerment, echoing the need to collect gender dis-aggregated data on property ownership to understand best the role it plays for women's well-being. Lastly, while most of these studies focus on only one aspect of women's welfare, I link both domestic violence and intrahousehold consumption theoretically and test the relations empirically.

Beyond women's property rights, the study builds on the broader literature on property rights and economic development that distinguishes the documented (de jure) and effective (de facto) ownership rights. Besley (1995), Goldstein and Udry (2008), Bellemare (2010), Meinzen-Dick and Di Gregorio (2004) and Field (2005) highlight the importance of de facto rights in influencing investment and economic outcomes. My research underscores the critical role of social norms and local knowledge in translating legal rights into tangible benefits by empirically examining how effective ownership, rather than just legal documentation, impacts women's empowerment. It demonstrates that legal reforms must be accompanied by mechanisms that ensure these rights are recognized and respected within communities.

By involving husbands in the information intervention, the study contributes to the body of work that looks at the role of men and other stakeholders in gender equality initiatives. Studies such as Doyle et al. (2018), Ashraf et al. (2014), Ashraf et al. (2022), Dhar et al. (2022) and Arango et al. (2014) demonstrate that interventions targeting men's attitudes and behaviors can lead to significant improvements in women's empowerment, including better communication, reduced violence, and increased participation in domestic and reproductive decisions. The evidence that women benefit when men perceive them as owners highlights the need to engage with men to improve women's bargaining power.

Lastly, I contribute to an emerging literature studying the effect of asymmetric information between spouses on household decision-making (Ashraf, 2009; Ashraf et al., 2022; Chen, 2013; Stern and Friedberg, 2010) in contrast to the complete information approach (Chiappori, 1988). I show how, in the presence of strong patriarchal norms, husbands may refuse to perceive women as owners even when information about women's rights is transferred to them in a clear fashion. This can mute the effect of better property rights on women's empowerment.

I present the local context in Section 2. Section 3 presents the experimental design, and Section 4 discusses data and empirical strategy. Main results are discussed in Section 5. Section 6 explains the model and the predictions, which I test in Section 7. Section 8 concludes.

2 Context

In this section, I discuss the state of women's property rights in India and explain the specific context of these rights in the city of Pune. I then provide a detailed examination of the Ghar Dogaanche program conducted by the local government, which altered homeownership rights for married women.

2.1 Female Property Rights in India

Women in India do not enjoy strong documented or effective property rights over household land and property, regardless of marital status. The 2005 amendment to the Hindu Succession Act 1956 provides that daughters have the same inheritance rights as sons; however, the practical implementation of this law is far from perfect. Roy (2015) finds no actual increase in women's inheritance due to the amendment. In fact, daughters have reported being pressured by their brothers and other paternal family members to give up their share of the inheritance. Women often also relinquish their shares in their ancestral property in fear of losing family ties (Singh, 2013).[8]

India follows a "separation of property" regime wherein each spouse retains ownership of their individual assets and has no claim to the other's property (Sivaramayya, 1999).[9] Due to their limited inheritance rights as daughters, women typically enter marriage without any assets of their own. During marriage, asset ownership is usually in the husband's name, leaving women without any property in their name in case of separation or divorce. This systemic issue exacerbates women's vulnerability and economic dependence on men.

While divorce and separation rates in India on average are low, they have been increasing (Kulkarni and Bhat, 2010). According to the Indian Census of 2011, 0.24% of the married population reported being divorced, while 0.61% reported being separated. This trend is observed in both urban and rural areas. When considering both separation and divorce as forms of marriage dissolution, India's figures align more closely with the global average (Jacob and Chattopadhyay, 2016). For Maharashtra in particular, National Family Health Survey-5 (NFHS-5) survey (IIPS, 2021), conducted between 2019 and 2021, reports that 2% of married women are divorced, separated, or deserted, while Kulkarni and Bhat (2010) reports the number to be at 4.5% for Pune. The lack of rights for married or separated women is a significant concern, as it sustains exploitative marriages and deprives women of a viable fallback option if they choose to separate.

[8] Widows have slightly better effective rights over land. According to the law, a widow is the first heir to inherit the property along with the children after the husband's death. As widows, women tend to have greater social legitimacy, which is seen with significantly more women owning land as widows than as daughters (Agarwal et al., 2021). However, this improvement is still marginal in the broader context, as widows often fear losing their stake in the house to relatives from their husband's family and their children, especially sons (Datta, 2006).

[9] The state of Goa is the only exception, as it follows a "community of property" regime.

2.2 Ghar Dogaanche program

In order to address the poor state of property rights for women, the state of Maharashtra passed a non-statutory resolution in 2003, declaring that every married woman has the right to an equal share in her husband's property.[10] The resolution called on all villages to add the wife's name to the house property tax document, Form 8, which serves as a certified document that asserts ownership in the region. The resolution, being non-statutory, did not have the force of law, and the implementation of the resolution varied across different districts. For instance, it was effectively implemented in districts such as Satara in 2016 and Parbhani in 2013, due to the efforts of NGOs and state government agencies dedicated to female empowerment (Kulkarni, 2020; Abraham and Neetha, 2024).

In Pune, a district in Maharashtra with approximately 1800 villages, the local administrative government decided to implement the resolution and create the Ghar Dogaanche Program (hereafter GD program) in October 2021.[11] The program, which was designed to be demand-driven, required current property owners to provide written consent for adding their wife's name to the ownership documents. However, local government instituted the program via top-down enforcement over 8 months, until May 2022.[12] Conversations with multiple village secretaries responsible for the on-the-ground implementation revealed that they often implemented the program as a mandatory change without family consent and relying on their local knowledge to implement the program. According to government numbers, the population of houses with women as one of the registered owners reached 90%.[13]

A significant reason for the campaign's short implementation span and the local government's emphasis on updating ownership documents was the subsequent implementation of the nation-wide land titling scheme SVAMITVA.[14] Under this scheme, property ownership, according to Form 8, is the basis for obtaining a legal title. Therefore, getting as many names on these ownership documents as possible is crucial; this resulted in a greater emphasis from the local Pune government on ensuring documented ownership of women.

Ideally, accessing the ownership document is straightforward and only requires a visit to the village centre. However, anecdotal evidence suggests that women often feel uncomfortable visiting the village office to inquire about property or land ownership information. This discomfort stems from the societal perception that land and property issues are the domain of men; women thus fear being looked down upon by other village and household members.

The mandatory change in rights, with or without family consent, coupled with patriarchal norms about

[10] Government Resolution 1094/3625/10-08-1994.

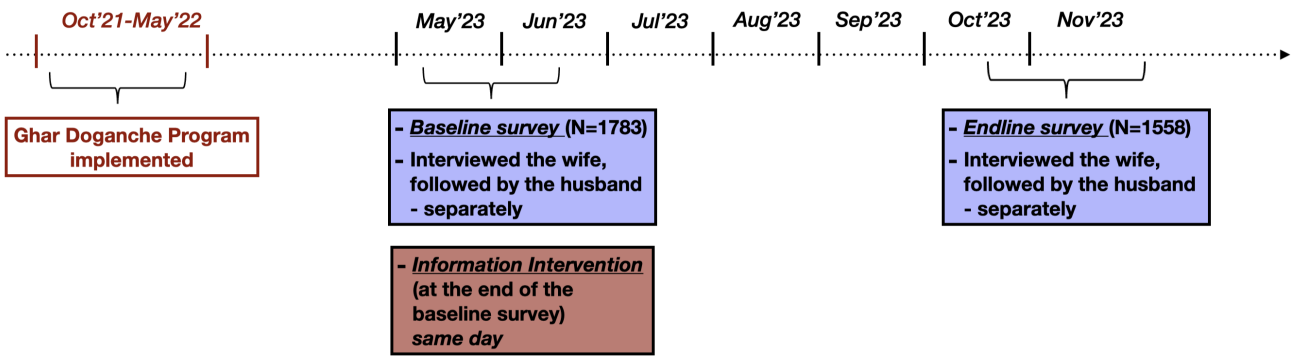
[11] *"Ghar dogaanche"* means house for two in Marathi, the regional language of Maharashtra. Popular news sources, such as the Times of India and Indian Express, reported on the institution of the program.

[12] In the field, government officials referred to the implementation of the program as "mission-mode," a term often used in Indian policy-making for projects with clear goals and timelines. In this case, the administrative aim was to achieve 100% co-ownership by the end of one year of the campaign's implementation.

[13] The reason for not reaching 100% was due to the presence of large families with multiple male heads, or the refusal of husbands to add their wives' names to ownership documents.

[14] The SVAMITVA scheme is yet to be implemented in the sample of villages studied in this paper. The scheme is implemented by the Government of India

Figure 1: Study Timeline



land and property being a man's issue, led to low levels of awareness in villages in Pune about women's change in documented and effective property rights on the ground. I leverage these levels of awareness for my analysis.

3 Experimental Design

I started the field experiment in May 2023, almost one year after the conclusion of the GD program in Pune. The study's timeline is shown in Figure 1. The sample of houses comes from the population of houses in the villages legally owned by a single couple. I selected houses from 53 villages in Khed block, where the local NGO, Chaitanya, operates and has local ties, facilitating the implementation of surveys. The proportion of houses legally owned by a single couple in these villages ranges from 40% to 98%, while the proportion of houses with female owners ranges from 50% to 99%.[15] This difference arises because some houses are owned solely by a single female or have various owners, including son-mother pairs or several couples. I do not sample from these houses because intrahousehold decision-making might differ from those where only the wife and husband are owners: I specifically aim to study the effect on within-couple household bargaining due to increased awareness about wife's ownership rights.

3.1 Treatment Assignment

I performed simple household-level randomization to assign houses into treatment and control on the population of houses co-owned by couples.[16] I did not perform stratified randomization due to insufficient time between the baseline survey and the intervention. I minimized the risk of spillovers by randomly picking houses that are geographically away from each other.[17]

[15] Single men or multiple male owners own the remaining houses.

[16] From each village, I sampled fewer than 15% of houses and further treated less than 10% in each village in order to prevent any concerns regarding general equilibrium effects, as I would not have had enough statistical power to measure those effects.

[17] This was difficult to implement in practice. I did not have the geographical locations of the houses ex ante; I therefore used house numbers as a proxy for distances, assuming that geographical distance is directly proportional to the difference in house numbers.

3.2 Information Intervention

There is a single treatment arm in which the information is given to both the husband and the wife, together. Respondents received the information at the conclusion of the baseline survey. The intervention included a verbal component in which each couple was told about the GD program and that they equally own their house. In order to make the information more salient, enumerators provided a paper copy of the ownership document containing the names of both husband and wife to each couple. An example of the document is shown in Figure B1 in the Appendix.

4 Data and Empirical Specification

The data for this study comes from two surveys, implemented approximately five months apart, as shown in Figure 1. The baseline sample consisted of 1783 houses.[18] 1558 women were surveyed in the endline sample, but I could not survey men in 80 of the 1558 houses. Therefore, the sample size of females is 1558, while that of men is 1478. Attrition is balanced for both men and women as shown in Appendix Table A1.

The sample characteristics and balance for the sample are shown in Appendix Table A2. The average size of the household is four, which is similar to the average of 4.4 in Maharashtra, as per the NFHS-5 survey (IIPS, 2021). The average age of women in my sample is 50; this is in line with what one observes for India on average and what researches see in samples in other studies that focus on women who own property (Fertig et al., 2022; Agarwal et al., 2021).[19] The sample is overall balanced between treatment and control, while caste is unbalanced at a significance level of 10%.

I estimate the following ordinary least squares regression:

$$Y_{ih} = \beta_0 + \beta_1 \cdot \text{Treat}_h + \beta_2 \cdot Y_{ih}^0 + \mathbf{X}_{ih} \cdot \boldsymbol{\beta}_3 + \epsilon_{ih} \tag{1}$$

where Y_{ih} is the outcome variable measured at the endline for woman/man i in household h. Treat_h is a binary variable that equals 1 if the house was assigned to the treatment group, and 0 otherwise. Y_{ih}^0 is the baseline analog of the outcome variable and $\mathbf{X}_{ih}$ includes village fixed effects and post-double selection LASSO baseline controls. I consider robust standard errors.

[18] For four men, who could not be surveyed due to their working hours, there is no baseline information. These men were surveyed in the endline group.

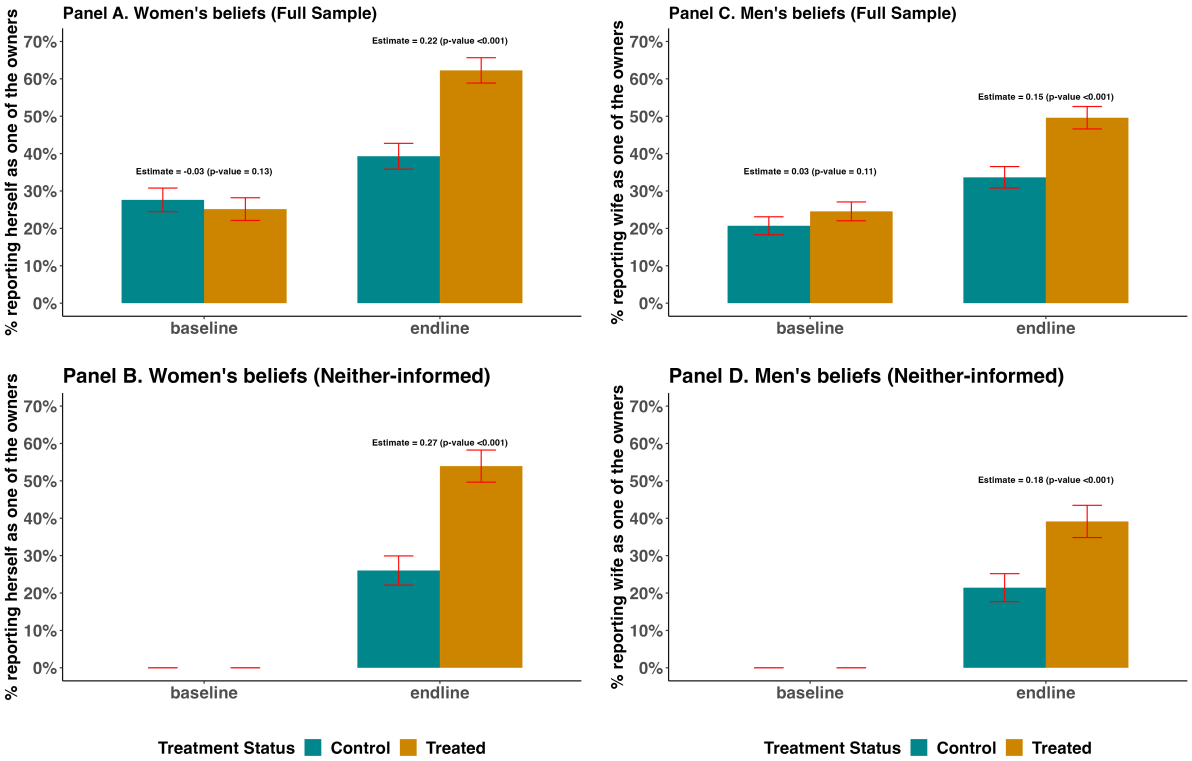
[19] www.thehindubusinessline.com

5 Results

5.1 First Stage

For property rights to affect women's empowerment, knowledge about women's property rights needs to translate into effective rights; in other words, women need to perceive themselves as owners of the house, and others need to perceive women as home owners as well. In order to capture how perceptions about women's ownership change, I asked wives and husbands, separately, the following question, "In your opinion, who is the owner of this house?" Figure 2 shows how beliefs about wives' ownership change for both husbands and wives. Panel A shows that women's reported ownership increases by 36.7 percentage points (pp) from 25.2% to 61.9% in the treated group while observing a 10.8 pp increase in the control group. Panel B shows that percentage of men who report their wife as an owner increase by 24.3 pp from 24.5% to 48.8% while observing a 13 pp increase in the control group.

Figure 2: First Stage: Change in beliefs about woman's effective ownership



Notes: Data sources are the baseline and endline survey data. Panel A shows for the full sample the percentage of women that report themselves as one of the owners when asked the question, "In your opinion, who is the owner of this house?" The estimate is the value of the coefficient when a dummy takes 1 if a woman reports herself as the owner, and 0 otherwise in the endline sample is regressed on the treatment variable. The regression includes village fixed effects with robust standard errors. The sample size for Panel A is 1558. Panel B shows for the full sample the percentage of men that report their wife as one of the owners when asked the question "In your opinion, who is the owner of this house?". The estimate is the value of the coefficient when a dummy variable that takes 1 if the man reports his wife as the owner and 0 otherwise in endline is regressed on the treatment variable. The sample size for Panel B in endline is 1478. Panel C and Panel D show analogous figures for "neither-informed" sample.

Several key points are worth noting. First, at baseline there is variation in couples' beliefs regarding the wife's effective ownership of property. I can categorize households into four types based on who reports the wife as an owner at the baseline:

1. "Neither-informed": neither the husband nor the wife reports the wife as an owner (N=1007).
2. "Husband-informed": only the husband reports the wife as an owner (N=138).
3. "Wife-informed": only the wife reports herself as an owner (N=195).
4. "Both-informed": both the husband and wife report the wife as an owner (N=214)

Theoretically, when one assesses how improved effective property rights for women impact their outcomes, one intuitively begins from a point where their effective rights are lowest; that is, where both husband and wife are unaware of the wife's ownership ("neither-informed" houses). The baseline distinction in beliefs is especially important because, as the model illustrates in Section 6, disparities in spousal beliefs regarding women's rights can lead to different effects on household consumption, as well as domestic violence. Table 1 indicates that women in households where at least one individual reports the wife as an owner tend to have higher baseline decision-making power, are more likely to reside in the village center, and report significantly different levels of domestic violence at the baseline. Appendix Table A8 shows a version of this table with additional variables.

In order to interpret the treatment effects as the transformation of documented rights into effective rights without the confounding influence of preexisting differences in beliefs within a couple, I focus first on the "neither-informed" houses, which represent 65% of my sample.[20] I then use the additional heterogeneity in baseline beliefs to test a model of household decision-making.

The results for the full sample are quantitatively and qualitatively similar to those of the neither-informed sample: domestic violence outcomes are more robust in the full sample, while the consumption results are more robust in the neither-informed sample. I address why these differences might arise between the two samples later when I discuss the role of baseline beliefs. Results of the full sample are presented in the appendix of the paper. Panel C and Panel D in Figure 2 display the first-stage effects for the neither-informed sample. The sample characteristics and balance across the treatment arms for the neither-informed sample are shown in Appendix Table A3. Except for husband's age which is significant at 10%, the sample is balanced.

The second point to note from Figure 2 is that beliefs about women's effective rights also increase among control households. To account for potential spillovers, I test whether proximity to a treated household within the same village influenced control households, as shown in Appendix Table A9, and find no evidence of spillovers. The observed increase in awareness appears to be partly due to a time trend and partly influenced by the intervention itself. In particular, a positive correlation exists between the percentage of households surveyed in a village and belief updating in the control group (p-value =

[20]Since the intervention and baseline surveys were conducted in the same sitting, stratifying the sample based on baseline beliefs was not feasible.

Table 1: Differences from Neither-Informed Houses in Baseline Characteristics

Variable	husband-informed	wife-informed	both-informed
HH Decision-making Index	0.0223**	0.0399***	0.0617***
HH Size	-0.0078*	-0.0011	-0.0076
Husband's age	-0.0011	0.0020**	-0.0003
IPV Index	-0.0088	0.0248*	-0.0060
Outside Vilage Centre (=1)	-0.0569**	-0.0127	-0.0553**
Woman earns (=1)	-0.0011	0.0106	0.0495**
Woman's age	-0.0008	0.0017*	0.0002

Note: In column 1, the sample consists of "husband-informed" and "neither-informed" houses (N=1,145). In column 2, the sample consists of "wife-informed" and "neither-informed" houses (N=1,202). In column 3, the sample consists of "both-informed" and "neither-informed" houses (N=1,221). Each row corresponds to the variable that is used as a dependent variable and is regressed on a dummy which takes value 1 if the house is not a "neither-informed" house and 0, otherwise. I control for village fixed effects and include robust standard errors. For construction of the household decision-making index, please refer to Appendix F.

0.07). As a result, the estimates can be interpreted as attenuated due to the change in beliefs within the control arm. Unless otherwise specified, I report intent-to-treat (ITT) estimates in my analysis.

Thirdly, several reasons may explain why increases in beliefs do not reach 100% for the treated houses: respondents may not have registered or trusted the information, or they may not have perceived women as owners despite receiving the information.[21] While disentangling these different reasons is beyond the scope of the paper, Figure 3 suggests that this is partly the effect of social norms, which here dictate that property ownership is a man's concern.

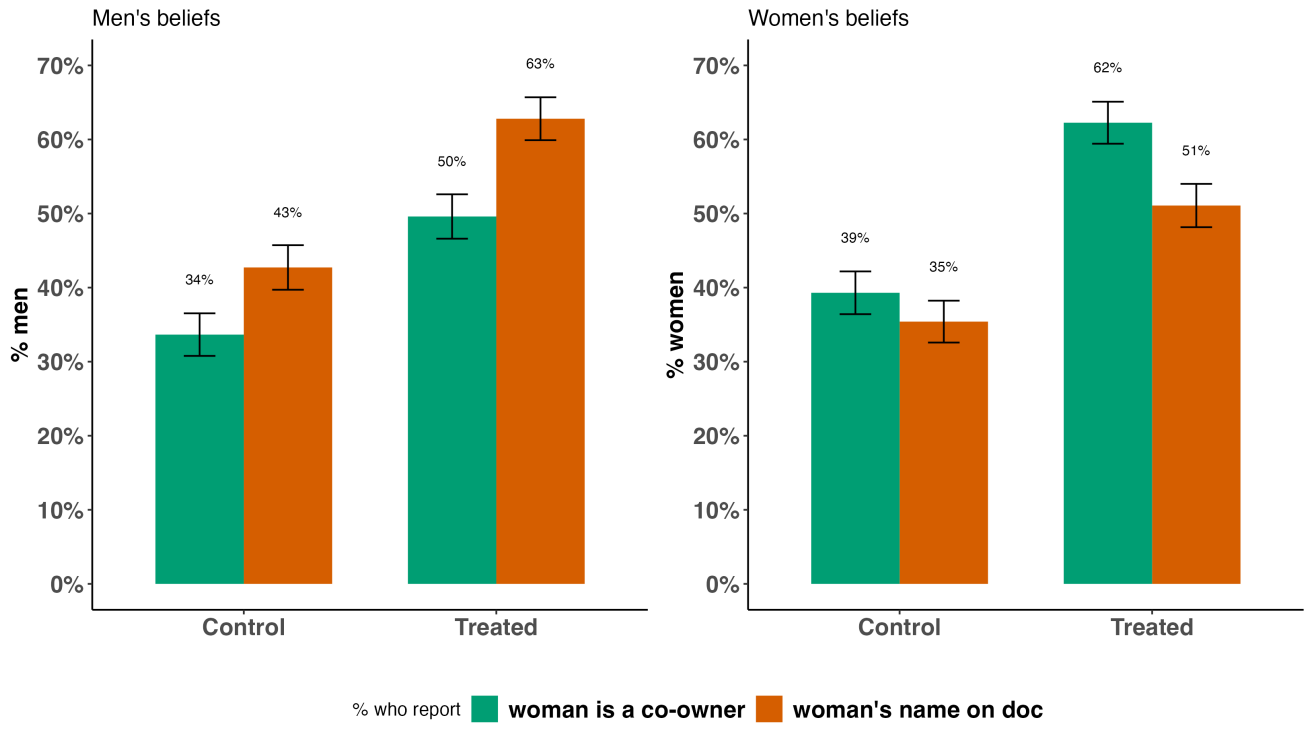
Panel A in Figure 3 illustrates that more men at the endline report their wives' names is on the ownership document than those who report their wife as an owner. Additionally, the percentage of men who acknowledge their wives' name on the documents but do not recognize them as owners is significantly higher in the treated group compared to the control group. This likely reflects entrenched beliefs, particularly among men, that the male head of the household is the owner of the house.[22]

In contrast, Panel B of Figure 3 shows that women are more likely to update their perception of being owners than retaining the information about whether their names are on the documents. This pattern is also evident when women in the treatment group were asked to recall the documents they received and the information provided during the baseline survey. Some women who did not recall receiving the ownership documents reported being told after the baseline survey that they were the home owners. This suggests that the recognition of ownership resonates more with women than the specifics of the document itself. This trend was also observed during focus group discussions, where many women emphasized that they value the recognition of ownership more than understanding or possessing the specific documents that confer ownership.

[21] There is also some noise: for 45 treated couples and 83 control couples the responses switch from wives being owners at the baseline to not being owners at the endline

[22] In this setting, the term *"ghar ka malik"* is used for both the household head and house owner. Given that the household head is the husband, it generates a perverse equivalence between the husband and the owner of the house.

Figure 3: Endline beliefs about women's ownership vs name being on the document



Notes: The data for this figure comes from the endline survey. The green bar shows the % women and men who report wives as owners.. The red bar shows the % women and men who report that wives' names are on the ownership documents.

In addition to changes in beliefs about ownership, Appendix Table A10 and Table A11 illustrate how the intervention enhances women's beliefs about their effective control over the house. This is evidenced by their increased participation in decision-making related to the home, such as taking out loans, selling the properties, and making changes to the kitchens. These findings align with expectations, as women often spend significant time in the home kitchen; the kitchen thus becomes part of the house with which they most closely identify.

5.2 Allocation of Household Resources

At both baseline and endline, I ask women about the expenditure (in rupees) on goods they solely consume. These include clothes, cosmetics, jewelry, and misri, which is a special kind of tobacco that only women consume. For clothes, cosmetics and jewelry, I ask for the amount spent on these items in the last three months, while for tobacco, I ask for the amount spent the previous week. I then aggregate these numbers and divide them by the household's total expenditure in order to measure women's private share in total household consumption. As an alternative measure, I also create a summary index based on the procedure of Anderson (2008) and Dhar et al. (2022), which I mention in Appendix F. Since the consumption variables are have a lot of zeroes, I use a Poisson regression as recommended by Chen and Roth (2024), instead of using a log or inverse hyperbolic sine specification.

Table 2 shows that women's private share of total consumption increases by 40% (a 2 pp rise). This

Table 2: ITT Effects for Private Consumption

	Share	Index	Clothes	Cosmetics	Jewellery	Tobacco	Alcohol
	← OLS →		← Poisson Regression $(exp(\beta) - 1)$ →				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Women							
Treated	0.022**	0.134**	0.434***	0.204*	0.206	0.065	
	(0.010)	(0.060)	(0.116)	(0.106)	(0.317)	(0.090)	
Control mean	0.0490	-0.0558	359.4	150.1	543.8	13.53	
Observations	1006	1007	1007	1007	1007	1007	
Panel B: Men							
Treated	-0.007	-0.013*	0.300			0.074	-0.331*
	(0.010)	(0.007)	(0.164)			(0.092)	(0.242)
Control mean	0.0835	-0.0367	291.9			36.70	86.62
Observations	1006	1007	1007			1007	1007

Note: Dependent variable in Col. (1) is the ratio of women's total expenditure over three months on clothes, cosmetics, jewellery and tobacco and the three month's household. The share is winsorized at 1%. expenditure. Controls include baseline value of the dependent variable and those selected by post-double selection Lasso. All regressions have village-level fixed effects with robust standard errors reported in the parenthesis. For index construction, please refer to Appendix F. In Cols. (3) to (7) I run Poisson regressions. The estimates reported for the Poisson regressions are $exp(\beta_1) - 1$ which is the average treatment effect in this case (Poisson regression equation: $Y_{ih} = exp(\beta_0 + \beta_1 \cdot \text{Treat}_h + \beta_2 \cdot Y^0_{ih} + \mathbf{X}_{ih} \cdot \boldsymbol{\beta}_3)\epsilon_{ih}$).

effect is largely attributable to a 43% increase in spending on clothes and a 20% rise in expenditure on cosmetics. In monetary terms, this amounts to an additional 50 rupees on clothing and 10 rupees on cosmetics in a month. Considering the average monthly household expenditure of approximately 10,000 rupees, these increases are within a reasonable range. Table A14 reveals that the intervention does not affect overall household expenditure, suggesting that the observed changes are not driven by income effects. These effect sizes are in line with what Wang (2014) finds for a policy that granted individual-level property rights in China.

Regarding men's expenditures, I collected data on their spending on clothes over the past three months and their weekly alcohol and tobacco consumption. Table 2 shows a significant decline in the husband's private consumption index, and a notable 33% decrease in alcohol expenditure.

The consumption shares and expenditures reported here are winsorized at 1%. Appendix Tables A16 and A17 demonstrate that the results remain robust under different winsorization levels. When examining the extensive margin results in Appendix Table A18, I observe a strong positive effect on women's clothing expenditures. For men, I observe reallocation away from alcohol towards tobacco and clothing, which is indicative of improvements in women's bargaining, given the well-documented negative correlation between women's well-being and alcohol consumption by their partners (Foran and O'Leary, 2008).

These results show that increase in women's consumption is partially offset by a reduction in men's expenditures, particularly on alcohol. Other potential reallocations within the household may exist, but I am unable to assess them due to the absence of a comprehensive consumption module. Although I

collected data on spending related to children's health, education, and clothing, I found no significant effects, as shown in Appendix Table A19. Given that the average age of women in my sample is 50 years, it is plausible that their children are older, which could explain the lack of increased spending on children. For example, only 25% of the women in my sample have a child under the age of 19. I also tested for changes in women's personal savings and health expenditures but found no significant effects, as detailed in Appendix Table A19.

5.3 Domestic Violence

In order to assess the impact of increased women's effective property rights on incidences of domestic violence, the survey included questions covering various aspects of domestic violence, specifically: (i) threats of being thrown out of the house, (ii) food insecurity related to domestic violence, (iii) physical violence, (iv) threats of harm from the husband, and (v) verbal insults from the husband. The second question explores the relationship between food insecurity and domestic violence. There is substantial evidence suggesting that these two issues are closely intertwined, with food insecurity often being strongly correlated with higher instances of domestic violence. One advantage of asking questions related to food insecurity is that women tend to feel more comfortable answering these compared to more direct questions about violence, which can lead to higher reporting rates, as reflected in the control means presented in Table A21. The specific questions that were asked in the survey can be found in Appendix F. The first two aspects were asked both in the baseline and endline surveys, while data from the last three questions were only collected at the endline survey. I create a domestic violence index by aggregating these five questions at the endline while for the baseline measure, I only use the first two questions. The index is created along the same lines as the consumption indices. The variable corresponding to each question takes value 1 if violence happens, and 0 otherwise. A negative coefficient therefore implies a decrease in domestic violence. Table A21 presents the results for each question and the overall index.

Information regarding property ownership apparently did not affect the incidence of violence on average. However, I note the following three points: firstly, the number of observations is lower, as not all women felt comfortable answering the question. Secondly, there may be reason for concern regarding low reporting about domestic violence, as the control mean shows about 95% women saying they do not face violence, which is significantly higher than what is noted in the latest round of the NFHS-5 for Maharashtra (72%). Due to these reasons, I might be lacking power to detect an effect. Lastly, since it is not immediately clear which direction violence might move, null effects could be concealing underlying heterogeneity. The next section addresses this issue by incorporating women's effective rights into an intrahousehold bargaining framework, thus allowing us to examine how changes in these rights might influence the dynamics of domestic violence.

Table 3: ITT Effects on Incidence of Domestic Violence

VARIABLES	(1) Banish Threat	(2) Food Insecurity	(3) Beating	(4) Insulting	(5) Threat to Harm	(6) IPV Index
Treatment	-0.001	-0.010	0.005	0.009	0.003	-0.008
	(0.013)	(0.023)	(0.010)	(0.025)	(0.013)	(0.057)
Observations	980	1,007	987	990	988	1,007
Baseline	X	X				X
Control mean	0.0395	0.150	0.0208	0.176	0.0416	-0.0819

Note: In Cols (1) to (5) have the dependent variable is an indicator variable which takes 1 if that particular form of violence happened in the last three months and 0 otherwise. All regressions have village-level fixed effects with robust standard errors reported in the parenthesis. Controls include baseline value of the dependent variable and those selected by post-double selection Lasso. For index construction, please refer to Appendix F.

6 Intrahousehold bargaining and effective ownership rights

My findings reveal that, in households with initially low beliefs about women's effective ownership, the intervention significantly increased women's share of private consumption, with a corresponding decline in men's consumption, particularly of consumption of alcohol. With regard to domestic violence, the "neither-informed" households showed no significant effect. These results prompt two key questions: (a) how should we expect the results to change for households where at least one partner already recognized the wife's ownership at baseline, and (b) which women benefit most from the intervention, and through what mechanisms?

A common theme connecting these questions is the role of beliefs regarding women's effective ownership. In an intrahousehold bargaining framework, these beliefs can influence resource allocation by shifting a woman's outside options or increasing her threat point within the marriage. Improved outside options for women can lead to higher consumption. However, when spouses hold differing beliefs, the role played by the outside threat point becomes more complex. Additionally, increases in women's decision-making power can affect consumption decisions.

The impact on domestic violence is ambiguous: greater decision-making power could escalate violence as women assert their preferences, but if husbands perceives wives' exit threats as more credible, violence may decrease. How beliefs evolve and are updated further complicates the analysis. In this section, I try to bring these forces together through a noncooperative intrahousehold bargaining model.

I adapt the noncooperative intrahousehold bargaining model from Anderson and Genicot (2015), with two key modifications. First, I account for the possibility that husbands and wives hold different beliefs about women's ownership rights in the event of separation. These differing beliefs allow me to map the model to the four household types observed at baseline, where not reporting the wife as an owner reflects low initial beliefs about her property rights. Second, instead of assigning the husband as the sole first mover in the bargaining process, I introduce a probabilistic mechanism where either spouse can be the first

mover, meaning that, with a certain probability, the wife gets to make the initial offer, which I interpret as her ability to voice her preferences.

6.1 Setup

I consider a household-level model with husband (h) and wife (w). The preferences of the individuals depend on the status of their marriage. When a marriage is intact, both partners can access household resources. Additionally, each spouse experiences personal satisfaction within the marriage, which is private information. Preferences are represented by utility functions:

$$U^h(Y_h, Y_w, \gamma, \theta_h, R) = (1-\gamma)Y + \theta_h + R \;\&\; U^w(Y_h, Y_w, \gamma, \theta_w, R) = \gamma Y + \theta_w + R, \tag{2}$$

where γ is the share of woman's private consumption. θ_j is the private level of satisfaction of individual $j \in \{h, w\}$ with the marriage and follows distribution $G_j(.)$. I assume $G_j(.) \sim U[0, \overline{\theta_j}]$. R is the total value of housing services. Y_j for $j \in \{h, w\}$ represents the resources for husband and wife with $Y = Y_h + Y_w$. For ease of notation I denote $U^h(Y_h, Y_w, \gamma, \theta_h, R)$ as $U^h(\gamma)$ and $U^w(Y_h, Y_w, \gamma, \theta_w, R)$ as $U^w(\gamma)$ below.

The preferences of the husband and the wife change if they separate or revert to "separate spheres" (Lundberg and Pollak, 1993). In case of a separation, the value of the house, R, gets split up between the husband and the wife, depending on the beliefs about wife's effective ownership rights. Let r_h be the husband's belief that the wife is an equal owner of the house, and let r_w be the wife's belief that she is an equal owner of the house. Husband interprets that, in case of separation, with probability r_h, he will enjoy $\frac{R}{2}$ of the housing services and, with probability $(1 - r_h)$, he will have a full claim over the house. In contrast, according to the wife, she, in case of a separation, will get to enjoy $\frac{R}{2}$ of the house with probability r_w, and with probability $(1 - r_w)$, she has no claim over the house. In particular, the husband's utility in case of separation is given by

$$\begin{aligned} V^h(Y_h, r_h, \kappa_h) &= r_h(Y_h - \kappa_h + \frac{R}{2}) + (1 - r_h)(Y_h - \kappa_h + R) \\ &= Y_h - \kappa_h + R(1 - \frac{r_h}{2}), \end{aligned} \tag{3}$$

and the corresponding utility of the wife is

$$\begin{aligned} V^w(Y_w, r_w, \kappa_w) &= r_w(Y_w - \kappa_w + \frac{R}{2}) + (1 - r_w)(Y_w - \kappa_w) \\ &= Y_w - \kappa_w + R(\frac{r_w}{2}), \end{aligned} \tag{4}$$

where $\kappa_j \geq 0$ represents the cost of separation. Note that r_j reflects the effective ownership of the wife from individual j's perspective. It is plausible that men and women may hold divergent beliefs regarding a wife's effective ownership of the house. This divergence can be attributed to several factors. One

reason is the presence of information asymmetries and communication gaps between spouses, which can result in differing perceptions and understandings of ownership dynamics (see, e.g., Ashraf et al., 2022). Additionally, patriarchal social norms, which often position land and property as predominantly male concerns, may lead husbands to hold different beliefs about the extent of women's rights to these assets even if there are no information asymmetries. Since r_h and r_w are private beliefs of the husband and wife, I denote by $\tilde{r}_h$ wife's belief over r_h; in other words according to the wife, the husband believes that the wife is an equal owner of the house with probability $\tilde{r}_h$. Analogously, I use $\tilde{r}_w$ to denote the husband's belief over what the wife believes about her effective ownership.[23] Therefore, while r_j represents individual j's first-order beliefs over a wife's effective ownership, $\tilde{r}_j$ represents individual j's second-order beliefs.

6.2 Timing

The interaction between the husband and the wife is modeled as an ultimatum game. In stage 0, the probability with which the woman can make the offer in stage 1 is determined, which I represent by $p \in [0, 1]$. A higher value of p signifies that the woman has higher decision-making power. In stage 1, if the man is chosen to make the offer, then he makes an offer γ_h, which the wife can either accept or reject. If she accepts, then individual j gets utility $U^j(\gamma_h)$ according to equation 2, and the game ends. If the wife rejects the offer, the game ends with the couple separating and enjoying utilities according to equations 3 and 4. Similarly, if instead the wife is chosen to make the offer in stage 1, she makes an offer γ_w, which the husband decides to either accept or reject.

When the game ends after a rejection, it triggers marital conflict: individual j incurs a cost of conflict κ_j and the couple separates or moves to "separate spheres".

6.3 Equilibrium

The game effectively involves two independent ultimatum games that differ by who makes the first offer. I first solve the case where the woman is the first mover. Working backwards, the husband would accept the offer γ_w if

$$\begin{aligned} (1-\gamma_w)\cdot Y + \theta_h + R &\geq Y_h - \kappa_h + R(1-\frac{r_h}{2}) \\ \theta_h &\geq Y_h - \kappa_h - \frac{R\cdot r_h}{2} - (1-\gamma_w)Y \equiv \hat{\theta}_h \end{aligned} \tag{5}$$

$\hat{\theta}_h$ is the value of θ_h for which the husband will be indifferent between accepting and rejecting the offer. The probability of conflict is therefore equal to $G_h(\hat{\theta}_h) = \frac{\hat{\theta}_h}{\bar{\theta}_h}$. Note that if I replace Y in Eq 5 with $Y_h + Y_w$, we get the interpretation that the larger the wife's consumption relative to her contribution is to the household income, $\gamma_w Y - Y_w$, the greater the probability is that the husband will reject the offer.

Going forward, for the sake of convenience, I use the following notations,

(i) $\Delta Y = Y_w - Y_h$

[23] I assume dogmatic second-order beliefs.

(ii) $\Delta\kappa = \kappa_w - \kappa_h$

(iii) $\Delta r = r_w - r_h$, $\Delta\tilde{r} = \tilde{r}_w - \tilde{r}_h$

(iv) $y_w = \frac{Y_w}{Y}$, $y_h = \frac{Y_h}{Y}$

(v) $c(\gamma) = Y \cdot (\gamma - y_w) = -Y \cdot ((1-\gamma) - y_h)$.

I use the notation of ΔZ to denote differences in the value of parameters Z for the wife and the husband as presented in notations (i), (ii), and (iii). I use y_j to denote the share of individual $j's$ income. I use $c(\gamma)$ to represent the difference in woman's consumption and her contribution to household income when her share of consumption is γ; this is the opposite of the difference between the husband's consumption and his contribution to household income.

I can rewrite $\hat{\theta}_h$ as

$$\hat{\theta}_h = c(\gamma_w) - \kappa_h - \frac{R \cdot r_h}{2}. \tag{6}$$

Moving to wife's decision, she will make offer γ_w that maximizes her expected utility which is given by

$$G_h(\tilde{\theta}_h)[Y_w - \kappa_w + \frac{R \cdot r_w}{2}] + (1 - G_h(\tilde{\theta}_h))[\gamma_w \cdot Y + \theta_w + R], \tag{7}$$

where $\tilde{\theta}_h = c(\gamma_w) - \kappa_h - \frac{R \cdot \tilde{r}_h}{2}$.

$G_h(\tilde{\theta}_h)$ represents the probability of husband rejecting the offer from the perspective of the wife who thinks that r_h is equal to $\tilde{r}_h$.

Taking the first order derivative of Eq. 7 with respect to γ_w yields the equilibrium value of γ_w,

$$\boxed{\gamma_w^* = y_w + \frac{-\Delta\kappa + \overline{\theta}_h - \theta_w}{2Y} + \frac{R}{2Y}\left(\frac{r_w + \tilde{r}_h}{2} - 1\right)} \tag{8}$$

The wife's share in consumption, when she is the first mover, increases in the share of income she contributes and the value of the housing services. Importantly, the share she gets increases with her beliefs about her effective ownership (r_w), as well as with the second order belief she holds about her effective rights according to her husband ($\tilde{r}_h$), since both improve her outside option, allowing her to extract a greater share of household income for her consumption. In contrast, the greater the cost of conflict for the wife relative to the husband, the lower the share she gets.

Substituting for γ_w^* in $G_h(\hat{\theta}_h)$ gives the expression for the probability of conflict which I represent by q_w^*,

$$\boxed{q_w^* = \frac{1}{2\overline{\theta}_h}\left\{-(\kappa_h + \kappa_w) + \overline{\theta}_h - \theta_w + R\left(\frac{r_w + \tilde{r}_h}{2} - r_h - 1\right)\right\}} \tag{9}$$

The probability of conflict, q_w^*, is increasing in the cost of conflict of either individual. Increases in r_w and $\tilde{r}_h$ lead to greater conflict as they reduce the share of consumption that the husband gets, thereby making separation a more viable option. On the other hand, increases in a man's beliefs about his wife's effective ownership, r_h, reduce the probability of conflict as it reduces the value of the man's outside option in case of a separation.

A similar analysis follows in the case when the husband is the first mover. Using the same steps as above, I get the expressions for the wife's share of private consumption and the probability of conflict when the husband is the proposer as,

$$\boxed{\gamma_h^* = y_w + \frac{-\Delta\kappa + \theta_h - \overline{\theta}_w}{2Y} + \frac{R}{2Y}\left(\frac{\tilde{r}_w + r_h}{2} - 1\right)} \tag{10}$$

$$\boxed{q_h^* = \frac{1}{2\overline{\theta}_w}\left\{-(\kappa_h + \kappa_w) + \overline{\theta}_w - \theta_h + R\Big(r_w - \frac{(\tilde{r}_w + r_h)}{2} - 1\Big)\right\}} \tag{11}$$

Comparing Eq. 10 with Eq. 8 we get,

$$\gamma_w^* - \gamma_h^* = \Pi + \frac{R}{4Y}[\Delta r - \Delta\tilde{r}] \tag{12}$$

where $\Pi = \left[\frac{\overline{\theta}_h - \theta_h + \overline{\theta}_w - \theta_w}{2Y}\right] > 0$.

Note that if second-order beliefs are accurate (i.e., if they match the first-order beliefs ($\tilde{r}_j = r_j$)), or if they are similar, then Eq. 12 will always be positive. However, the wife may receive a lower share of consumption when making the offer if the husband's first- and second-order beliefs are both close to 1 while the wife's are closer to 0, and if both have high levels of private satisfaction. Therefore, except in such extreme cases, the wife is likely to secure a higher share of consumption when she makes the first offer; this is consistent with the first-mover advantage.

As in the case when the wife is the first mover, the probability of conflict, q_h^*, increases in the cost of conflict of either individual. Increases in r_w lead to greater conflict as they improve women's prospects in case of separation. On the other hand, increases in $\tilde{r}_w$ and r_h reduce conflict as they induce the man to offer his wife a higher share of consumption. Therefore, regardless of who makes the first offer, the probability of conflict always increases with woman's first-order beliefs about her ownership (r_w) while it decreases with man's first-order beliefs about wife's ownership (r_h).

Putting the two ultimatum games together, the woman's ex-ante share of consumption conditional on

staying together given the solution is interior is presented as

$$\gamma^* = p \cdot \gamma_w^* + (1-p) \cdot \gamma_h^*$$

$$\implies \boxed{\gamma^* = y_w + \frac{R}{4Y}\Big\{p \cdot (r_w + \tilde{r}_h) + (1-p)(r_h + \tilde{r}_w)\Big\} + p \cdot \Pi - \frac{\Delta\kappa}{2Y} + \frac{\theta_h - \overline{\theta}_w}{2Y} - \frac{R}{2Y}} \tag{13}$$

Equation 13 indicates that the woman's ex-ante share of consumption, conditional on staying together, is determined by her share of income, a weighted average of both individuals' beliefs where the weights reflect the household's bargaining dynamics, and a set of additional terms that depend on the cost of conflict, their private satisfaction levels, housing services, and household income.

Finally, the ex-ante probability of conflict for an interior solution is equal to,

$$q^* = p \cdot q_w^* + (1-p) \cdot q_h^*$$

$$\implies \boxed{q^* = r_w \cdot f_1(p, \overline{\boldsymbol{\theta}}, R) - r_h \cdot f_2(p, \overline{\boldsymbol{\theta}}, R) + \frac{R\tilde{r}_h p}{4\overline{\theta}_h} - \frac{R\tilde{r}_w(1-p)}{4\overline{\theta}_w} + f_3(p, R, \boldsymbol{\kappa}, \boldsymbol{\theta}, \overline{\boldsymbol{\theta}})} \tag{14}$$

where $f_1(.), f_2(.) > 0 \; \forall \; p, R, \overline{\boldsymbol{\theta}}$.[24] For the derivation of Equation 14 refer to Appendix C.1.

The expression in Eq. 14 offers insight into how varying beliefs and intrahousehold bargaining dynamics influence the probability of conflict. While the wife's first-order beliefs are positively associated with an increased likelihood of conflict, the husband's first-order beliefs have the opposite effect. The extent to which these opposing forces counterbalance one another depends on the woman's decision-making power within the household and the distribution of their private satisfaction levels. Additionally, the wife's second-order beliefs further elevate the ex-ante probability of conflict, a tendency that increasingly overshadows the moderating influence of the husband's second-order beliefs as the wife's decision-making power strengthens.

6.4 Comparative Statics

The treatment informs both husbands and wives that women are now equal owners of the house, thus raising the value of both first- and second-order beliefs for both individuals. The marginal increase in these beliefs, denoted as dr_j (or $d\tilde{r}_j$), will naturally depend on their initial levels, those couples who start with higher beliefs about women's effective ownership should experience a smaller marginal increase than those with lower initial beliefs. I refer to the change in γ^* and q^* driven by changes in r_j and $\tilde{r}_j$ as the *exit* effect, as these changes impact the equilibrium outcomes via the threat of exit or the outside option channel.

Additionally, I account for the possibility that the intervention enhances the woman's decision-making power, independent of changes in the beliefs ($dp \geq 0$). Increased awareness of their property rights may boost women's confidence and their ability to assert their preferences, thereby strengthening their voice

[24] I use boldface symbols to denote vector of parameters.

in the decision-making process. I refer to the changes in the two outcomes driven by shifts in p as the *voice* effect.[25]

For comparative statics, I work with the benchmark model for which I make two assumptions. First, I assume that the private types of the husband and wife are drawn from the same distribution i.e. $\overline{\theta}_h = \overline{\theta}_w = \overline{\theta}$. Second, I assume that individuals have the correct second-order beliefs i.e. $\tilde{r}_h = r_h$ and $\tilde{r}_w = r_w$. In Appendix C, I present analysis of the comparative statics under weaker assumptions.

In this benchmark case, the equilibrium expressions of γ^* and q^* from Eq. 13 and 14 can be rewritten as

$$\gamma_{\mathrm{b}}^* = y_w - \frac{\Delta\kappa}{2Y} - \frac{(\overline{\theta} - \theta_h)}{2Y} + \frac{R}{2Y} \cdot \left(\frac{r_w + r_h}{2} - 1 \right) + p \cdot \left(\frac{2\overline{\theta} - \theta_w - \theta_h}{2Y} \right) \tag{15}$$

$$q_b^* = -\frac{(\kappa_h + \kappa_w)}{2\overline{\theta}} + \frac{\overline{\theta} - \theta_h}{2\overline{\theta}} + \frac{R}{2\overline{\theta}} \cdot \left(\frac{r_w - r_h}{2} - 1 \right) + p \cdot \frac{(\theta_h - \theta_w)}{2\overline{\theta}} \tag{16}$$

Note that, prior to the intervention, the model predicts that, in households where the husband's beliefs about the wife's effective ownership are stronger than the wife's own beliefs, the wife should experience lower levels of violence compared to households where the wife holds higher beliefs about her ownership. While houses where collectively $(r_h + r_w)$ is higher, woman's share of consumption should be higher. I test for these baseline patterns in Section 7.

The effect on γ_b^* as a result of receiving treatment $(d\gamma_b^*)$ is given by,

$$\begin{aligned} d\gamma_b^* &= \underbrace{\frac{\partial \gamma_b^*}{\partial r_h} \cdot dr_h + \frac{\partial \gamma_b^*}{\partial r_w} \cdot dr_w}_{\textit{exit}\text{ effect}} + \underbrace{\frac{\partial \gamma_b^*}{\partial p} \cdot dp}_{\textit{voice}\text{ effect}} \\ &= \underbrace{\frac{R}{4Y} \cdot \left\{ dr_w + dr_h \right\}}_{\textit{exit}\text{ effect} > 0} + \underbrace{\left\{ \frac{2\overline{\theta} - \theta_w - \theta_h}{2Y} \right\} \cdot dp}_{\textit{voice}\text{ effect} > 0} \end{aligned} \tag{17}$$

Both the *exit* and the *voice* effect of γ_b^* are unambiguously positive. The *exit* effect will be stronger in houses where individuals before the intervention hold lower beliefs and hence experience higher marginal increase in their beliefs, while controlling for the relative value of housing services to household income. The *voice* effect will be stronger in houses that have lower satisfaction levels from marriage.

Moving to analyze the change in probability of conflict, as in the case of γ_b^* I breakup the change in q_b^*

[25] I draw the concepts of *voice* and *exit* from Katz (1997), who adapted them to household bargaining from Hirschman (1970).

into *exit* effect and *voice* effect

$$dq_b^* = \underbrace{\frac{\partial q^*}{\partial r_h} \cdot dr_h + \frac{\partial q^*}{\partial r_w} \cdot dr_w}_{\textit{exit}\text{ effect}} + \underbrace{\frac{\partial q^*}{\partial p} dp}_{\textit{voice}\text{ effect}}$$

$$dq_b^* = \underbrace{\frac{R}{4Y} \cdot \left\{ dr_w - dr_h \right\}}_{\textit{exit}\text{ effect} \rightarrow \text{ambiguous}} + \underbrace{\left\{ \frac{\theta_h - \theta_w}{2\overline{\theta}} \right\} \cdot dp}_{\textit{voice}\text{ effect} \rightarrow \text{ambiguous}} \tag{18}$$

Increasing wife's beliefs relative to husband's beliefs leads to greater conflict. The overall direction of the *exit* effect will therefore depend on how these opposing influences balance each other, which in turn depends on the initial values of r_h and r_w. In a house where the wife before the treatment holds higher beliefs than her husband about her effective ownership rights, I expect that $dr_w < dr_h$: the treatment will likely reduce the probability of conflict.

The sign of the *voice* effect on conflict is determined by the difference between the two probabilities of conflict, which, in the benchmark case, corresponds to the difference in the satisfaction levels of the husband and wife. If the husband's satisfaction level is greater than the wife's satisfaction from the marriage, the probability of conflict is higher when the woman is the first mover. Consequently, the *voice* effect leads to increased conflict. Conversely, in a household where the wife holds a higher level of satisfaction, the probability of conflict decreases. Since $\mathbb{E}(\theta_j) = \frac{\overline{\theta}}{2}$, in expectation these two opposing forces tend to cancel each other out, thus resulting in a net *voice* effect on conflict of zero. The *exit* channel would therefore become the primary determinant of the direction in which conflict changes.

The next subsection discusses how I apply these results from the comparative statics to my experiment.

6.5 Linking the model to the experiment

As discussed in Section 5.1, I use responses to the question, "In your opinion, who is the owner of the house?" as an empirical measure of effective ownership. Let $r_h^{data} = 1$ if the husband reports his wife as one of the owners and zero otherwise, where $data \in \{baseline(bs), endline(es)\}$. Similarly, let $r_w^{data} = 1$ if the wife reports herself as one of the owners and zero otherwise. I refer to theoretical concept of effective ownership as captured by r_h and r_w and I assume the following for $j \in \{h, w\}$,

$$r_j^{data} = \begin{cases} 1 & \text{if } r_j \geq s + \epsilon \\ 0 & \text{if } r_j < s + \epsilon \end{cases} \tag{19}$$

Eq 19 says that individual j reports the wife as an owner in the surveys if their belief that the wife will be able to stake claim to the house in case of separation is at least as high as some threshold value s plus an error term ϵ, which is independently and identically distributed (i.i.d.) with a mean of zero to account for noise in the data. As shown in Table 4, I can now categorize my sample into four types of households based on the baseline measure of effective ownership and, using Equation 19 establish a link between

these categories and the preintervention values of the theoretical parameters, r_h and r_w. Note, I measure conflict in the data using the IPV index, as discussed in Section 5.3

Table 4: Four types of houses at baseline

House Type	r_h^{bs}, r_w^{bs}	r_h, r_w preintervention
Neither-informed	$r_h^{bs} = 0, r_w^{bs} = 0$	low values of r_h and r_w
Husband-informed	$r_h^{bs} = 1, r_w^{bs} = 0$	high value of r_h and low value of r_w
Wife-informed	$r_h^{bs} = 0, r_w^{bs} = 1$	low value of r_h and high value of r_w
Both-informed	$r_h^{bs} = 1, r_w^{bs} = 1$	high values of r_h and r_w

Combining the categories from Table 4 with the comparative statics from equations 17 and 18, I arrive at the first set of predictions related to the treatment effects.

Prediction 1 (Treatment Effects)**.** *On women's private share of consumption,*

(i) Women in the neither-informed sample experience the greatest increase in their consumption share, followed by those in the husband-informed and wife-informed samples, while women in the both-informed sample experience the lowest or no effect,

$$d\gamma^*_{b,\ \textit{neither-informed}} > d\gamma^*_{b,\ \textit{husband-informed}} \approx d\gamma^*_{b,\ \textit{wife-informed}} > d\gamma^*_{b,\ \textit{both-informed}} \geq 0$$

On incidences of domestic violence,

(ii) Women in wife-informed houses experience a decline in the incidence of domestic violence while for women in husband-informed houses incidence of violence increases,

$$dq^*_{b,\ \textit{wife-informed}} < 0,\ dq^*_{b,\ \textit{husband-informed}} > 0$$

For women in the neither-informed sample, the *exit* effect on consumption will be strongest given the lower baseline values of r_h and r_w relative to women in the other three types of households where at least one partner reports the wife as an owner. Additionally, as shown in Table 1, women in the other three household types begin with higher decision-making power, which suggests that the *voice* channel matters less for them than for women in neither-informed households, who start with lower baseline decision-making power.

With regard to domestic violence, the direction of the *exit* effect determines the impact on domestic violence. Since changes in women's and men's beliefs have opposing effects, domestic violence is expected to increase in households where the increase in the wife's belief about her effective ownership is greater than the change in the husband's belief, as is likely in husband-informed households. Conversely, violence should decrease in wife-informed households where the increase in the husband's belief outweighs that of the wife.

Moreover, I can also test how the model performs before the intervention is implemented. Recall that equations 15 and 16 from the previous section show that controlling for decision-making power, p, the higher the sum of beliefs, r_h and r_w, the greater the woman's share of consumption. Conversely, when r_w is higher relative to r_h, the probability of conflict increases. I therefore arrive at second set of predictions which I can test on baseline data.

Prediction 2 (Preintervention)**.** *On women's private share of consumption,*

(i) Controlling for baseline decision-making power, women in both-informed houses should report higher share of private consumption at baseline, compared to the rest of the sample.

On incidence of domestic violence,

(ii) Controlling for baseline decision-making power, women in wife-informed houses should report higher incidence of domestic violence at baseline compared to women in rest of the sample.

(iii) Controlling for baseline decision-making power, women in husband-informed houses should report lower incidences of domestic violence at the baseline compared to women in the rest of the sample.

Prediction 1 deals with treatment effect predictions based on baseline differences in beliefs. Alternatively, one way to apply the comparative statics to the data is to ask if the effects of domestic violence and consumption are actually driven by people who update on their beliefs. That is, if I close the bargaining channel, then the model predicts that houses where both the husband and wife update on their prior beliefs about a wife's effective ownership should see the greatest increase in consumption, followed by those where only one updates, relative to houses where neither updates. Similarly, in houses where the husband updates but not the wife, I should observe an improvement in domestic violence, while in the reverse situation, domestic violence should increase relative to houses where neither updates or both update.

Prediction 3 (Compliers)**.** *On women's private share of consumption,*

$$d\gamma^*_{b,\ \textit{both update}} > d\gamma^*_{b,\ \textit{only one update}} > d\gamma^*_{b,\ \textit{neither update}}$$

On incidence of domestic violence,

$$dq^*_{b,\ \textit{only wife updates}} < 0,\ dq^*_{b,\ \textit{only husband updates}} > 0$$

7 Heterogeneity: Applying predictions of the model

To test Prediction 1, I examine separately the effect of the treatment on households where at least one partner reported the wife as an owner at baseline. Panel A of Table 1 recaps the effects for the neither-informed sample. A caveat of this exercise is the small sample sizes of the other three types of households, which introduces more noise into the results. Refer to Appendix Tables A5, A4, A6 and A7 for the balance for each of these subsamples. I always control for the unbalanced variables.

Table 5: Testing for post-intervention predictions (Prediction 1)

	Women's Share	Women's Index	Men's Share	Men's Index	IPV Index
	(1)	(2)	(3)	(4)	(5)
Panel A: Neither-informed					
Treated	0.022**	0.103**	-0.006	-0.016	-0.008
	(0.010)	(0.052)	(0.010)	(0.013)	(0.056)
Control mean	0.05	-0.09	0.08	-0.04	-0.08
Observations	1006	1007	1006	1007	1007
Panel B: Husband-informed					
Treated	-0.011	0.059	-0.067*	0.017	-0.108
	(0.047)	(0.167)	(0.036)	(0.039)	(0.159)
Control mean	0.07	-0.15	0.11	-0.18	-0.08
Observations	138	138	138	138	138
Panel C: Wife-informed					
Treated	-0.016	0.051	0.010	-0.021	-0.383**
	(0.035)	(0.136)	(0.024)	(0.037)	(0.202)
Control mean	0.08	0.07	0.11	0.15	0.19
Observations	195	195	195	195	195
Panel D: Atmost one-informed					
Treated	0.015	0.097**	-0.010	-0.022*	-0.022
	(0.010)	(0.046)	(0.009)	(0.012)	(0.051)
Control mean	0.06	-0.07	0.09	-0.02	-0.03
Observations	1339	1340	1339	1340	1340
Panel E: Both-informed					
Treated	-0.081**	-0.336*	-0.005	0.026	0.154
	(0.045)	(0.193)	(0.025)	(0.040)	(0.160)
Control mean	0.12	0.16	0.11	0.15	0.25
Observations	214	214	214	214	214

Note: Robust standard errors are reported in parenthesis. For index construction, please refer to Appendix F. Controls include baseline value of the dependent variable and those selected by post-double selection Lasso.

Regarding consumption, I do not find evidence of an increase in women's consumption in the husband- and wife-informed households, as shown in Columns (1) through (4) of Panels B and C. However, consistent with Prediction 1, the effect of the intervention is largest for the neither-informed sample. If I combine all subsamples from Panels A through C i.e., if I look at households where at least one partner did not report the wife as an owner at baseline, I find that women's consumption increases. With regard to domestic violence, as shown in Column 5 of Panel C, women in the wife-informed households experience a significant decrease in the incidence of violence, while I do not find any evidence for the husband-informed sample.

In Panel E of Table 1, I report the average treatment effects for the both-informed households. The model predicts that, for both consumption and domestic violence, women in these households should not experience an effect. However, as seen in Columns (1) and (2), women in these samples experience a reduction in their private consumption. One reason for these adverse effects could be related to the dynamics of the marriage market if the model is expanded to a general equilibrium setting.

I test Prediction 2 by examining the baseline correlations between beliefs about women's effective ownership and outcomes related to consumption and domestic violence. Columns 1 and 2 of Table 6 show that, at baseline, the difference in women's consumption between both-informed households and the rest of the sample is positive but not statistically significant. In Column 3, consistent with Prediction 1.(ii), I find that in households where only the wife reports herself as an owner at baseline (wife-informed), the incidences of domestic violence are higher compared to the rest of the sample. However, in Column 4, while women in the husband-informed sample appear to experience less violence than the rest of the sample, the coefficient is not statistically significant. In sum, while the evidence is not strong, it aligns with Prediction 2.

Testing Prediction 3 presents an empirical challenge. While, the awareness campaign enables randomization of information, it leads to the formation of four endogenous groups: both spouses update, only the husband updates, only the wife updates, or neither updates. To assess how the impacts vary depending on who updates is challenging due to self-selection, where individuals naturally sort themselves into the four groups based on unobserved characteristics or preferences. For example, couples with a greater mutual understanding or those who prioritize egalitarian values may be more likely to both update their beliefs, whereas couples with more traditional views may be less inclined to update at all. These unobserved factors, such as pre-existing attitudes about women's rights or household decision-making dynamics, could independently influence the outcome variables, like consumption and domestic violence. Therefore, a simple comparison across these groups would conflate the effect of updating beliefs with the underlying characteristics that led each individual to update or not, resulting in biased estimates.

With only a single instrumental variable—participation in the information campaign—and four endogenous treatment groups, a straightforward Two Stage Least Squares (2SLS) approach is inadequate. I apply two strategies to get around this problem.

In the first strategy, I conduct a heterogeneity analysis based on baseline characteristics that predict who updates their beliefs at endline. This analysis is performed by combining the neither-informed,

Table 6: Baseline correlations testing for pre-intervention predictions (Prediction 2)

	Women's Index	Women's Share	IPV Index	IPV Index
	(1)	(2)	(3)	(4)
Both-informed	0.081	0.010		
	(0.084)	(0.009)		
Woman-informed			0.180**	
			(0.090)	
Man-informed				-0.032
				(0.079)
Observations	1554	1554	1554	1554

Note: Robust standard errors are reported in parenthesis. All regressions include the full sample. In Cols. (1) and (2) I test Prediction 1(i) by regressing the dependent variable on a dummy which takes 1 if the household is a "both-informed" type and 0 otherwise. In Col. (3), I test Prediction 1(ii) and regress the baseline IPV index on a dummy variable which takes 1 if household is of "wife-informed" type and 0, otherwise. In Col. (4), I test Prediction 1(iii) and regress the baseline IPV index on a dummy variable which takes 1 if household is of "husband-informed" type and 0, otherwise. The number of observations are 1554 and not 1558 as for four men, who could not be surveyed due to their working hours, there is no baseline information. However, they were surveyed at the endline. These four houses get dropped as they cannot be categorized based on baseline beliefs. In all regressions I control for baseline household decision-making index, which acts as a proxy for decision-making power and other baseline controls. For index construction, please refer to Appendix F.

husband-informed, and wife-informed samples, creating a larger sample where at least one partner has the potential to update their prior beliefs, from not reporting the wife as an owner at baseline to recognizing her ownership at endline. This combined sample corresponds to Panel D in Table 5.

Appendix Table A22 shows that, within treated households, women are more likely to update their prior beliefs and report themselves as owners at endline if they come from smaller families with lower household expenditures, actively participate in village meetings, and reside in the village center. Men who are younger, and live in the village center, as well as those with smaller families and wives who are younger, educated, and socially active, are more likely to change their prior beliefs at endline.

In Panels A, B, and C of Table 7, I examine the heterogeneity in treatment effects based on baseline characteristics that predict belief updating for both men and women. Panel A reveals that, while men and women from smaller households are more likely to update their beliefs, there are no significant differences in treatment effects by household size. However, women's private consumption increases significantly more for those residing in the village center and for women who reported greater participation in village meetings at baseline. For these baseline characteristics, I do not find any heterogeneous effects on domestic violence, which could be partly due to the opposing effects of both husbands and wives updating their beliefs.

In Panels D to G of Table 7, I explore the heterogeneous treatment effects based on baseline characteristics that predict whether only the husband or only the wife updates their beliefs. Appendix Table A22 indicates that husbands in younger couples with educated wives are more likely to revise their beliefs about

Table 7: HTEs to test for Prediction 3

	Women's Share	Women's Index	Men's Share	Men's Index	IPV Index
	(1)	(2)	(3)	(4)	(5)
Panel A: Household Size					
Treated	0.015	0.082	-0.006	-0.030**	-0.010
	(0.013)	(0.059)	(0.012)	(0.015)	(0.069)
Treated*Above Median HH Size	-0.001	0.039	-0.011	0.022	-0.033
	(0.016)	(0.089)	(0.016)	(0.024)	(0.107)
Observations	1339	1340	1339	1340	1340
Panel B: Woman Attends Village Meetings					
Treated	0.011	0.068	-0.010	-0.023*	-0.003
	(0.010)	(0.049)	(0.010)	(0.013)	(0.056)
Treated*Attends Village Meeting	0.033	0.249*	0.005	0.012	-0.161
	(0.032)	(0.132)	(0.023)	(0.037)	(0.150)
Observations	1339	1340	1339	1340	1340
Panel C: Distance from Village Centre					
Treated	0.055***	0.243***	-0.001	-0.032	0.078
	(0.018)	(0.081)	(0.014)	(0.020)	(0.093)
Treated*Lives ouside Village centre	-0.062***	-0.226**	-0.013	0.015	-0.156
	(0.021)	(0.098)	(0.019)	(0.025)	(0.115)
Observations	1339	1340	1339	1340	1340
Panel D: Woman's Age					
Treated	0.025*	0.126*	-0.020	-0.049***	-0.161**
	(0.015)	(0.069)	(0.012)	(0.018)	(0.070)
Treated*Above Median Woman's Age	-0.022	-0.063	0.023	0.060***	0.310***
	(0.020)	(0.093)	(0.018)	(0.023)	(0.104)
Observations	1339	1340	1339	1340	1340
Panel E: Man's Age					
Treated	0.021	0.064	-0.016	-0.043**	-0.116
	(0.014)	(0.070)	(0.013)	(0.019)	(0.074)
Treated*Above Median Man's Age	-0.012	0.067	0.013	0.045**	0.192*
	(0.020)	(0.095)	(0.018)	(0.023)	(0.105)
Observations	1339	1340	1339	1340	1340
Panel F: Woman's Education					
Treated	0.005	0.030	-0.029**	0.000	-0.004
	(0.012)	(0.058)	(0.013)	(0.014)	(0.074)
Treated*Above Median Woman's Education	0.020	0.145	0.041**	-0.041*	-0.031
	(0.017)	(0.089)	(0.017)	(0.024)	(0.102)
Observations	1339	1340	1339	1340	1340
Panel G: Household Expenditure					
Treated	0.049	-0.481	-0.113	0.126	-0.006
	(0.089)	(0.528)	(0.138)	(0.149)	(0.641)
Treated*HH Expenditure	-0.004	0.064	0.011	-0.016	-0.001
	(0.010)	(0.060)	(0.015)	(0.017)	(0.071)
Observations	1339	1340	1339	1340	1340
Control mean	0.06	-0.07	0.09	-0.02	-0.03

Note: Robust standard errors are reported in parenthesis. All regressions include the sample of houses where at least one partner did not report wife as an owner at baseline. Controls include baseline value of the dependent variable and those selected by Post Double Selection Lasso. For index construction, please refer to Appendix F.

women's ownership rights following the intervention. Consistent with Prediction 3, one would expect an improvement in the incidence of domestic violence in households with younger wives or husbands. Indeed, Column (5) in Panel D shows that domestic violence decreases for younger women but increases for older women. A similar trend is observed by husband's age in Panel E. While I do not find significant evidence of heterogeneity in women's consumption, there is some indication that men's consumption decreases among younger couples. In Panel G, I find no evidence of heterogeneity based on household expenditure, which is negatively correlated with cases where only the wife updates her beliefs.

While the results from the above analysis generally align with Prediction 3, they remain suggestive at best. These heterogeneous effects could be masking other factors through which these characteristics influence the downstream outcomes, independent of the belief-updating mechanism. In the second approach, I apply a more rigorous econometric method to test Prediction 3. Specifically, I utilize the toolkit provided by Lee and Salanié (2018) to identify the effects of endogenous treatments in the next subsection.

7.1 Econometrics of Endogenous Treatments

I apply the method of Lee and Salanié (2018) to a two-threshold model involving four treatment types, denoted by $k \in \{1, 2, 3, 4\}$. The four treatments are based on who updates their beliefs about women's ownership rights at endline. Let $D_k = 1$ if treatment k is realized, and $D_k = 0$ otherwise. The outcome is represented by Y, and $\mathbf{Z}$ denotes the vector of instruments, which in this case consists of a dummy variable for receiving the information campaign, interacted with a set of baseline observables. I use $\mathbf{X}$ to denote the set of baseline observables.

Let V_h and V_w denote unobserved factors influencing the husband and wife, respectively, in updating their beliefs. As suggested above, these factors may also correlate with the outcome variable. V_h and V_w are independent of $\mathbf{z} \in \mathbf{Z}$ conditional on $\mathbf{X}$ and without loss of generality have marginals $U[0, 1]$ for all $\mathbf{x} \in \mathbf{X}$. There are two thresholds, $Q_h(x, z)$ and $Q_w(x, z)$ that determine the selection into the four treatment groups as follows:

- D=1 (Neither spouse updates) iff $V_h < Q_h(x, z)$ and $V_w < Q_w(x, z)$,
- D=2 (Only husband updates) iff $V_h > Q_h(x, z)$ and $V_w < Q_w(x, z)$,
- D=3 (Only wife updates) iff $V_h < Q_h(x, z)$ and $V_w > Q_w(x, z)$,
- D=4 (Both spouses update) iff $V_h > Q_h(x, z)$ and $V_w > Q_w(x, z)$.

Here $Q_j(x, z)$ is estimated as the probability with which individual j updates their belief about wife's ownership. Applying Theorem 3.1 from Lee and Salanié (2018), under the assumption that V_h and V_w are independent, the expressions for the Marginal Treatment Effects (MTE) turn out to be

$$MTE_{1\to2}(q_h, q_w, \mathbf{x}) = \mu(x,2) - \mu(x,1) + (q_h - \frac{1}{2})(a_h^2 - a_h^1) + (q_w - \frac{1}{2})(a_w^2 - a_w^1) \tag{20}$$

$$MTE_{1\to3}(q_h, q_w, \mathbf{x}) = \mu(x,3) - \mu(x,1) + (q_h - \frac{1}{2})(a_h^3 - a_h^1) + (q_w - \frac{1}{2})(a_w^3 - a_w^1) \tag{21}$$

$$MTE_{1\to4}(q_h, q_w, \mathbf{x}) = \mu(x,4) - \mu(x,1) + (q_h - \frac{1}{2})(a_h^4 - a_h^1) + (q_w - \frac{1}{2})(a_w^4 - a_w^1) \tag{22}$$

The full derivation is shown in Appendix D. Equation (20) provides the MTE for the transition from a state where neither spouse updates to a state where only the husband updates. In contrast, equation (21) details the MTE for the case where only the wife updates relative to neither spouse updating. Finally, equation (22) presents the MTE for both spouses updating in comparison to neither updating.

The difference $\mu(x,k) - \mu(x,1)$ represents the change in outcomes resulting from moving from treatment group $D = 1$ to $D = k$, if the assignment to these treatment groups was entirely random and *not* influenced by individuals self-selecting into different endogenous treatment groups. On the other hand, the difference $a_j^k - a_j^1$ captures the marginal change arising from the fact that individual j updates their beliefs based on some unobservables that can be correlated with the outcomes of interest.

Table 8: Women's Share of Private Consumption

	$a_h^k - a_h^1$	$a_w^k - a_w^1$
	(1)	(2)
Neither Update → Both Update	$\boxed{-0.51}$	$\boxed{0.54^{**}}$
	(-1.54, 0.04)	(0.11, 1.32)
Neither Update → Husband Updates	-1.01	0.48
	(-2.54, -0.27)	(-0.03, 1.41)
Neither Update → Wife Updates	0.29	-0.22
	(-0.41, 1.26)	(-0.82, 0.21)

Note: I report 90% bootstrapped confidence interval in parenthesis.

In Table 8, I present the estimated values of $a_j^k - a_j^1$. Given the limited sample size, the estimates are imprecise, yet notable patterns emerge. Recall that for women's share of private consumption, the model predicts that the marginal treatment effect should be most pronounced when moving from neither partner updating to both updating. Consistent with this, I find that the wife's contribution to the marginal treatment effect is positive, significant, and largest when both partners update their beliefs, compared to cases where only she updates. However, while the husband's contribution to the MTE is greater when both update than when only he updates, it is negative and statistically insignificant.

Table 9: Domestic Violence

	$a_h^k - a_h^1$	$a_w^k - a_w^1$
	(1)	(2)
Neither Update → Both Update	0.06	-0.74
	(-3.91, 5.59)	(-4.35, 1.87)
Neither Update → Husband Updates	$\boxed{-1.29}$	-1.04
	(-7.40, 4.27)	(-5.42, 2.83)
Neither Update → Wife Updates	-0.22	$\boxed{0.15}$
	(-3.38, 2.98)	(-1.92, 2.22)

Note: I report 90% bootstrapped confidence interval in parenthesis.

Examining the incidence of domestic violence (Table 9), I find that changes in the husband's beliefs have a negative contribution to the MTE on the IPV index when moving from neither partner updating to only the husband updating. In contrast, when we shift from neither updating to only the wife updating, the MTE increases due to the changes in the wife's beliefs. Although the confidence intervals are wide, these results align with model predictions, highlighting the significance of improving the husband's beliefs about women's property rights as an essential pathway for reducing violence.

8 Conclusion

In developing countries, policies often fall short of their intended impact due to implementation challenges or a lack of public awareness. This gap is particularly pronounced in policies aimed at enhancing women's property rights, which encounter additional resistance from entrenched patriarchal norms. While it's known that implementation is a challenge, the size of the gap between having documented rights and fully internalizing those rights remains less understood. In this paper, I provide evidence of a significant gap between documented and effective property rights for women by studying a government program that added married women as official homeowners. I then evaluate the impact of closing this gap on women's empowerment by randomizing an awareness campaign that informed couples of the changes in women's property rights.

I find that informing couples about women's property rights significantly improves perceptions of women's ownership, increasing women's share of private consumption and reducing men's alcohol consumption. An intrahousehold bargaining model shows that the effects on these outcomes depend on which partner updates their beliefs about women's rights. The model predicts that improved beliefs from either spouse positively affect women's consumption share, while the direction of impact on domestic violence differs: increases in the wife's beliefs heighten violence, while improvements in the husband's beliefs reduce it. Consistent with these predictions, I observe the strongest consumption effects in households with initially low beliefs about women's ownership and reductions in domestic violence

where the husband's initial beliefs lag behind the wife's.

This study highlights how crucial awareness and information transmission are for laws aimed at empowering women, particularly given that women often have lower legal literacy than men. It shows that even simple, low-cost interventions can unlock the full potential of large-scale programs to reform women's property rights. The results of this study are especially important as they show that, even in a setting with low state capacity and entrenched patriarchal norms, changing perceptions of women's property rights can significantly enhance women's empowerment.

The findings also underscore the need for gender-disaggregated data, as disparities in legal knowledge between spouses can shape the effectiveness of property rights. The paper suggests that who receives information matters for outcomes, emphasizing the importance of understanding who holds initial knowledge before rolling out information campaigns. Often, household surveys interview only the household head—typically the man—obscuring intra-household knowledge dynamics. Identifying households where one partner is informed but the other is not can help tailor policy interventions more effectively.

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A Appendix: Tables

Table A1: Attrition at Endline

	Woman Surveyed==1	Man Surveyed==1
	(1)	(2)
Treated	0.021	0.026
	(0.016)	(0.018)
Control mean	0.86	0.82
Observations	1783	1783

Note: All regressions have village-level fixed effects with robust standard errors.

Table A2: Sample Characteristics and Balance (Full Sample)

Variable	N	Treatment	Control	Difference	Reg Coeff	P-value
Woman's age	1558	49.61	49.55	0.06	-0.057	0.909
HH Exp	1558	8.97	8.93	0.04	0.055	0.108
Husband's age	1554	56.70	56.94	-0.24	-0.309	0.567
General Caste (=1)	1558	0.70	0.65	0.05	0.039	0.063*
Woman works in agri. (=1)	1558	0.78	0.75	0.03	0.022	0.302
Woman's education	1558	4.46	4.30	0.16	0.194	0.336
Husband's education	1554	6.95	6.71	0.24	0.269	0.226
Outside Vilage Centre (=1)	1558	0.64	0.66	-0.02	-0.014	0.552
HH Size	1558	3.96	3.99	-0.03	-0.034	0.774
No. of rooms	1558	2.34	2.35	-0.01	-0.009	0.879
Mahila Sabha attendance	1558	0.12	0.13	-0.01	-0.013	0.444
SHG member (=1)	1558	0.46	0.46	0.00	-0.001	0.965
Age girl should get married	1558	20.31	20.30	0.01	0.023	0.827
Education a girl should get	1558	12.95	12.94	0.01	0.009	0.957
HH Decision-making Index	1558	0.00	0.00	0.00	0.007	0.879
Woman's Consump. Index	1558	-0.05	0.00	-0.05	-0.056	0.250
Husband's Consump. Index	1558	-0.07	0.00	-0.07	-0.061	0.190
IPV Index	1558	-0.05	0.00	-0.05	-0.052	0.246
Woman earns (=1)	1558	0.36	0.37	-0.01	-0.020	0.414

Note: This table presents summary statistics for households' baseline covariates for the full sample by treatment group and tests whether there are any statistically significant differences between experimental arms at baseline. Col. (1) presents the number of observations, and Cols. (2) and (3)the mean of each covariate. Col. (4) present the coefficient and (5) records the p-value of a regression of each covariate on a dummy variable for treatment with village fixed effects and robust standard errors. N in Col. (1) is 1554 because at baseline 4 husbands were not surveyed.

Table A3: Sample Characteristics and Balance (Neither-informed Sample)

Variable	N	Treatment	Control	Difference	Reg Coeff	P-value
Woman's age	1007	48.88	49.65	-0.77	-0.899	0.154
HH Exp	1007	8.98	8.93	0.05	0.052	0.242
Husband's age	1007	55.91	57.25	-1.34	-1.315	0.060*
General Caste (=1)	1007	0.70	0.65	0.05	0.036	0.180
Woman works in agri. (=1)	1007	0.79	0.76	0.03	0.024	0.338
Woman's education	1007	4.63	4.33	0.30	0.369	0.146
Husband's education	1007	6.79	6.63	0.16	0.210	0.408
Outside Vilage Centre (=1)	1007	0.66	0.69	-0.03	-0.023	0.434
HH Size	1007	4.08	4.10	-0.02	-0.063	0.674
No. of rooms	1007	2.38	2.37	0.01	0.003	0.969
Mahila Sabha attendance	1007	0.12	0.11	0.01	0.005	0.790
SHG member (=1)	1007	0.45	0.44	0.01	0.001	0.986
Age girl should get married	1007	20.31	20.33	-0.02	-0.010	0.942
Education a girl should get	1007	13.02	12.83	0.19	0.245	0.294
HH Decision-making Index	1007	-0.11	-0.11	0.00	0.009	0.875
Woman's Consump. Index	1007	-0.06	-0.02	-0.04	-0.054	0.388
Husband's Consump. Index	1007	-0.06	-0.04	-0.02	-0.023	0.681
IPV Index	1007	-0.05	-0.04	-0.01	-0.016	0.745
Woman earns (=1)	1007	0.35	0.36	-0.01	-0.015	0.630

Note: This table presents summary statistics for households' baseline covariates for the neither-informed sample by treatment group and tests whether there are any statistically significant differences between experimental arms at baseline. Col. (1) presents the number of observations, and Cols. (2) and (3)the mean of each covariate. Col. (4) present the coefficient and (5) records the p-value of a regression of each covariate on a dummy variable for treatment with village fixed effects and robust standard errors.

Table A4: Sample Characteristics and Balance (Husband-informed Sample)

Variable	N	Treatment	Control	Difference	Reg Coeff	P-value
Woman's age	138	49.84	47.51	2.33	3.086	0.111
HH Exp	138	8.92	8.96	-0.04	-0.065	0.622
Husband's age	138	56.43	54.42	2.01	3.301	0.117
General Caste (=1)	138	0.74	0.71	0.03	0.100	0.278
Woman works in agri. (=1)	138	0.77	0.81	-0.04	0.005	0.959
Woman's education	138	4.49	4.99	-0.50	-0.716	0.392
Husband's education	138	7.14	7.90	-0.76	-1.385	0.110
Outside Vilage Centre (=1)	138	0.54	0.55	-0.01	-0.046	0.677
HH Size	138	3.78	3.67	0.11	0.223	0.666
No. of rooms	138	2.30	2.39	-0.09	-0.034	0.893
Mahila Sabha attendance	138	0.07	0.13	-0.06	-0.054	0.383
SHG member (=1)	138	0.49	0.48	0.01	0.041	0.727
Age girl should get married	138	20.65	20.72	-0.07	-0.071	0.874
Education a girl should get	138	12.78	12.83	-0.05	-0.079	0.393
HH Decision-making Index	138	0.04	0.19	-0.15	-0.309	0.190
Woman's Consump. Index	138	-0.06	-0.06	0.00	-0.055	0.793
Husband's Consump. Index	138	-0.08	-0.16	0.08	0.146	0.442
IPV Index	138	-0.03	-0.08	0.05	0.081	0.630
Woman earns (=1)	138	0.33	0.38	-0.05	-0.011	0.916

Note: This table presents summary statistics for households' baseline covariates for the husband-informed sample by treatment group and tests whether there are any statistically significant differences between experimental arms at baseline. Col. (1) presents the number of observations, and Cols. (2) and (3)the mean of each covariate. Col. (4) present the coefficient and (5) records the p-value of a regression of each covariate on a dummy variable for treatment with village fixed effects and robust standard errors.

Table A5: Sample Characteristics and Balance (Wife-informed Sample)

Variable	N	Treatment	Control	Difference	Reg Coeff	P-value
Woman's age	195	52.76	50.01	2.75	2.227	0.182
HH Exp	195	8.98	8.84	0.14	0.251	0.036**
Husband's age	195	60.53	57.44	3.09	2.719	0.109
General Caste (=1)	195	0.64	0.56	0.08	0.037	0.623
Woman works in agri. (=1)	195	0.77	0.69	0.08	0.074	0.334
Woman's education	195	3.64	3.54	0.10	0.406	0.532
Husband's education	195	7.64	6.40	1.24	1.734	0.145
Outside Vilage Centre (=1)	195	0.65	0.60	0.05	0.054	0.514
HH Size	195	3.81	3.68	0.13	0.380	0.314
No. of rooms	195	2.34	2.21	0.13	0.103	0.583
Mahila Sabha attendance	195	0.20	0.13	0.07	0.051	0.446
SHG member (=1)	195	0.50	0.47	0.03	0.076	0.360
Age girl should get married	195	20.22	19.83	0.39	0.348	0.346
Education a girl should get	195	12.86	13.47	-0.61	-1.174	0.365
HH Decision-making Index	195	0.09	0.18	-0.09	-0.078	0.595
Woman's Consump. Index	195	-0.03	0.06	-0.09	0.025	0.868
Husband's Consump. Index	195	-0.11	0.12	-0.23	-0.238	0.177
IPV Index	195	0.12	0.16	-0.04	-0.008	0.971
Woman earns (=1)	195	0.39	0.36	0.03	0.098	0.223

Note: This table presents summary statistics for households' baseline covariates for the wife-informed sample by treatment group and tests whether there are any statistically significant differences between experimental arms at baseline. Col. (1) presents the number of observations, and Cols. (2) and (3) the mean of each covariate. Col. (4) present the coefficient and (5) records the p-value of a regression of each covariate on a dummy variable for treatment with village fixed effects and robust standard errors.

Table A6: Sample Characteristics and Balance (Atmost one-informed Sample)

Variable	N	Treatment	Control	Difference	Reg Coeff	P-value
Woman's age	1340	49.41	49.50	-0.09	-0.143	0.791
HH Exp	1340	8.97	8.92	0.05	0.059	0.116
Husband's age	1340	56.48	57.00	-0.52	-0.514	0.384
General Caste (=1)	1340	0.70	0.64	0.06	0.040	0.082*
Woman works in agri. (=1)	1340	0.79	0.76	0.03	0.025	0.265
Woman's education	1340	4.50	4.25	0.25	0.288	0.188
Husband's education	1340	6.92	6.72	0.20	0.218	0.362
Outside Vilage Centre (=1)	1340	0.65	0.66	-0.01	-0.007	0.795
HH Size	1340	4.02	3.98	0.04	0.030	0.811
No. of rooms	1340	2.37	2.35	0.02	0.004	0.946
Mahila Sabha attendance	1340	0.12	0.12	0.00	0.006	0.729
SHG member (=1)	1340	0.46	0.45	0.01	0.007	0.789
Age girl should get married	1340	20.34	20.28	0.06	0.058	0.612
Education a girl should get	1340	12.98	12.95	0.03	0.049	0.830
HH Decision-making Index	1340	-0.07	-0.02	-0.05	-0.037	0.472
Woman's Consump. Index	1340	-0.06	-0.01	-0.05	-0.043	0.400
Husband's Consump. Index	1340	-0.07	-0.02	-0.05	-0.046	0.351
IPV Index	1340	-0.03	-0.01	-0.02	-0.024	0.613
Woman earns (=1)	1340	0.35	0.36	-0.01	-0.010	0.696

Note: This table presents summary statistics for households' baseline covariates for the atmost one-informed sample by treatment group and tests whether there are any statistically significant differences between experimental arms at baseline. Col. (1) presents the number of observations, and Cols. (2) and (3)the mean of each covariate. Cols. (4) present the coefficient and (5) records the p-value of a regression of each covariate on a dummy variable for treatment with village fixed effects and robust standard errors.

Table A7: Sample Characteristics and Balance (Both-informed Sample)

Variable	N	Treatment	Control	Difference	Reg Coeff	P-value
Woman's age	214	50.60	49.61	0.99	1.192	0.442
HH Exp	214	8.96	8.99	-0.03	0.153	0.100*
Husband's age	214	57.87	56.50	1.37	1.702	0.256
General Caste (=1)	214	0.68	0.77	-0.09	-0.001	0.987
Woman works in agri. (=1)	214	0.73	0.73	0.00	0.022	0.727
Woman's education	214	4.25	4.78	-0.53	-0.521	0.410
Husband's education	214	7.10	6.68	0.42	0.427	0.536
Outside Vilage Centre (=1)	214	0.59	0.62	-0.03	0.008	0.916
HH Size	214	3.66	3.96	-0.30	-0.069	0.847
No. of rooms	214	2.19	2.32	-0.13	-0.017	0.923
Mahila Sabha attendance	214	0.08	0.20	-0.12	-0.085	0.104
SHG member (=1)	214	0.48	0.56	-0.08	-0.103	0.173
Age girl should get married	214	20.18	20.58	-0.40	-0.485	0.186
Education a girl should get	214	12.81	12.90	-0.09	-0.122	0.086*
HH Decision-making Index	214	0.40	0.23	0.17	0.317	0.056*
Woman's Consump. Index	214	-0.03	0.09	-0.12	-0.150	0.402
Husband's Consump. Index	214	-0.07	0.18	-0.25	-0.146	0.328
IPV Index	214	-0.16	0.06	-0.22	-0.071	0.481
Woman earns (=1)	214	0.38	0.50	-0.12	-0.091	0.284

Note: This table presents summary statistics for households' baseline covariates for the full sample by treatment group and tests whether there are any statistically significant differences between experimental arms at baseline. Col. (1) presents the number of observations, and Cols. (2), (3), and (4) the mean of each covariate. Cols. (4) present the coefficient and (5) records the p-value of a regression of each covariate on a dummy variable for treatment with village fixed effects and robust standard errors.

Table A8: Differences from Neither-Informed Houses in Baseline Characteristics

variable	husband-informed	wife-informed	both-informed
Bargaining Power Index	0.0223**	0.0399***	0.0617***
	(0.0110)	(0.0107)	(0.0114)
General Caste==1	0.0065	-0.0386	0.0067
	(0.0230)	(0.0242)	(0.0256)
HH Exp	-0.0028	0.0108	0.0173
	(0.0132)	(0.0152)	(0.0152)
HH Size	-0.0078*	-0.0011	-0.0076
	(0.0040)	(0.0044)	(0.0048)
Husband's age	-0.0011	0.0020**	-0.0003
	(0.0009)	(0.0009)	(0.0009)
Husband's education	0.0040	0.0012	0.0012
	(0.0025)	(0.0030)	(0.0027)
IPV Index	-0.0088	0.0248*	-0.0060
	(0.0131)	(0.0140)	(0.0155)
Mahila Sabha attendance	-0.0176	0.0442	0.0337
	(0.0305)	(0.0325)	(0.0380)
Men's Index	-0.0132	0.0148	0.0143
	(0.0107)	(0.0118)	(0.0121)
No. of rooms	0.0021	-0.0012	-0.0037
	(0.0075)	(0.0080)	(0.0085)
Outside Vilage Centre (=1)	-0.0569**	-0.0127	-0.0553**
	(0.0234)	(0.0219)	(0.0245)
SHG member (=1)	0.0062	0.0078	0.0181
	(0.0206)	(0.0202)	(0.0217)
Wife should always obey	-0.0039	0.0232	0.0304
	(0.0207)	(0.0209)	(0.0228)
Woman earns (=1)	-0.0011	0.0106	0.0495**
	(0.0201)	(0.0204)	(0.0227)
Woman works in agri. (=1)	-0.0023	-0.0493*	-0.0446
	(0.0247)	(0.0253)	(0.0275)
Woman's age	-0.0008	0.0017*	0.0002
	(0.0010)	(0.0010)	(0.0011)
Woman's education	0.0010	-0.0064**	0.0003
	(0.0025)	(0.0025)	(0.0027)
Women's Index	-0.0003	0.0083	0.0138
	(0.0113)	(0.0101)	(0.0129)
Age girl should get married	0.0086*	-0.0083*	-0.0007
	(0.0044)	(0.0047)	(0.0050)
Education a girl should get	-0.0048***	0.0038	-0.0064***
	(0.0014)	(0.0044)	(0.0013)

Note: In column 1 the sample consists of "husband-informed" and "neither-informed" houses (N=1,145). In column 2 the sample consists of "wife-informed" and "neither-informed" houses (N=1,202). In column 3 the sample consists of "both-informed" and "neither-informed" houses (N=1,221). Each row corresponds to the variable that is used as a dependent variable and is regressed on a dummy which takes value 1 if the house is not a "neither-informed" house and 0, otherwise. I control for village fixed effects and include robust standard errors.

Table A9: Spillovers by geographical proximity in the control arm

	Full Sample		Neither-informed	
	Wife	Husband	Wife	Husband
	(1)	(2)	(3)	(4)
% treated in the neighbourhood	-0.024	0.027	-0.022	0.038
	(0.091)	(0.076)	(0.110)	(0.082)
Observations	771	728	488	462
Baseline	X	X		

Note: This table test for spillovers in the control sample by geographical proximity to treated individuals. I create a network where links between individuals are created based in geographical proximity within a village. I then define a measure of % individuals treated in the neighborhood which is the main independent variable. Col. (1) and (2) shows the spillovers for control group in the full sample while Cols. (3) and (4) are the neither-informed sample counterparts. The dependent variable in Cols. (1) and (3) is whether wife reports herself as an owner at endline, while in Cols. (2) and (4) I have husband's endline reports about whether the wife is an owner. For the full sample regressions I control for caste while for neither-informed samples I control for husband's age. The full sample regressions also control for the baseline outcome variable. All regressions have village-level fixed effects with robust standard errors.

Table A10: Woman's role in selling a house/taking loan

	(1)	(2)	(3)	(4)
VARIABLES	Sell	Loan (Legal)	Loan (Opinion)	Index
Treatment	0.169***	0.172***	0.027	0.370***
	(0.031)	(0.032)	(0.018)	(0.078)
Observations	1,007	1,007	980	1,007
Controls	YES	YES	YES	YES
Control mean	0.355	0.379	0.904	-0.0359

Note: In Column 1, the dependent variable takes one if the woman says she is one of the legal decision-makers related to selling the house, zero otherwise. In Column 2, the dependent variable takes one if the woman says she is one of the legal decision-makers related to taking a loan against the house, zero otherwise. In Column 3, the dependent variable takes one if the woman says she her opinion is considered while taking a loan against the house, zero otherwise. Column 4 aggregates the dependent variable from the first three columns into an index. Controls include baseline value of the dependent variable and those selected by post-double selection Lasso. All regressions have village-level fixed effects with robust standard errors.

Table A11: Woman's decision-making around changes made to house

VARIABLES	(1) Painting	(2) Kitchen	(3) Extension	(4) Decision Index
Treatment	0.021	0.058*	0.042	0.107
	(0.031)	(0.031)	(0.031)	(0.070)
Observations	1,007	1,007	1,007	1,007
Controls	YES	YES	YES	YES
Control mean	0.398	0.494	0.385	0.0351

Note: In Column 1, the dependent variable takes one if the woman says she is one of the decision-makers related to painting in the house, zero otherwise. In Column 2, the dependent variable takes one if the woman says she is one of the decision-makers related to making changes to the kitchen, zero otherwise. In Column 3, the dependent variable takes one if the woman says she is one of the decision-makers around building and extension of the house, zero otherwise. Column 4 aggregates the dependent variable from the first three columns into an index. Controls include baseline value of the dependent variable and those selected by post-double selection Lasso. All regressions have village-level fixed effects with robust standard errors.

Table A12: Woman's role in selling house/taking loan (Full Sample)

VARIABLES	(1) Sell	(2) Loan (Legal)	(3) Loan (Opinion)	(4) Index
Treatment	0.127***	0.143***	0.024*	0.083***
	(0.024)	(0.024)	(0.014)	(0.028)
Observations	1,558	1,558	1,527	1,558
Controls	YES	YES	YES	YES
Control mean	0.451	0.471	0.914	-0.0362

Note: In Column 1, the dependent variable takes one if the woman says she is one of the legal decision-makers related to selling the house, zero otherwise. In Column 2, the dependent variable takes one if the woman says she is one of the legal decision-makers related to taking a loan against the house, zero otherwise. In Column 3, the dependent variable takes one if the woman says she her opinion is considered while taking a loan against the house, zero otherwise. Column 4 aggregates the dependent variable from the first three columns into an index. Controls include baseline value of the dependent variable and those selected by post-double selection Lasso. All regressions have village-level fixed effects with robust standard errors.

Table A13: Woman's decision-making around changes made to house (Full Sample)

VARIABLES	(1) Painting	(2) Kitchen	(3) Extension	(4) Decision Index
Treatment	0.011	0.048**	0.030	0.059
	(0.024)	(0.024)	(0.024)	(0.044)
Observations	1,558	1,558	1,558	1,558
Controls	YES	YES	YES	YES
Control mean	0.464	0.560	0.462	-0.0410

Note: In Column 1, the dependent variable takes one if the woman says she is one of the decision-makers related to painting in the house, zero otherwise. In Column 2, the dependent variable takes one if the woman says she is one of the decision-makers related to making changes to the kitchen, zero otherwise. In Column 3, the dependent variable takes one if the woman says she is one of the decision-makers around building and extension of the house, zero otherwise. Column 4 aggregates the dependent variable from the first three columns into an index. Controls include baseline value of the dependent variable and those selected by post-double selection Lasso. All regressions have village-level fixed effects with robust standard errors.

Table A14: Effect on household expenditure

VARIABLES	(1) log(Household Exp.)
Treatment	-0.014
	(0.046)
Observations	1,007
Control mean	8.996

Note: Dependent variable is the logarithm of monthly household expenditure. Controls include baseline value of the dependent variable and those selected by post-double selection Lasso. Regression includes village-level fixed effects with robust standard errors reported in the parenthesis.

Table A15: ITT Effects for Private Consumption (Full Sample)

	Share	Index	Clothes	Cosmetics	Jewellery	Tobacco	Alcohol
	← OLS →		← Poisson Regression ($exp(\beta) - 1$) →				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Women							
Treated	0.004	0.071	0.298***	0.166*	-0.211	0.083	
	(0.009)	(0.049)	(0.096)	(0.091)	(0.267)	(0.069)	
Control mean	0.0629	0	395.3	158.9	739.4	13.63	
Observations	1,557	1,558	1,558	1,558	1,558	1,558	
Panel B: Men							
Treated	-0.009	-0.015***	0.120			0.091	-0.111
	(0.008)	(0.006)	(0.121)			(0.080)	(0.120)
Control mean	0.0925	0	291.9			37.38	88.11
Observations	1,557	1,558	1,558			1,558	1,558

Note: Dependent variable in Col. (1) is the ratio of women's total expenditure over three months on clothes, cosmetics, jewellery and tobacco and the three month's household. The share is winzorized at 1%. expenditure. Controls include baseline value of the dependent variable and those selected by post-double selection Lasso. All regressions have village-level fixed effects with robust standard errors reported in the parenthesis. For index construction, please refer to Appendix F. In Cols. (3) to (7) I run Poisson regressions. The estimates reported for the Poisson regressions are $exp(\beta_1)-1$ which is the average treatment effect in this case (Poisson regression equation: $Y_{ih} = exp(\beta_0+\beta_1 \cdot \text{Treat}_h+\beta_2 \cdot Y^0_{ih}+\mathbf{X}_{ih} \cdot \boldsymbol{\beta}_3)\epsilon_{ih}$).

Table A16: ITT Effects for Private Consumption, (winorized, 1.5%)

	Share	Index	Clothes	Cosmetics	Jewellery	Tobacco	Alcohol
	← OLS →		← Poisson Regression ($exp(\beta) - 1$) →				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Women							
Treated	0.015**	0.100*	0.381***	0.176	0.052	0.035	
	(0.006)	(0.060)	(0.114)	(0.104)	(0.228)	(0.084)	
Control mean	0.0447	-0.0463	357.3	149.2	397.8	13.37	
Observations	1,006	1,007	1,007	1,007	1,007	1,007	
Panel B: Men							
Treated	-0.006	-0.013**	0.277			0.125	-0.312*
	(0.010)	(0.006)	(0.157)			(0.085)	(0.228)
Control mean	0.0818	-0.0333	283.7			34.91	80.36
Observations	1,006	1,007	1,007			1,007	1,007

Note: Dependent variable in Col. (1) is the ratio of women's total expenditure over three months on clothes, cosmetics, jewellery and tobacco and the three month's household. The share is winzorized at 1.5%. expenditure. Controls include baseline value of the dependent variable and those selected by post-double selection Lasso. All regressions have village-level fixed effects with robust standard errors reported in the parenthesis. For index construction, please refer to Appendix F. In Cols. (3) to (7) I run Poisson regressions. The estimates reported for the Poisson regressions are $exp(\beta_1)-1$ which is the average treatment effect in this case (Poisson regression equation: $Y_{ih} = exp(\beta_0+\beta_1 \cdot \text{Treat}_h+\beta_2 \cdot Y^0_{ih}+\mathbf{X}_{ih} \cdot \boldsymbol{\beta}_3)\epsilon_{ih}$).

Table A17: ITT Effects for Private Consumption, (winorized, 2%)

	Share	Index	Clothes	Cosmetics	Jewellery	Tobacco	Alcohol
	← OLS →		← Poisson Regression ($exp(\beta) - 1$) →				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Women							
Treated	0.013**	0.083	0.347***	0.132	-0.000	0.030	
	(0.005)	(0.060)	(0.111)	(0.097)	(0.212)	(0.084)	
Control mean	0.0431	-0.0558	355.3	146.1	368.1	13.35	
Observations	1,006	1,007	1,007	1,007	1,007	1,007	
Panel B: Men							
Treated	-0.005	-0.015**	0.266			0.147	-0.342*
	(0.009)	(0.007)	(0.150)			(0.085)	(0.224)
Control mean	0.0788	-0.0323	271.4			34.91	76.99
Observations	1,006	1,007	1,007			1,007	1,007

Note: Dependent variable in Col. (1) is the ratio of women's total expenditure over three months on clothes, cosmetics, jewellery and tobacco and the three month's household. The share is winzorized at 2%. expenditure. Controls include baseline value of the dependent variable and those selected by post-double selection Lasso. All regressions have village-level fixed effects with robust standard errors reported in the parenthesis. For index construction, please refer to Appendix F. In Cols. (3) to (7) I run Poisson regressions. The estimates reported for the Poisson regressions are $exp(\beta_1)-1$ which is the average treatment effect in this case (Poisson regression equation: $Y_{ih} = exp(\beta_0+\beta_1 \cdot \text{Treat}_h+\beta_2 \cdot Y^0_{ih}+\mathbf{X}_{ih} \cdot \boldsymbol{\beta}_3)\epsilon_{ih}$).

Table A18: ITT Effects for Private Consumption, Extensive Margin

	Clothes		Cosmetics		Jewellery		Tobacco		Alcohol	
	Logit (1)	OLS (2)	Logit (3)	OLS (4)	Logit (5)	OLS (6)	Logit (7)	OLS (8)	Logit (9)	OLS (10)
Panel A: Women										
Treated	0.444***	0.092***	0.098	0.017	-0.185	-0.040	0.189	0.008		
	(0.146)	(0.031)	(0.171)	(0.026)	(0.145)	(0.031)	(0.298)	(0.016)		
Control mean	0.35	0.35	0.77	0.77	0.4	0.4	0.49	0.49		
Observations	989	1007	986	1007	1003	1007	1006	1007		
Panel B: Men										
Treated	0.266*	0.047*					0.422*	0.041**	-0.685**	-0.049***
	(0.161)	(0.028)					(0.224)	(0.021)	(0.267)	(0.019)
Control mean	0.22	0.22					0.53	0.53	0.16	0.16
Observations	997	1007					997	1007	894	1007

Note: In all regressions the dependent variable is a indicator variable which takes 1 if any money was spent on that particular good, and 0 otherwise. Controls include baseline value of the dependent variable and those selected by post-double selection Lasso. All regressions have village-level fixed effects with robust standard errors reported in the parenthesis.

Table A19: Expenditure on Kids, Health and Investment

VARIABLES	(1) Children (Poisson)	(2) Log(Savings for self)	(3) Log(Health Exp. on self)
Treatment	0.085	0.060	0.093
	(0.252)	(0.133)	(0.234)
Observations	1,007	1,007	1,007
Baseline	X	X	
Control mean	2221	3.120	5.047

Note: All regressions have village-level fixed effects with robust standard errors. Controls include baseline value of the dependent variable and those selected by post-double selection Lasso. In Col. (1) I run a Poisson regressions and the estimate reported is $exp(\beta_1) - 1$ which is the average treatment effect in this case (Poisson regression equation: $Y_{ih} = exp(\beta_0 + \beta_1 \cdot \text{Treat}_h + \beta_2 \cdot Y^0_{ih} + \mathbf{X}_{ih} \cdot \boldsymbol{\beta}_3)\epsilon_{ih}$). Cols (2) and (3) are OLS regressions.

Table A20: Time Allocation

VARIABLES	(1) Housework	(2) Childcare	(3) Paid work	(4) Not paid work	(5) Total work	(6) Personal Care	(7) Leisure
Treatment	-0.011	0.007	-0.195	0.211	0.002	-0.033	-0.038
	(0.138)	(0.083)	(0.173)	(0.192)	(0.155)	(0.097)	(0.117)
Observations	1,007	1,007	1,007	1,007	1,007	1,007	1,007
Control mean	4.852	0.590	1.477	3.723	5.201	6.379	1.977

Table A21: ITT Effects on Incidence of Domestic Violence (Full Sample)

VARIABLES	(1) Banish Threat	(2) Food Insecurity	(3) Beating	(4) Insulting	(5) Threat to Harm	(6) IPV Index
Treatment	-0.001	-0.040**	0.007	0.005	0.003	-0.034
	(0.012)	(0.019)	(0.009)	(0.020)	(0.011)	(0.048)
Observations	1,518	1,558	1,528	1,531	1,530	1,558
Baseline	X	X				X
Control mean	0.0632	0.176	0.0277	0.194	0.0487	0

Note: In Cols (1) to (5) have the dependent variable is an indicator variable which takes 1 if that particular form of violence happened in the last three months and 0 otherwise. All regressions have village-level fixed effects with robust standard errors reported in the parenthesis. Controls include baseline value of the dependent variable and those selected by post-double selection Lasso. For index construction, please refer to Appendix F.

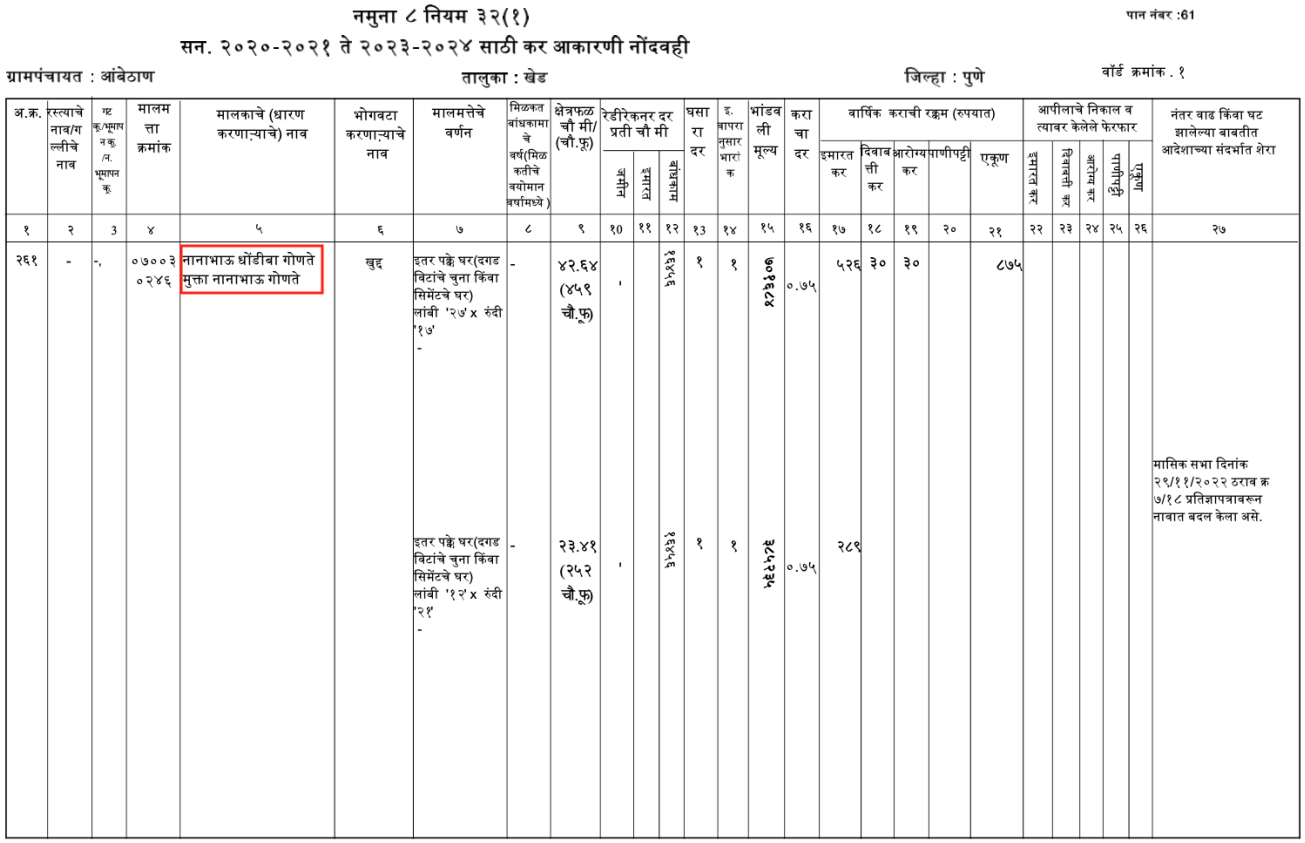
Table A22: Baseline Covariates and Updating of Beliefs

Baseline Covariates	Woman Updates=1	Man Updates=1
Age girl should get married	0.0159	0.0163
	(0.0103)	(0.0107)
Education a girl should get	0.0038*	0.0035
	(0.0023)	(0.0037)
General Caste (=1)	0.0636	0.0757
	(0.0519)	(0.0545)
HH Decision-making Index	-0.0005	-0.0204
	(0.0223)	(0.0233)
HH Exp	-0.0516*	-0.0034
	(0.0300)	(0.0326)
HH Size	-0.0175**	-0.0177*
	(0.0083)	(0.0091)
Husband's age	-0.0003	-0.0035*
	(0.0020)	(0.0020)
Husband's education	0.0001	0.0065
	(0.0052)	(0.0062)
IPV Index	0.0114	0.0267
	(0.0224)	(0.0278)
Mahila Sabha attendance	0.1288**	0.1501**
	(0.0617)	(0.0672)
Men's Index	0.0038	0.0208
	(0.0229)	(0.0245)
No. of rooms	-0.0227	-0.0026
	(0.0176)	(0.0184)
Outside Vilage Centre (=1)	-0.0852*	-0.1010**
	(0.0454)	(0.0497)
SHG member (=1)	0.0520	0.0514
	(0.0424)	(0.0446)
Woman earns (=1)	0.0632	0.0191
	(0.0439)	(0.0450)
Woman works in agri. (=1)	-0.0214	0.0376
	(0.0515)	(0.0568)
Woman's age	-0.0002	-0.0046**
	(0.0021)	(0.0022)
Woman's education	0.0042	0.0093*
	(0.0054)	(0.0056)
Women's Index	-0.0260	-0.0205
	(0.0217)	(0.0233)
Observations	588	561

Note: Robust standard errors are reported in parenthesis. In each column the base category is houses where neither the husband nor the wife update their beliefs at endline. Each row corresponds to the variable that is used as a dependent variable and is regressed on a dummy which takes value 1 if the wife (husband) updates her beliefs at endline in Col 1 (Col 2) and 0 otherwise. The sample consists of houses where at least one partner did not report the wife as an owner at baseline (neither-informed + husband-informed + wife-informed) in the treated arm.

B Appendix: Figures

Figure B1: Copy of the ownership document (owners' names shown in the red box)



नमुना ८ नियम ३२(१)

पान नंबर :61

सन. २०२०-२०२१ ते २०२३-२०२४ साठी कर आकारणी नोंदवही

ग्रामपंचायत : आंबेठाण | तालुका : खेड | जिल्हा : पुणे | वॉर्ड क्रमांक . १

अ.क्र.	रस्त्याचे नाव/गल्लीचे नाव	गट क्र./भूमापन क्र./ग. भूमापन क्र.	मालमत्ता क्रमांक	मालकाचे (धारण करणाऱ्याचे) नाव	भोगवटा करणाऱ्याचे नाव	मालमत्तेचे वर्णन	मिळकत बांधकामाचे वर्ष(मिळकतीचे वयोमान वर्षामध्ये)	क्षेत्रफळ चौ मी/(चौ.फू)	रेडीरेकनर दर प्रती चौ मी			घसारा दर	इ. वापरानुसार भारांक	भांडवली मूल्य	कराचा दर	वार्षिक कराची रक्कम (रुपयात)					आपीलाचे निकाल व त्यावर केलेले फेरफार					नंतर वाढ किंवा घट झालेल्या बाबतीत आदेशाच्या संदर्भात शेरा
									जमीन	इमारत	घसारा					इमारत कर	दिवाबत्ती कर	आरोग्य कर	पाणीपट्टी	एकूण	इमारत कर	दिवाबत्ती कर	आरोग्य कर	पाणीपट्टी	एकूण	
१	२	3	४	५	६	७	८	९	१०	११	१२	१३	१४	१५	१६	१७	१८	१९	२०	२१	२२	२३	२४	२५	२६	२७
२६१	-	-,	०७००३ ०२४६	नानाभाऊ धोंडीबा गोणते मुक्ता नानाभाऊ गोणते	खुद्द	इतर पक्के घर(दगड विटांचे चुना किंवा सिमेंटचे घर) लांबी '२७' x रुंदी '१७' -	-	४२.६४ (४५९ चौ.फू)	'		६१०४३४	१	१	४२७३३०७	०.७५	५२६	३०	३०		८७५						मासिक सभा दिनांक २९/११/२०२२ ठराव क्र ७/१८ प्रतिज्ञापत्राबरून नावात बदल केला असे.
						इतर पक्के घर(दगड विटांचे चुना किंवा सिमेंटचे घर) लांबी '१२' x रुंदी '२१' -	-	२३.४१ (२५२ चौ.फू)	'		६१०४३४	१	१	२९६१७३५	०.७५	२८९										

Figure B2: A surveyor giving the ownership document to the couple

C Appendix: Theory

C.1 Derivation for Equation (14)

$$
\begin{aligned}
q^* &= pq_w^* + (1-p)q_h^* \\
&= p\left\{\frac{1}{2\overline{\theta}_h}\left[-(\kappa_h+\kappa_w)+\overline{\theta}_h-\theta_w+R\left(\frac{r_w+\tilde{r}_h}{2}-r_h-1\right)\right]\right\} \\
&\quad + (1-p)\left\{\frac{1}{2\overline{\theta}_w}\left[-(\kappa_h+\kappa_w)+\overline{\theta}_w-\theta_h+R\left(r_w-\frac{(r_h+\tilde{r}_w)}{2}-1\right)\right]\right\} \\
&= r_w\underbrace{\left\{\frac{Rp}{4\overline{\theta}_h}+\frac{R(1-p)}{2\overline{\theta}_w}\right\}}_{f_1(p,\overline{\boldsymbol{\theta}},R)} - r_h\underbrace{\left\{\frac{Rp}{2\overline{\theta}_h}+\frac{R(1-p)}{4\overline{\theta}_w}\right\}}_{f_2(p,\overline{\boldsymbol{\theta}},R)} - R\tilde{r}_w\frac{(1-p)}{4\overline{\theta}_w}+R\tilde{r}_h\frac{p}{4\overline{\theta}_h} \\
&\quad \underbrace{-\frac{(\kappa_h+\kappa_w)}{2}\left\{\frac{p}{\overline{\theta}_h}+\frac{(1-p)}{\overline{\theta}_w}\right\}+\frac{p}{2}\left\{\frac{\theta_h}{\overline{\theta}_w}-\frac{\theta_w}{\overline{\theta}_h}\right\}+\frac{(\overline{\theta}_w-\theta_h)}{2\overline{\theta}_w}-\frac{R}{2}\left\{\frac{p}{\overline{\theta}_h}+\frac{(1-p)}{\overline{\theta}_w}\right\}}_{f_3(p,R,\boldsymbol{\kappa},\boldsymbol{\theta},\overline{\boldsymbol{\theta}})}
\end{aligned}
\tag{23}
$$

C.2 Comparative Statics when $\tilde{r}_j \leq r_j$

In this section I relax the assumption of equality between the second-order and first-order beliefs and instead impose a weaker assumption of $\tilde{r}_j \leq r_j$. I maintain the assumption that the private levels of satisfaction for the two spouses are drawn from the same distribution i.e. $\overline{\theta}_h = \overline{\theta}_w = \overline{\theta}$.

The effect on γ^* as a result of receiving treatment ($d\gamma^*$) is given by

$$
\begin{aligned}
d\gamma^* &= \underbrace{\frac{\partial\gamma^*}{\partial r_h}\cdot dr_h+\frac{\partial\gamma^*}{\partial r_w}\cdot dr_w+\frac{\partial\gamma^*}{\partial\tilde{r}_h}\cdot d\tilde{r}_h+\frac{\partial\gamma^*}{\partial\tilde{r}_w}\cdot d\tilde{r}_w}_{\textit{exit}\text{ effect}}+\underbrace{\frac{\partial\gamma^*}{\partial p}\cdot dp}_{\textit{voice}\text{ effect}} \\
&= \underbrace{\frac{R}{4Y}\cdot\left\{p\cdot(dr_w+d\tilde{r}_h)+(1-p)\cdot(dr_h+d\tilde{r}_w)\right\}}_{\textit{exit}\text{ effect }>0}+\underbrace{\left\{\frac{2\overline{\theta}-\theta_w-\theta_h}{2Y}+\frac{R}{4Y}\{(r_w-\tilde{r}_w)-(r_h-\tilde{r}_h)\}\right\}\cdot dp}_{\textit{voice}\text{ effect }\geq 0\text{ unless }\frac{R(r_w-\tilde{r}_w)}{2}+2\overline{\theta}-\theta_w-\theta_h<\frac{R(r_h-\tilde{r}_h)}{2}}
\end{aligned}
\tag{24}
$$

In this general case, the *exit* effect on a woman's consumption continues to be unambiguously positive. In contrast, the *voice* effect could be negative in the extreme case when the difference in the husband's first-order belief and the wife's second-order belief is large enough that the wife loses her first-mover advantage and receives a lower share of consumption when she makes the offer.

The effect on q^* as a result of receiving treatment (dq^*) is given by

$$dq^* = \underbrace{\frac{\partial q^*}{\partial r_h} \cdot dr_h + \frac{\partial q^*}{\partial r_w} \cdot dr_w + \frac{\partial q^*}{\partial \tilde{r}_h} \cdot d\tilde{r}_h + \frac{\partial q^*}{\partial \tilde{r}_w} \cdot d\tilde{r}_w}_{\textit{exit}\text{ effect}} + \underbrace{\frac{\partial q^*}{\partial p} \cdot dp}_{\textit{voice}\text{ effect}}$$

$$dq^* = \underbrace{\frac{R}{4\bar{\theta}} \cdot \left\{ -\{(1+p)dr_h + (1-p)d\tilde{r}_w\} + (2-p)dr_w + pd\tilde{r}_h \right\}}_{\textit{exit}\text{ effect} \rightarrow \text{ambiguous}}$$

$$+ \underbrace{\left\{ \frac{\theta_h - \theta_w}{2\bar{\theta}} + \frac{R(\tilde{r}_h + \tilde{r}_w - r_h - r_w)}{4\bar{\theta}} \right\} \cdot dp}_{\textit{voice}\text{ effect} \rightarrow \text{ambiguous}} \tag{25}$$

Under the assumption that $\tilde{r}_j \leq r_j$, the second term in the *voice* effect is always weakly negative. Therefore, unless the husband's satisfaction level is sufficiently large ($\theta_h > \frac{R(r_h + r_w - \tilde{r}_h - \tilde{r}_w)}{2} + \theta_w$), the *voice* effect leads to a decline in conflict. In expectation, it is unambiguously nonpositive.

The expression for the *exit* effect reveals that increase in wife's beliefs about her property rights (both first-order and second-order) leads to greater conflict, while the opposite is true when there in an increase in husband's beliefs. The direction of the *exit* effect will depend on the level of woman's decision-making power and the relative values of the marginal increase in beliefs. Under the assumption $\tilde{r}_j \leq r_j$, we have $d\tilde{r}_j \geq dr_j$. Below, I consider the case when $dr_h < dr_w$ ("husband-informed" households) and $dr_h > dr_w$ ("wife-informed" households) separately.

When $\mathbf{dr_h < dr_w}$ ("husband-informed" households): When the wife's decision-making power, p, is very low, conflict will decrease if the increase in the husband's second-order beliefs relative to the increase in the wife's first-order beliefs is greater than the increase in the wife's first-order beliefs relative to the increase in the husband's first-order beliefs, i.e., $d\tilde{r}_w - dr_w > dr_w - dr_h$. Otherwise, conflict will increase. As the wife's preintervention decision-making power increases, the change in her beliefs will outweigh the change in the husband's second-order beliefs, leading to an unambiguous rise in conflict.

When $\mathbf{dr_h > dr_w}$ ("wife-informed" households): When the wife's decision-making power, p, is very high, conflict will increase if the increase in the wife's second-order beliefs relative to the increase in the husband's first-order beliefs is greater than the increase in the husband's first-order beliefs relative to the increase in the wife's first-order beliefs, i.e., $d\tilde{r}_h - dr_h > dr_h - dr_w$. Otherwise, conflict will decline. As the wife's preintervention decision-making power decreases, the change in husband's beliefs will outweigh the change in the wife's second-order beliefs, leading to an unambiguous decline in conflict.

D Appendix: Econometrics of Endogenous Treatments

Define $\mu(x,k) = E(Y(k)|X = x)$, and $\epsilon(k) = Y(k) - \mu(x,k)$. For the four groups we have

- **D=1**: $E(Y|D = 1, Q_h = q_h, Q_w = q_w, X = x) = \mu(x,1) + E(\epsilon(1)|V_h < q_h, V_w < q_w, x)$
- **D=2**: $E(Y|D = 2, Q_{=}q_h, Q_w = q_w, X = x) = \mu(x,2) + E(\epsilon(2)|V_h > q_h, V_w < q_w, x)$

- **D=3**: $E(Y|D=3, Q_h=q_h, Q_w=q_w, X=x) = \mu(x,3) + E(\epsilon(3)|V_h < q_h, V_w > q_w, x)$
- **D=4**: $E(Y|D=4, Q_h=q_h, Q_w=q_w, X=x) = \mu(x,4) + E(\epsilon(4)|V_h > q_h, V_w > q_w, x)$

I assume that $E(\epsilon(k)|V_h = v_h, V_w = v_w, x)$ is additive in (v_h, v_w) which implies that the expression for the four endogenous groups can be written as

- **D=1**: $E(\epsilon(1)|V_h = v_h, V_w = v_w, x) = a_h^1(x)(v_h - 1/2) + a_w^1(x)(v_w - 1/2)$
- **D=2**: $E(\epsilon(2)|V_h = v_h, V_w = v_w, x) = a_h^2(x)(v_h - 1/2) + a_w^2(x)(v_w - 1/2)$
- **D=3**: $E(\epsilon(3)|V_h = v_h, V_w = v_w, x) = a_h^3(x)(v_h - 1/2) + a_w^3(x)(v_w - 1/2)$
- **D=4**: $E(\epsilon(4)|V_h = v_h, V_w = v_w, x) = a_h^4(x)(v_h - 1/2) + a_w^4(x)(v_w - 1/2)$

Combining the assumption of independence and uniformity of V_h and V_w I get

- **D=1**:

$$\begin{aligned} E(\epsilon(1)|V_h < q_h, V_w < q_w, x) &= a_h^1(x)[E(V_h|v_h < q_h) - 1/2] + a_w^1(x)[E(V_w|v_w < q_w) - 1/2] \\ &= a_h^1(x)\frac{(q_h - 1)}{2} + a_w^1(x)\frac{(q_w - 1)}{2} \end{aligned} \tag{26}$$

- **D=2**:

$$\begin{aligned} E(\epsilon(2)|V_h > q_h, V_w < q_w, x) &= a_h^2(x)[E(V_h|v_h > q_h) - 1/2] + a_w^2(x)[E(V_w|v_w < q_w) - 1/2] \\ &= a_h^2(x)\frac{(q_h)}{2} + a_w^2(x)\frac{(q_w - 1)}{2} \end{aligned} \tag{27}$$

- **D=3**:

$$\begin{aligned} E(\epsilon(3)|V_h < q_h, V_w > q_w, x) &= a_h^3(x)[E(V_h|v_h < q_h) - 1/2] + a_w^3(x)[E(V_w|v_w > q_w) - 1/2] \\ &= a_h^3(x)\frac{(q_h - 1)}{2} + a_w^3(x)\frac{(q_w)}{2} \end{aligned} \tag{28}$$

- **D=4**:

$$\begin{aligned} E(\epsilon(4)|V_h > q_h, V_w > q_w, x) &= a_h^4(x)[E(V_h|v_h > q_h) - 1/2] + a_w^4(x)[E(V_w|v_w > q_w) - 1/2] \\ &= a_h^4(x)\frac{(q_h)}{2} + a_w^4(x)\frac{(q_w)}{2} \end{aligned} \tag{29}$$

Now

$$\begin{aligned} E(Y\mathbf{1}(D=k)|Q_h=q_h, Q_w=q_w, X=x) =& E(Y|D=k, Q_h=q_h, Q_w=q_w, X=x) \\ &\times Pr(D=k|Q_h=q_h, Q_w=q_w, X=x) \end{aligned}$$

Given independence assumption the ptobability of each treat group is gives as follows:

- **D=1**: $Pr(D=1|Q_h=q_h, Q_w=q_w, X=x) = q_h q_w$
- **D=2**: $Pr(D=2|Q_h=q_h, Q_w=q_w, X=x) = (1-q_h)q_w$
- **D=3**: $Pr(D=3|Q_h=q_h, Q_w=q_w, X=x) = (1-q_w)q_h$
- **D=4**: $Pr(D=4|Q_h=q_h, Q_w=q_w, X=x) = 1-q_h-q_w+q_h q_w$

The expression for $E(Y\mathbf{1}(D=k)|Q_h=q_h, Q_w=q_w, X=x)$ for the four groups reduces to:

- **D=1**:

$$\begin{aligned} E(Y\mathbf{1}(D=1)|Q_h=q_h, Q_w=q_w, X=x) =& \Big[\mu(x,1) + a_h^1(x)\frac{(q_h-1)}{2} + a_w^1(x)\frac{(q_w-1)}{2}\Big] \\ &\times q_h q_w \\ \implies \frac{\partial^2 E(Y\mathbf{1}(D=1)|Q_h=q_h, Q_w=q_w, X=x)}{\partial q_h \partial q_w} =& \mu(x,1) + a_h^1(x)(q_h-\frac{1}{2}) + a_w^1(x)(q_w-\frac{1}{2}) \end{aligned} \tag{30}$$

- **D=2**:

$$\begin{aligned} E(Y\mathbf{1}(D=2)|Q_h=q_h, Q_w=q_w, X=x) =& \Big[\mu(x,2) + a_h^2(x)\frac{(q_h)}{2} + a_w^2(x)\frac{(q_w-1)}{2}\Big] \\ &\times (q_w - q_h q_w) \\ \implies \frac{\partial^2 E(Y\mathbf{1}(D=2)|Q_h=q_h, Q_w=q_w, X=x)}{\partial q_h \partial q_w} =& -\left[\mu(x,2) + a_h^2(x)(q_h-\frac{1}{2}) + a_w^2(x)(q_w-\frac{1}{2})\right] \end{aligned} \tag{31}$$

- **D=3**:

$$\begin{aligned} E(Y\mathbf{1}(D=3)|Q_h=q_h, Q_w=q_w, X=x) =& \Big[\mu(x,3) + a_h^3(x)\frac{(q_h-1)}{2} + a_w^3(x)\frac{(q_w)}{2}\Big] \\ &\times (q_h - q_h q_w) \\ \implies \frac{\partial^2 E(Y\mathbf{1}(D=3)|Q_h=q_h, Q_w=q_w, X=x)}{\partial q_h \partial q_w} =& -\left[\mu(x,3) + a_h^3(x)(q_h-\frac{1}{2}) + a_w^3(x)(q_w-\frac{1}{2})\right] \end{aligned} \tag{32}$$

- **D=4**: $Pr(D=4|Q_h=q_h, Q_w=q_w, X=x) = q_h q_w$

$$E(Y\mathbf{1}(D=4)|Q_h=q_h, Q_w=q_w, X=x) = \Big[\mu(x,1) + a_h^4(x)\frac{(q_h)}{2} + a_w^4(x)\frac{(q_w)}{2}\Big] \times (1-q_h-q_w+q_hq_w)$$

$$\implies \frac{\partial^2 E(Y\mathbf{1}(D=4)|Q_h=q_h, Q_w=q_w, X=x)}{\partial q_h \partial q_w} = \mu(x,4) + a_h^4(x)(q_h - \frac{1}{2}) + a_w^4(x)(q_w - \frac{1}{2}) \tag{33}$$

Following Lee and Salanié (2018), the expression for the MTE of moving from $D=1$ to $D=k$ for $k \in \{2,3,4\}$ is given by

$$MTE_{1\to k}(q_h, q_w, \mathbf{x}) = \frac{\partial^2 E(Y\mathbf{1}(D=k)|q_h, q_w, x)}{\partial q_h \partial q_w} - \frac{\partial^2 E(Y\mathbf{1}(D=1)|q_h, q_w, x)}{\partial q_h \partial q_w} \tag{34}$$

since $f_{v_h,v_w}(q_h, q_w) = 1$ in this case. Hence, I get the expresssions for the three MTEs as

$$\begin{aligned}
MTE_{1\to 4}(q_h, q_w, \mathbf{x}) &= \mu(x,4) - \mu(x,1) + (q_h - \frac{1}{2})(a_h^4(x) - a_h^1(x)) + (q_w - \frac{1}{2})(a_w^4(x) - a_w^1(x)) \\
MTE_{1\to 2}(q_h, q_w, \mathbf{x}) &= \mu(x,2) - \mu(x,1) + (q_h - \frac{1}{2})(a_h^2(x) - a_h^1(x)) + (q_w - \frac{1}{2})(a_w^2(x) - a_w^1(x)) \\
MTE_{1\to 3}(q_h, q_w, \mathbf{x}) &= \mu(x,3) - \mu(x,1) + (q_h - \frac{1}{2})(a_h^3(x) - a_h^1(x)) + (q_w - \frac{1}{2})(a_w^3(x) - a_w^1(x))
\end{aligned} \tag{35}$$

Given I do not have a large sample for each endogenous treatment group, I assume $\mu(x,k)$ to be linear functions of x and further assume $a_j^k(x)$ to be independent of x. I follow the follwing steps in the estimation exercise,

1. Estimate q_h and q_w by running a logit regression on $X, T, X*T$, where $T=1$ if treated and 0 otherwise. Here X includes $\mathbf{1}$.

2. Take the subsample with D=1 and run the following regression,

$$Y = X\boldsymbol{\beta}^1 + \frac{(\hat{q}_h - 1)}{2}a_h^1 + \frac{(\hat{q}_w - 1)}{2}a_w^1 + v$$

   where v represents village fixed effects.

3. Take the subsample with D=2 and run the following regression,

$$Y = X\boldsymbol{\beta}^2 + \frac{(\hat{q}_h)}{2}a_h^2 + \frac{(\hat{q}_w - 1)}{2}a_w^2 + v$$

4. Take the subsample with D=3 and run the following regression,

$$Y = X\boldsymbol{\beta}^3 + \frac{(\hat{q}_h - 1)}{2} a_h^3 + \frac{(\hat{q}_w)}{2} a_w^3 + v$$

5. Take the subsample with D=4 and run the following regression,

$$Y = X\boldsymbol{\beta}^4 + \frac{(\hat{q}_h)}{2} a_h^4 + \frac{(\hat{q}_w)}{2} a_w^4 + v$$

Using $\hat{\boldsymbol{\beta}}^{\boldsymbol{k}}$ I can estimate $\hat{\mu}(x, k)$. I can plug in the estimates $\hat{\mu}(x, k), \hat{a}_h^k, \hat{a}_w^k$ back in (35) to get the marginal treatment effects.

E Appendix: Quotes from the field about importance of female ownership

Why their name should be there on the ownership document:

"Anything can happen in the future. Husband and children may change their thoughts at any time. We feel safe and secure. We feel proud as a part of the family."

"If the property is in a woman's name, she will get good treatment at home."

"If the land is in our name, then it's safe."

"I feel good. Because I am also able to exercise my right in the property. Husband can not ask me to leave if there is a fight." (the respondent knew her name was on the document)

"It will not change much. We both decide on expenditure, properties, etc. together."

"We are not sure whether our children will take care of us or not, so property is our safety. If it is in our name, then no one will ask us to leave the house. Women feel that some property should be in their name. We have rights equal to men. If we have not received property from our parents, then why will the in-laws give us the property or add our name to it?"

"The girl's father spends so much money on marriage, and after certain years, the husband tells the wife the property is in his name, and she does not have any rights. At that time, it is difficult for a woman to say anything. If the property has both husband's and wife's names, then women will have a right to say something. The husband cannot ask them to leave the house. It is important to add women's names on the property."

"Yes, because men cannot sell their property without consulting the women. For example, a drunkard husband sells his land when he runs out of money to drink more liquor or when he becomes a debt trap, but now he won't be able to do it because the wife will also be a shareholder of the property."

"Adding women's names will also affect the tax-paying decision. For example, if there is no water, women are the first people in the house who are affected by the unavailability of water, so they will insist that their husbands pay the water tax to ensure water availability."

F Appendix: Data

F.1 Outcomes

F.1.1 Index Construction

This section lays out how the index variables are constructed. I follow steps from Anderson (2008) and Dhar et al. (2022) to construct the indices. The steps involved in producing the indices are as follows:

1. Each individual variable is normalized by subtracting the overall sample mean and dividing by the control group standard deviation.

2. Weights are generated from the inverted covariance matrix of all the normalized and imputed variables in the respective index. For some index I consisting of variables $x, y, andz$, the weights thus produced are $wt_x, wt_y,$ and wt_z.

3. If an observation has missing variables (happens in case of domestic violence questions which were not mandatory), I construct the index using only non-missing variables. The non-missing variables are weighted by their respective weights and normalized by the appropriate sum of weights. For example, if x_i and y_i are non-missing for observation i, then sum $S_i = x_i * wt_x + y_i * wt_y$ represents the weighted sum of non-missing variables. Let $W = wt_x + wt_y + wt_z$ be the sum of all the weights and N_i be be the sum of weights of the non-missing variables $(wt_x + wt_y)$ for observation i. Then the index for the ith observation is calculated as $I_i = S_i * (W/N_i)$.

4. Index I is then re-scaled such that the control group mean is 0 and the standard deviation is 1 in the full sample.

5. The same above steps are followed for both baseline and endline indices.

F.1.2 Consumption indices

The woman's consumption index uses data from the following four questions.

1. How much money did you spend in the last 3 months on cosmetics which include bindis, lipstick, kajal, shampoo, face cream, body lotion,etc?

2. In the last three months how much did you spend on clothes for yourself such as sarees, salwars, suits, undergarments ?

3. In the last three months how much did you spend on bangles and other types of jewellery, real or fake ?

4. In the last week how much did you spend on misri for yourself ?

For husband's consumption index the questions used are the following:

1. In the last three months how much did he spend on clothes for himself such as pant shirt kurta, undergarments ?
2. In the last week how much did he spend on paan/tobacco/ghutka for himself ?
3. In the last week how much did he spend on alcohol for himself ?

F.1.3 IPV index

Each variable in this section takes a binary response of 0 if the violence does not happen and 1 if does. At baseline the index is summarized of the following two questions:

1. In the last month, was there any day when you slept empty stomach due to some kind of household related tension, stress, argument with the husband or other household member ?
2. Have you been threatened to be banished from this house in the last three months ?

At endline I was able to ask an additional three questions.

- Does your husband ever threaten to hurt or harm you or someone close to you in the last three months ?
- Does your husband ever insult you or make you feel bad about yourself in the last three months ?
- Does your husband beat you or slap you or throw something at you in order to hurt you in the last three months ?

F.1.4 Household decision-making index

The following questions go into the construction of the woman's household-decision making index. The selection of these questions were based on Jayachandran et al. (2021).

1. Please tell me who in your family decides whether to buy an expensive item like a bicycle or a cow in the house ?
2. Please tell me who in your family decides what to do if a child falls sick ?
3. Are you permitted to visit the homes of friends/relatives in neighboring villages to talk with them ?
4. Do you have to ask the permission of other household members to buy clothing/footwear/nailpaint/fake jewellery/ or anything else for yourself ?
5. Do you think you are able to spend money on things for the house (food, housewares – eg new utensils) or for your children without asking the permission of other household members?

For questions 1 and 2, I construct an indicator variable which takes the value 1 if wife names herself as one of the decision-makers and zero otherwise. Questions 3 to 5 are Likert scale questions which I code numerically in the increasing order of greater decision-making.