Gender Roles and the Decision to Insure*

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Abstract

In agricultural settings where men control the most valuable crops or livestock, shocks to men's incomes and assets are often the primary sources of risk to the household. Negative economic shocks lead men to reduce their contributions to household public goods such as school fees and food, shifting the burden to women. Insurance has the potential to reduce this burden. However, insurance is generally linked conceptually to crops or livestock, obscuring its potential role in preventing costly cuts to household public goods. This paper uses data from an lab-in-the-field experiment in Samburu County, Kenya to show that framing index-based livestock insurance as a financial product that can help households buy food and keep children in school during droughts increases demand among women relative to a livestock-focused framing. The effect is stronger in households that score lower on empowerment indices, suggesting it is due to traditional gender roles.

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1 Introduction

Women and girls often bear the brunt of economic shocks. Droughts adversely affected the body mass index (BMI) of women and daughters in a sample of rural Zimbabwean households, but not men and sons (Hoddinott and Kinsey, 2000). Crop failures in Rwanda adversely affected girls' health, but not boys' (Akresh et al., 2011). Indonesian women who grew up in areas with lower-than-average rainfall during their early years grew up to be shorter, completed less school, and lived in households with fewer assets later in life (Maccini and Yang, 2009). In post-Mao China, increases in women's incomes led to higher survival rates for girls and increased educational attainment for all household members, while increases in men's income actually reduced survival rate for girls and increases education attainment only for boys (Qian, 2008). Typhoons in the Philippines increased child mortality for female infants, but not males (Anttila-Hughes and Hsiang, 2013). Dercon and Krishnan (2000) document that women who fell ill in rural Ethiopia received a smaller share of household nutrition, but the same was not true for men, and Quisumbing et al. (2018) find that drought shocks eroded women's assets in Uganda.

This paper asks two questions. First, why do shocks disproportionately affect women? Second, can emphasizing the potential benefits of insurance for insulating household consumption rather than protecting men's income or assets increase demand?

I address the first question theoretically by showing that a non-cooperative household model with voluntary public goods contributions can explain the disproportionate effect of shocks on women. Negative shocks shift the burden of providing household public goods toward women, leading them to curtail their own consumption and/or draw down their own assets. On the other hand, men who are primary breadwinners are implicitly insured when their wives have positive wealth because they

can count on their wives to support public goods provision in the event of negative shocks. This means that in households where men are primary earners, some of the risk associated with their income or assets falls on their partner via household public goods, and suggests that women might benefit from insurance to shield them from that indirect risk. Further, in agricultural settings where men control the crops or animals associated with the bulk of household income, insurance indices are likely to be more feasible for their sources of income than for women's. This observation informs the design of the lab-in-the-field experiment I use to answer the second question, which tests whether highlighting the potential for insurance payments to cover household expenses in the event of shocks to male incomes increases demand among women.

To test whether linking insurance to household public goods makes it more appealing for women, I conduct a framed field experiment in Samburu County, Kenya. Samburu County is a good place to test the idea of household public goods insurance, because traditional gender roles mean that men are generally the primary income-earners and asset-owners, and frequent droughts mean their livestock assets and income are often subject to shocks. The experiment relies on SimPastoralist, a tablet-based game that simulates pastoralist life by allowing participants to invest in goats and buy insurance for ten simulated 'years.' The insurance product in the game is modeled after the Index Based Livestock Insurance (IBLI) program available in the study region, and the probabilities in the game are also designed to approximately mimic the real world. The game was played with 287 couples who were randomly selected from a randomized controlled trial studying the impact of index-based livestock insurance[1] and a poverty graduation program in the same region. In half of the sessions, insurance was framed as it has traditionally been done for the IBLI program: as a product designed to help offset or reduce livestock losses during a drought. In

[1]The study in this paper was done before the insurance had been launched in the real world.

the remaining sessions, I modified the insurance framing, explaining that insurance payouts could be used either to support animals or to pay for household expenses such as food or school fees in the event of a drought.

I find that linking insurance payouts to household public goods increases the amount of insurance purchased by women relative to insurance framed around livestock, which are the main household assets in the region and are usually controlled by men. Estimates suggest that the household framing increases the share of total spending allocated to insurance purchased by women by about 27% and by men by about 17%, although the impact for men was not statistically significant. In percentage point terms, the average participant allocated 5.6 percent of their budget to insurance in the traditional livestock framing, and the framing increased the average amount purchased by women by 1.8 percentage points and by men by 1.1 percentage points.

Further, the effect of reframing insurance is driven by households in which women score lower on an empowerment index. The effect on insurance purchase for both women and men in households that score above the sample median on an empowerment index is statistically insignificant, while the average effects nearly double for both women and men (to 3.2 and 2.0 percentage points, respectively) in those households below the median. In other words, in more egalitarian households where both partners have equal say in decisions, de-linking the insurance from male assets has a smaller effect than those in which women have less say in such decisions. This suggests that for households where most decisions are jointly made it is less important whether insurance is linked to gendered assets.

This paper builds on a substantial literature that seeks to explain why uptake for index insurance products has been lower than expected in many real-world settings. Index insurance has large potential benefits for farmers (Cai, 2016; Karlan et al., 2014; Jamison et al., 2014; Carter et al., 2016), but uptake has been low. Existing research

has explored many factors that may affect uptake, including basis risk, uncertainty aversion, trust, social network effects, financial literacy, liquidity constraints, and disaster experience (Clarke, 2016; Carter et al., 2015; Cole et al., 2013; Jensen et al., 2015; Giné et al., 2008; Gaurav et al., 2011; Cai et al., 2015). Carter et al. (2017) and Jensen and Barrett (2017) provide overviews of this literature. This paper finds evidence that the way insurance is framed may also affect demand, and in particular that linking the benefits to consumption rather than production may lead to greater uptake.

The theory in this paper builds on a large body of existing work on intrahousehold models, and is the first I am aware of to study what non-cooperative models mean for insurance decisions. Intrahousehold models in general can be divided into two groups: cooperative and non-cooperative models. Cooperative models can accommodate unequal weight in household decisions, but always yield outcomes that are Pareto optimal; see Chiappori and Mazzocco (2017) for an overview. Non-cooperative models on the other hand assume outcomes are determined by Nash equilibria of a non-cooperative game, and outcomes are not always efficient. Lundberg and Pollak (1993) and Carter and Katz (1997) add gendered responsibilities and transfer payments within the household to non-cooperative models. The theory developed in this paper focuses on the dynamic implications of the non-cooperative model studied in detail by Browning et al. (2010). I build on this literature by applying the model to a dynamic setting and show that non-cooperation in the household leads to non-convexities in the indirect utility function that discourage insurance purchase for primary earners and discourage investment for secondary earners.

A broader implication of both the theoretical and empirical results in this study is

that when individuals are part of a non-cooperative household, their investment[2] and insurance decisions are affected by the household structure. More concretely, men who control more wealth than their partners may appear to be less risk averse than women simply because the structure of the household insulates them from downside risk. For the same reason, returns to women's investments are implicitly taxed because higher incomes mean increased responsibility for household public goods provision, discouraging investment. Taken together, this sort of household structure means that women's assets and consumption are at risk when their partners are faced with negative shocks.

The theoretical implications of non-cooperative household models for insurance decisions are laid out in Section 2 of this paper. The lab-in-the-field experiment is described in Section 3, and the data from the experiment is summarized. Section 4 discusses the empirical results, and Section 5 concludes.

2 Theory

This section examines the dynamic implications of a standard Nash equilibrium based non-cooperative voluntary contributions model. In this non-cooperative model, household consumption is divided into three categories: private consumption by the woman, private consumption by the man, and household public goods consumption.

[2]In addition to its implications for insurance and risk-taking, the model in this paper provides an explanation for the common finding that male but not female-operated enterprises benefit from business grants (De Mel et al., 2008; Fafchamps et al., 2014; Fiala, 2018). Previous analyses interpreted this as evidence that women had lower returns to investment than men, but Bernhardt et al. (2019) show that returns at the household level do not appear to differ by gender of grant recipient. However, they also show that returns for women in multi-enterprise houses are lower than returns for both men in multi-enterprise households and women in sole-enterprise households. They argue households may be efficiently reallocating capital to male-owned businesses because men within the household tend to operate the businesses with the highest returns. The model in this paper provides a different interpretation: women who receive grants increase their contributions to household public goods and men correspondingly decrease their contribution and increase their own investment. This explanation is similar in that grants are shifted toward men's businesses, but it does not require that men's businesses have higher returns.

Each partner decides strategically how much to contribute to household public goods consumption based on their budget, preferences, and their partner's contribution. The model is a special case of the model examined in detail in Browning et al. (2010), which builds on earlier work on the private provision of public goods by Bergstrom et al. (1986) and Warr (1983), among others. Browning et al. (2010) also link their model to the separate spheres model proposed by Lundberg and Pollak (1993), which they argue can be viewed as a special case of their model.[3] Non-cooperative models can be contrasted with cooperative intrahousehold models, which assume cooperative bargaining and thus Pareto efficiency, and with unitary models, which assume household preferences can be represented by a single utility function. For an overview of cooperative models, see Chiappori and Mazzocco (2017). Browning et al. (2010) focus on the distributional effects of non-cooperative models, and this paper builds on their work by examining how those distributional effects are likely to affect portfolio choice when two partners in a household each control their own wealth.

The key insight from the model I develop in this paper is that the existence of multiple equilibria in non-cooperative models discourages investment for lower income partners and discourages insurance for higher income partners. This is because the model implies 'kinks' in both partners' indirect utility functions at the boundaries between equilibria, as shown in Figure 1. These kinks lead to corner solutions for investment and an indirect utility function that is not globally concave, which has several important implications. First, the lower wealth member's optimal level of investment is lower than it would otherwise be because returns to investment beyond a certain level are 'taxed' by a growing need to contribute to household public goods. Second, the higher wealth member of the household benefits from implicit insurance

[3]Browning et al. (2010) note, however, that while their model can produce the same results as the separate spheres model proposed by Lundberg and Pollak (1993), the Nash equilibrium model relies on preferences to determine which partner finances which public good(s) while the separate spheres model relies on societal gender roles.

because a large enough drop in their income leads their partner to begin contributing to household public goods, dampening the effect of business losses on utility.

For simplicity, I focus on the case of Cobb-Douglas preferences and a single household public good representing expenditures that benefit both partners such as food, children's consumption, education, or housing. Generalizing this model to cases with multiple public goods is a useful avenue for future research.

Let the two partners in the household be indexed by the letters i and j. Each individual in the household gains utility from private consumption c_i and total household public goods z, which is the sum of individual contributions z_i and z_j. Since the problem is symmetric, we can focus on one partner's side. Individual i has income y_i and solves the problem:

$$\max_{c_i, z_i} u_i(c_i, z_i + z_j) \text{ such that } c_i + z_i \leq y_i \tag{1}$$

Let agent i's utility function be given by $u_i(c_i, z) = c_i^{\alpha_i} z^{1-\alpha_i}$ where $\alpha_i \leq 1$. Solving for a Nash equilibrium yields the following optimal contributions to household public goods:

$$z_i^*(y_i, y_j) = \begin{cases} (1-\alpha_i)y_i & \text{if } \frac{y_i}{y_j} > \frac{1-\alpha_j}{(1-\alpha_i)\alpha_j} \\ \frac{(1-\alpha_i)y_i - \alpha_i(1-\alpha_j)y_j}{1-\alpha_i\alpha_j} & \text{if } \frac{(1-\alpha_j)\alpha_i}{1-\alpha_i} \leq \frac{y_i}{y_j} \leq \frac{1-\alpha_j}{(1-\alpha_i)\alpha_j} \\ 0 & \text{otherwise.} \end{cases} \tag{2}$$

And $c_i^*(y_i, y_j) = y_i - z_i^*(y_i, y_j)$. As shown by Browning et al. (2010), in the first case, agent i's income is large enough relative to their partner's that they are the sole contributor to public goods. In the second, both agents contribute, and household income is 'pooled' in the sense that income received by either partner in the household will have the same effect on household expenditures. In the third case, only agent j contributes to public goods. Intuitively, the first case holds when agent i has enough

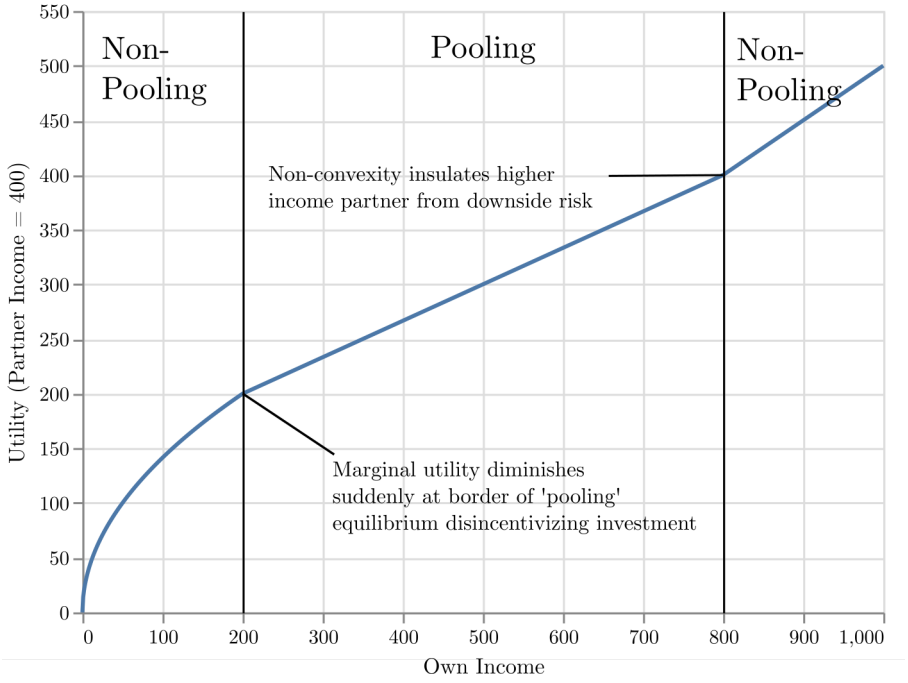
income that their contribution to public goods is greater than agent j would prefer, leading agent j's optimal contribution to public goods to be zero. Instead, agent j spends their entire budget on consumption c_j. The second case occurs when incomes are relatively equal so that both agents make a positive contribution to household public goods. The third case is identical to the first with the roles of the two partners reversed. The boundaries between the three cases are determined by each partner's relative preference for private consumption. Intuitively, if one agent puts relatively more weight on household public goods than the other, they will begin contributing at a lower relative income and will also become the sole contributor at a lower relative income.

2.1 Individual Preferences in Noncooperative Households

Up until this point, the model I have described is standard in the literature. My contribution is to study how two agents who know that income will be allocated according to the non-cooperative model described above make forward-looking investment and insurance decisions. Define the indirect utility function $v_i(y_i, y_j) = u_i(c_i^*(y_i, y_j), z_i^*(y_i, y_j))$, where $z_i^*(y_i, y_j)$ is as defined in Equation 2 and $c_i^*(y_i, y_j) = y_i - z_i^*(y_i, y_j)$. We can use this function to study preferences over both own and partner income. Because responsibility for public goods production depends on relative incomes, lower-income partners are less likely to invest and higher income partners are less likely to insure than they would be absent this structure. This is because when relative income reaches a certain level, the higher income partner begins to curtail contributions to public goods because they know the lower income partner will fill in the gap.

The most important feature of $v_i(y_i, y_j)$ is that it is not globally concave when both partners have a positive income. As shown in Figure 1, there are two 'kinks' in

Figure 1: Indirect Utility Function: Own Income



Holding partner income constant at 400, each partner faces an indirect utility function over their own income with two 'kinks.' For the lower-wealth partner this is likely to yield a corner solution when making investment decisions because of rapidly diminishing marginal utility for own income over 200. For the higher income partner, the second kink provides implicit insurance by flattening the utility function if own income falls below 800. The non-convexity at this point could induce locally risk-loving behavior.

each partner's utility function holding the other's income constant. This figure was generated assuming identical Cobb-Douglas utility functions with $\alpha_i = \alpha_j = \frac{1}{2}$.[4] The shape of this indirect utility function has important implications for both insurance and investment, but in this paper I focus on the insurance implications. At the same time, it is worth noting that the shape of the utility function discourages investments that would lead to a 'pooling' outcome, meaning it is likely the lower income partner will find themselves in the 'non-pooling' region of the graph on the left and the higher income partner will find themselves in the 'non-pooling' region on the right.

The non-concavity of the indirect utility function depicted in Figure 1 means that relative incomes are important drivers of insurance decisions: the lower income partner will be indirectly affected by downside risk to her partner's income. This is because a large enough negative shock to the higher income partner's income will reduce his responsibility for household public goods provision and increase the lower income partner's responsibility for public goods provision. In many patriarchal settings, the woman is the lower income partner, which means she will bear more risk than her husband and thus may benefit more from insurance. Her husband, on the other hand, will be 'insured' by the fact that below a certain level of income his wife will step in and contribute to household public goods, reducing the impact of a negative shock.

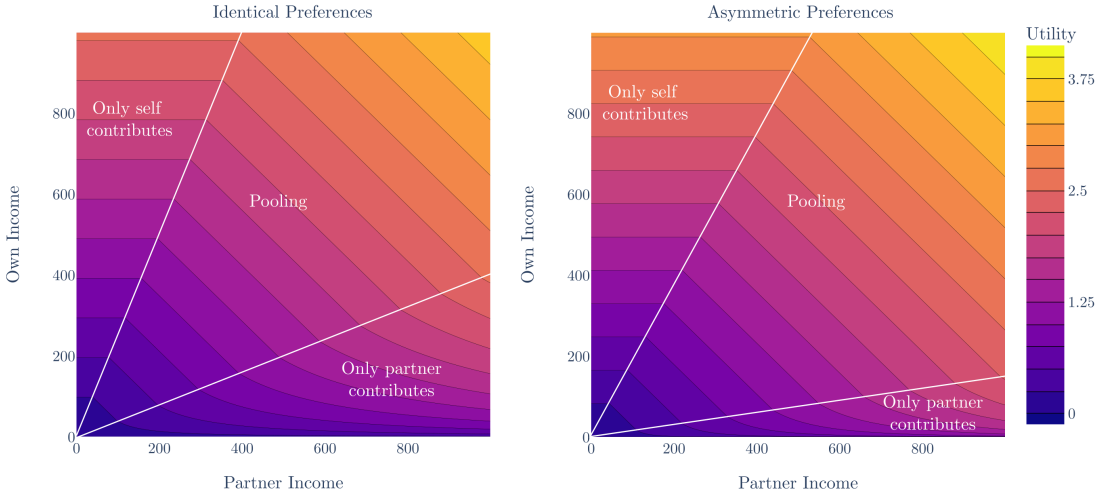
Holding partner preferences constant, a stronger preference for private consumption (a higher α_i) shifts both 'kinks' in the utility function depicted in Figure 1 rightward. This means that if the agent with higher income has a stronger preference for private consumption relative to household public goods his insurance 'deductible' will be smaller, because his partner's stronger preference for public goods will lead her to begin contributing more readily. Intuitively, someone who values public goods

[4]Changing the values for α_i and α_j affects the cutoff points and slopes, but does not change the overall shape of the utility function.

more than their partner will make public goods contributions at a lower relative income. This means that if, for example, women tend to be lower income and also have a stronger preference for public goods than their partners, the implicit insurance they provide is more effective.

Figure 2 shows how own utility varies with both own and partner income under the same assumptions used to generate Figure 1. For the purpose of discussion, suppose the figure represents utility as a function of own and partner income from the woman's perspective. The left panel is based on identical Cobb-Douglas utility functions, while the right depicts a scenario wherein the woman puts more weight on household public goods. In either case, there are three scenarios that correspond to three regions on the figure. First, the upper left represents the region in which only the woman contributes to household public goods because her income is high relative to her partner's. In that case, her utility does not depend on her partner's income at all, and shocks to her partner's income therefore do not affect her. By comparing the right to the left panel we can see that this area grows larger when the woman cares more about household public goods than her partner. This scenario is uncommon in patriarchal societies where women have limited opportunities to earn income and primarily work in the household. The "pooling" region of the figure represents the range of incomes in which both partners make positive contributions to household public goods. In this case, both partners are affected by shocks to the other's income, so both could benefit from insurance on either income. Finally, the lower right area of the graphic represents the region where her partner's income is high enough relative to hers that he is exclusively funding household public goods. Within this area, a shock to his income has a somewhat smaller impact on her utility, but shocks that move the equilibrium from the 'only partner contributes' to pooling equilibrium have a disproportionately large effect. It is therefore especially beneficial for the woman to insure against shocks that would lead to a transition between the two areas.

Figure 2: Indirect Utility Function:Own and Partner Income



Contour lines represent equivalent utility values. In the figure on the left, both individuals have identical preferences, while on the right the partner whose contribution is on the vertical axis cares more about public goods than the other. In a non-pooling equilibrium, the higher income partner will be in the upper left region of the graphic while the lower income partner will be in the lower right. A shift along the y-axis represents a change in own income, while a shift along the left represents a change in partner income. The kinks along the borders between the pooling and non-pooling equilibria show how the lower-income partner is insulated from upside risk while the higher-income partner is insulated from downside risk (see Figure 1 for a two-dimensional version holding partner income constant).

As shown on the figure, a woman's partner's income must be high relative to hers for 'only partner contributes' to be the outcome, but in settings where women have little or no income this is likely to be common. It is worth noting that the man in such settings also has a disincentive to insure against precisely the types of shocks that would be most detrimental to his partner: shocks that would lead to a transition to pooling. This is because he is implicitly insured by the knowledge that his partner will step in to cover household public goods in the event of a shock.

As mentioned above, insurance linked to partner income is also useful in pooling scenarios, particularly when partner income is high relative to own income. Whether or not pooling is occurring, the larger income has a larger impact on utility, so when women's activities earn less and/or are less indexable as is the case in many settings, insurance linked to their partner's income may be more beneficial.

2.2 Insurance in Non-cooperative Households

The shape of the utility function described above means that agents who are poor enough relative to their partner have a disincentive to invest their own endowment and agents who are rich enough have a disincentive to insure their own endowment. This is because the poorer agents will reduce their own consumption and increase provision of public goods when their partner's income receives a large enough shock. This is exactly the phenomenon that has been reported in the real world: disasters lead women to curtail their own consumption to cover household expenses.

It is useful to explore the intuition of the model a bit further. The wealthier partner is partially insured by the knowledge that if their income falls sufficiently relative to their partner's, the partner will step in and cover a share of household expenses. A small increase in their partner's income is analogous to a reduction in their insurance deductible because it increases the minimum level of y_i at which they'll make a positive contribution to z. At the same time, higher income partners in a non-pooling equilibrium are unaffected by downside risk to their partner's income since their partners are already not contributing to z goods.

The poorer partner in a non-pooling equilibrium is exposed to risk on their own income and their partner's income. At the same time, they are disincentivized to invest their income because their responsibility for z goods will increase as their earnings increase. This effect is more pronounced if the poorer partner's preference for z goods is stronger than the richer partner's. Concretely, in the many cases in which women are the poorer partners, their disincentive to invest may be *stronger* if they care about expenditures on household expenses more than their husbands.

In a pooling equilibrium, income is 'pooled' in the sense that changes in either partner's income have the same effect on household expenditures. Thus, both partners are affected by risk to each income. However, the kinks in the utility function make

this equilibrium unlikely, as they tend to create corner solutions in which the lower wealth partner avoids investing enough for pooling to occur.

Due to the fact that this model leads to a non-convex indirect utility functions with respect to both own and partner income, the standard result that agents will fully insure when actuarially fair insurance is available does not apply.

2.3 Public Goods Insurance

As shown in the previous section, men in non-cooperative households who have more wealth than their wives have a disincentive to insure because their partners step in to cover household expenses in the event of negative shocks, which exposes women to risk. The most obvious solution would be to offer insurance to women. However, in many households in rural agrarian economies women earn little income, and as a result the risk they are exposed to indirectly via their husband's income is much larger than the risk from their own income. Providing women with the opportunity to insure their own income may be valuable for those women who are entrepreneurs, but it still leaves them exposed to substantial indirect risk, and is less useful when women's incomes are a small share of the household total. An alternative is to emphasize the fact that insurance payouts can be used to finance household public goods (z goods in the model) as opposed to solely replacing livestock men lose during a drought.

Household public goods insurance could be implemented either by directly providing food, payment of school fees, and other expenses in the event of a negative shock or by simply reframing insurance to connect payouts to household public goods. The idea that labeling cash payments affect their final use is explored theoretically by Thaler (1990, 1999), and there is empirical evidence for this idea in a range of cases including the UK Winter Fuel Payment (Beatty et al., 2014), SNAP benefits (Hastings and Shapiro, 2018), and a lab setting (Abeler and Marklein, 2017). The experiment

described in the sections that follow implements household public goods insurance using a labeling approach, and the fact that framing insurance around household goods increases insurance demand for women suggests that labeling matters in this context as well.

Despite the evidence that framing can affect how money is spent, it is unrealistic to assume that framing insurance around household public goods would lead households to fully allocate payouts to public goods in real world situations of scarcity. However, framing could still affect insurance demand, especially for women, by highlighting the how shocks to their partners' income can indirectly affect them. This may be particularly relevant for the sample of women included in the experiment to follow in this paper, some of whom have recently begun businesses as part of The BOMA Project's poverty graduation program. Many of these women are owning significant assets and earning incomes for the first time, and shocks to their husbands' assets could have negative impacts on their new businesses in addition to their and their family's consumption.

3 Experimental Game

This section describes a framed, incentivized field experiment designed to study how linking insurance to household public goods rather than male-owned assets or income affects demand. This experiment was conducted in Samburu County, Kenya, where most household livelihoods are based on herding livestock. Traditionally, the household's livestock herd and income are controlled by men, with women earning small amounts of income by tending to small stock (goats, sheep, or chickens) at home and/or operating kiosks. This fits the theory laid out in the previous section as the strongly patriarchal norms mean men consistently have larger expected incomes than women in these households. Further, the region faces frequent droughts which

cause large shocks to livestock assets and hence incomes. Finally, the International Livestock Research Institute's Index-Based Livestock Insurance (IBLI) program is currently being rolled out in the region. This program has traditionally linked insurance payouts to replacing lost livestock or preventing their deaths, which according to the model above may provide limited benefit to women relative to a program that insures household public goods.

The experiment is based on an tablet-based game that simulates pastoralist life (SimPastoralist), allowing players to make both investment and insurance decisions with probabilities and payoffs that approximate the real world. We collected data for this experiment in 34 sessions with a total of 287 couples. In half of the game sessions, insurance was framed around livestock to mirror the currently existing products offered by the IBLI Program. In the other half, insurance was framed to associate payouts with household public goods.

Framed field experiments have been used extensively in past studies on index insurance. A subset of this research focuses on games as a way of educating potential customers on index insurance. Patt et al. (2009) used games to educate individuals on index insurance with the goal of educating users and building trust in the product. Cai and Song (2017) find evidence that participating in insurance games can increase uptake by as much as 46%. Vasilaky et al. (2020) find evidence that insurance games can indeed increase demand in the real world, and Janzen et al. (2021) find evidence that games increase reported preferred insurance coverage levels among participants.

Experimental games have also been used to study individual preferences as they relate to insurance, with a particular focus on understanding why demand for insurance has been lower than expected in many cases. Brick and Visser (2015) use games to show that individuals with high levels of risk aversion are less likely to adopt risky agricultural technologies than others, and that index insurance does little to reduce that tendency. McIntosh et al. (2019) use insurance games to explicitly estimate in-

dividual utility functions, finding evidence that both probability weighting and loss aversion affect insurance choices. Norton et al. (2014) find evidence that individuals prefer contracts with higher frequency payouts (i.e. lower deductibles). Serfilippi et al. (2020) provide evidence that uncertainty aversion also curtails demand for index insurance.

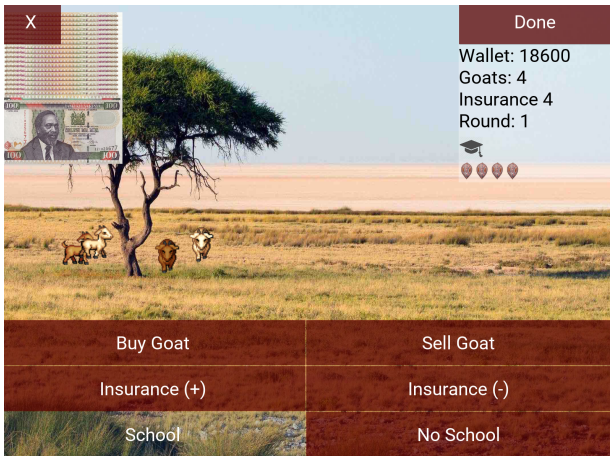
The remainder of this section describes in greater detail the experimental game (Section 3.1), the study design including how individuals were assigned to treatment (Section 3.2), and the way each experimental section was run (Section 3.3).

3.1 SimPastoralist

This section describes SimPastoralist, the experimental videogame that forms the basis of the experiment. I designed the SimPastoralist game in close collaboration with a number of Samburu young people who also served as enumerators on the project. The SimPastoralist game makes it possible to collect rich data on decisionmaking by individuals and couples in a setting that mirrors the decisions they make in their daily lives. The probabilities, prices, and the insurance markup were all designed to match reality as closely as possible while keeping the game relatively simple. The game lasts 10 rounds. In each round, players allocate their budget between insurance, goats (investment), and education.

Figure 3 depicts the gameplay screen from SimPastoralist. The shield icons represent the amount of insurance the player holds, and the graduation hat icon represents years of school. The wallet balance is shown both numerically and by adjusting the size of visible stack of cash on the left hand side of the screen. The enumerators explain all of these symbols to the players, and update them on their balances of cash, goats, and insurance before they finalize each decision and at the beginning of each round.

Figure 3: SimPastoralist



Players start with a relatively small budget of 25000-35000 Kenyan Shillings.[5] At the beginning of each round in SimPastoralist, the player must pay 5000 KSh for essential household consumption. If they do not have sufficient cash on hand, they can sell one or more goats to pay these costs. If they are unable to pay these costs, the game ends early with a final score of zero - otherwise it ends after 10 rounds, which simulates ten years.

After paying consumption expenses, players can buy and sell goats and insurance. Goats are worth 2000 KSh and reproduce with probability 2/3 in a good year and die with probability 2/3 in a bad year. Goats who reproduce also produce milk which leads to cash income of 1500 KSh. There is no milk production in a bad year.

Every round each player also decides whether or not to send their children to school. School costs 2,000 KSh, and six years of school are required for graduation. If the student graduated from school, the player earns a bonus of 10,000 KSh at the end of the game.[6]

[5]The exact starting budget was randomly chosen for each session using a random number generator to be 25,000, 30,000, or 35,000 Ksh.

[6]Nearly all participants of both genders chose to send their children to school until they graduated, meaning there is no significant variation in schooling decisions. This is perhaps a bit surprising since six years of school costs 12,000 KSh and the bonus is only 10,000 KSh, but it suggests that players are perhaps thinking of this game in terms of real-life decisions rather than purely in terms of the payoff to the experiment.

Insurance is sold in discrete units. The per unit premium is 350 KSh and each unit pays 1,000 KSh in the event of a drought, so the net income from insurance is -350 KSh in a good year and 650 KSh in the event of a drought. As detailed below, bad years occur with probability 1/3 so the insurance is slightly more expensive than actuarially fair - the markup was designed to be similar to the Index-Based Livestock Insurance available in the region.

After the player decides how to allocate their budget between goats, insurance, and school, they press the 'Done' button to move to the next round. At this point, the clouds at the top of the screen begin moving to depict the passage of time, and the good/ bad year outcome is randomly determined. In good years, rain falls on the screen and goats reproduce and produce milk. In bad years, no rain falls and goats who die fall off the screen. The game then reports the total gains/ losses in animals, the amount of milk produced, and any insurance payout received. The next round then begins with household consumption expenses and the player repeats. This cycle continues for 10 rounds or until the player no longer has enough funds to pay household consumption expenses.

The final score is the sum of the value of the goats in their herd and the cash in their wallet, plus a bonus of 10000 KSh if their child finished school. In the incentivized rounds of the games, the real-world incentive is calculated so that every 500 KSh in the final game score translates into 1 KSh of real-world payment. More details on the structure of the experimental sessions can be found in Section 3.3.

Because data collection is integrated into the game, it moves quite quickly. This increases participant engagement and allows participants to practice the game several times before they participate in the incentivized round. As a result, participants understand the game well before participating in the incentivized round, and many asked to stay longer to play more after the sessions were over. Participants also reported without prompting that they felt the game was educational and reflective of

their lives.

In addition to the individual version of the game, there is also a two player 'couples' version of the game. In that version, two players can play simultaneously on a split screen, and can transfer resources between each other. Otherwise, the game is identical: both players experience the same shocks and make the same individual decisions.

3.2 Sampling and Sessions

The experimental sessions were conducted over 14 days between July 26 and August 10, 2018 by four groups of enumerators, each of whom would host one experimental session each day, for a total of 56 sessions. Each group was assigned to a different part of Samburu County. The couples were randomly selected from a larger sample of women who are participating in a randomized controlled trial of the BOMA Rural Entrepreneur Access (REAP) program.[7] In this study, a subset of women were invited to participate and asked to bring their husbands. For that randomized controlled trial from which the sample was drawn, women were selected randomly from a group screened by BOMA through a participatory process designed to identify the poorer households in each village. As a result, the households in this study are also among the poorer households in the study region.

The framings and starting budgets for each session were randomized with a computer in advance, and each team was informed in the morning whether they would be hosting a 'Livestock' or 'Family' session each day. The next section describes the experimental sessions and the differences between the two types.

[7]The BOMA REAP Program is a poverty graduation program similar to the well-known BRAC Program documented in Banerjee et al. (2015) and elsewhere.

3.3 Experimental Sessions

Each experimental session started with a brief overview of the experiment and a skit designed to introduce the participants to the idea of insurance. These skits were used to situate the insurance and were central to the experiment: in half of the sessions the skits introduced insurance as a product focused on livestock coverage during droughts as has traditionally been done in the index-based livestock insurance program. Each skit is oriented about two women discussing a drought affecting their families. In the 'livestock framing' the woman introducing insurance says:

> "Have you heard about the new insurance program? It sends money to your M-Pesa account when droughts strike. We also lost half our goats and cattle, but we'll be able to replace them using the insurance money."

In the 'family framing,' which links insurance to household public goods, the woman introducing insurance instead focuses on the benefits

> "Have you heard about the new insurance that helps families in this kind of situation? It sends money to your M-Pesa account when droughts strike to help cover household expenses. We also lost half our goats and cattle, but at least we'll be able to pay school fees and buy food."

See Appendix A for the full text of the scripts used in the introductory skits.

Following the introductory skit, participants were paired with enumerators who assisted them in playing the game. In order to learn the game mechanics, they first played two practice rounds of the game without insurance and then two with insurance. The goal of these rounds was to ensure that participants understood the game mechanics before beginning the incentivized rounds.

After each player practiced the game without insurance twice and then with insurance twice, they were reminded that they were now playing one of the two the

incentivized games. They were reminded that one of the two incentivized games would randomly be selected to yield real-world compensation, and that every 500 game shillings including the value of livestock would translate into 1 real Kenyan shilling.

After completing the first incentivized game, players were introduced to the 'couples' version of the game as described in Section 3.1. Again, they played two practice rounds in the couples game before beginning the incentivized round, and were reminded when the incentivized round was beginning.

At the end of each session, participants were paid real Kenyan shillings based on one of the two incentivized rounds chosen at random. As explained above, each 500 game shillings is converted to one real world shilling. For example, a player ending the game with 50,000 KSh and 25 goats (a total value of 100,000 KSh) would receive a payout of 200 KSh in addition to the 500 KSh offered to all participants in the study in compensation for their time. In both the individual and couples versions of the game, each individual has their own cash and herd of animals, so incentives were paid individually (not to couples collectively) regardless of which game was chosen for payment.

3.4 Data

The sample consists of 287 couples. Of those, 151 were assigned to the family framing and 136 were assigned to the livestock framing. Because I drew this sample from a larger randomized controlled trial, I had detailed information on household characteristics available. Table 1 shows the sample means for a number of measures along with p-values from a t-test for differences in means. There are no statistically significant differences between the samples exposed to the family and livestock framings.

Table 1: Sample Balance

Variable	Livestock	Family	p-value
Household Size	5.986	6.052	0.800
Husband Age	32.419	32.244	0.910
Husband School	4.905	5.111	0.846
Empowerment Index	3.254	3.357	0.278
Wife Age	32.529	32.669	0.922
Wife School	5.417	5.645	0.831
Total Livestock Units	1.863	2.296	0.452

4 Results

This section focuses on testing whether altering the way insurance is framed affects the quantity of insurance purchased. I also test whether the effect differs for women and men. In summary, participants bought more insurance on average under the household framing than under the livestock framing, and the effect of the household framing appears to have been larger for women than for men. This is consistent with the theory laid out earlier in the paper, and suggests that real-world index insurance uptake might increase if its benefits were described more broadly.

For the regressions to follow, I use the share of the participant's budget spent on insurance as the dependent variable. The sample average for the budget share spend on insurance is 0.0627, meaning that participants allocated about 6% of their budget to insurance on average.

The first question of interest is whether the household framing increases demand for insurance on average. The basic form of the regression we use to answer this question is:

$$S_{it} = \alpha + \beta_1 HH_i + \epsilon_{it}$$

where S_{it} is the share of the budget allocated to insurance and HH_i is a dummy

Table 3: Average Effect of Family Framing

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Family Framing	0.011**	0.011**	0.014***	0.010*	0.010*	0.013**
	(0.008)	(0.008)	(0.001)	(0.014)	(0.015)	(0.002)
Budget				-0.007***	-0.007**	-0.006**
				(0.001)	(0.001)	(0.002)
R^2	0.006			0.019		
N	7997	7997	7997	7997	7997	7997
Round Effects		X	X		X	X
Enumerator Effects			X			X

All standard errors are clustered at the participant level.
+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

variable equal to 1 when the family framing was presented and 0 when the traditional livestock framing was presented. The subscript i refers to the player and t to the current round of gameplay (0 to 10). I also estimate versions of this equation with two sets of fixed effects. Enumerator fixed effects are dummy variables that are associated with the enumerator who was assisting the participant in playing the game. Since the enumerator teams were fixed throughout the study, these effects also incorporate any variation in the way each team presented the game to participants. Round fixed effects are dummies based on the round (1 to 10) of the game, which allows us to account for dynamic effects (e.g. participants may buy more insurance in the beginning or end of the game for strategic reasons).

Table 3 shows the results from our initial regression. All specifications suggest that the family framing increases the share of insurance purchased on average, and the results are significant at the 99% level. Among those who were exposed to the livestock framing, the average is 0.056, while among those who were exposed to the family framing it was 0.069. Our coefficients suggest that the family framing increased insurance purchase by 1.1 to 1.4 percentage points. In other words, both the differences in the raw averages and the regression coefficients suggest the family framing

Table 4: Gendered Effect of Family Framing

	Full Sample		Low Empowerment		High Empowerment	
	Women	Men	Women	Men	Women	Men
Family Framing	0.018**	0.011*	0.032**	0.020**	0.002	0.000
	(0.006)	(0.034)	(0.004)	(0.006)	(0.745)	(0.957)
N	4025	3972	2240	2141	1785	1831
Round Effects	X	X	X	X	X	X
Enumerator Effects	X	X	X	X	X	X

All standard errors are clustered at the participant level.
+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

increased the budget share spent on insurance by about 1.4 percentage points or 22%.

The coefficients estimated by the models in Table 3 change very little in response to fixed effects or controlling for the budget. The negative coefficient on the budget coefficient suggests that participants allocate less a smaller budget share to insurance as their wealth increases, which is consistent with decreasing absolute risk aversion. However, endogeneity is a potential issue with these specifications because the budget itself is related to prior insurance decisions after the first round of the game. The direction of the bias that this sort of endogeneity might introduce is also consistent with a negative coefficient: if a participant tends to buy more insurance, it will decrease the expected value of the budget on average since the insurance is priced above the actuarially fair price. Because the effect of budget on the estimated impact of the family framing is minimal and the budget is potentially endogenous after the first round of the game, we focus on Model 3 as our preferred model.

I next examine whether women and men are affected differently by the family framing by running the same regressions as above on women and men in our sample separately. As shown in the first two columns of Table 4, we estimate larger and more statistically significant coefficients for women than for men. I focus on our preferred specification (Model 3) in Table 3 on subsets of the data, but all other specifications

for each subset are available in Appendix B and are qualitatively equivalent. However, the differences between women and men are not statistically significant because the variance on the coefficient for men is quite high, perhaps because the framing increases insurance purchases for some men and decreases it for others. I find similar results when we run the model on the full sample and interact the framing with gender.[8] In summary, the family framing leads to a statistically significant increase in the budget share spent on insurance for women and for all study participants as a group (women and men), but the effect for men alone is not statistically significant. Since the coefficient for men is still positive, I interpret the results to mean the framing has a small or slightly positive impact on purchases by men (or perhaps by some men) and a larger and/or more consistent impact for women.

These results are consistent with the theory in Section 2. If family insurance is thought of as a flow to be allocated to z goods, it would tend to benefit women more than men, while livestock insurance would benefit men more than women. At the same time, both would be beneficial to some degree to all household members, and the two would be identical for households who are not close to the threshold that divides the pooling and non-pooling equilibria.

Table 4 also shows that the estimated impact of the family framing is larger in households where women are less empowered. The empowerment index is constructed by asking a series of questions[9] about to what extent women are involved in various household decisions. I define "Low Empowerment" households as those where the average score is less than or equal to 3.

Interestingly, the coefficient estimates for "Low Empowerment" households are high for both women and men in our sample, though for men the coefficient is only

[8] See Appendix B Table 7.

[9] The index we calculate is based on equal weighting of the 10 questions, each of which is answered on a scale from 1 to 5 (1=None, 2=Little, 3=Somewhat, 4=Mostly, 5=Fully). See Appendix C for the full list of questions used to calculate the index value.

significant at the 10% level. The effect of the framing is much less clear for "High Empowerment" households among both genders.

5 Conclusion

It is well documented that unitary or cooperative models fail to explain observed household behavior in some settings and that the negative shocks tend to disproportionately affect women. This paper has shown that a simple non-cooperative model of household behavior predicts these disproportionate impacts for an intuitive reason: negative shocks to men's incomes lead them to reduce their contributions to public goods. This means that insuring assets belonging to men be of little benefit to women, and that insuring household public goods may provide an effective workaround. I use experimental games to test whether framing insurance around household public goods increases demand among a group of pastoralists in Samburu County, Kenya. The effect appears to be more pronounced among women and in households where women are less empowered, which is consistent with the idea that framing is particularly important in households where women have less decision power over expenditures for men's assets.

The theory presented in this paper focuses on the simple case of Cobb-Douglas preferences and a single public good; future work will focus on generalizing the model. Also, Browning et al. (2010) note that many of the 'pooling' characteristic of their model extends to all bargaining models that use noncooperation as an outside option; testing whether the indirect utility function 'kinks' described in this paper also extend in a more general setting would be a useful future step.

On the empirical front, this paper makes it clear that there is a need to test insurance products that take into account intrahousehold dynamics in real-world settings. This paper suggests that linking insurance to household public goods this may in-

crease demand, and if that affects the way insurance payouts are spent it may also make insurance more beneficial to women. Future work should test whether this holds true outside of insurance games.

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A Scripts

The following are the scripts that were read by pairs of enumerators at the beginning of each session. Within each of the four teams, the same two enumerators held the roles in each session to minimize variation.

Household Framing

Woman 1: It has been a tough season - no rain at all. How is the drought affecting your family?

Kotogolo ana ng'amata meti nchan pii , aji eikunita nkolong'/lamei nkang' ino?

Woman 2: We lost half our goats and cattle and have been cutting back on meals because the goats that survived aren't producing much milk. It's going to be hard to pay school fees this year, and if the children have any medical expenses we will probably have to sell even more livestock.

Kotuata yio nkineji o nkishu, nomokure eta nkera ndaa, amaa amu meata ntare natelekunye naara kule. Kogolu abaki laata e skool e nkera, teneibisieng'u abaki nkera suom natelekunye naake kimir .

Woman 1: Have you heard about the new insurance that helps families in this kind of situation? It sends money to your M-Pesa account when droughts strike to help cover household expenses. We also lost half our goats and cattle, but at least we'll be able to pay school fees and buy food.

You can also buy insurance to help offset lost animals in the event of drought. You have to pay 500 KSh per goat in August, before the rainy season begins. If the rains are poor, they send 1000 Ksh for each goat to help revive your herd.

Itining'o ana ripet ng'ejuk naret nkang'ite ta mbaa/ramat natiwenyi? Kereu ropiyiani te simu (M-pesa) nkata e nkolong' payie eyasie ramat e nkaji. Kotuata yio ntare o nkishu, keikash naa amu kindim taa atalak ropiyiani e nkera e skool, nikindim sii ainy'angu ndaa

Woman 2: That sounds very helpful. How do I get this benefit?

Panijo kotuwua keretisho kulo omon. Aji aiko payie atum ana reto?

Woman 1: Well, it's not free – you have to pay a X KSh per family member in August, before the rainy season begins. If the rains are poor, they send 1000 Ksh for each person to help pay household expenses.

If you're interested, I can introduce you to the agent who sold us our insurance.

Maara taa pesheu, keyiari nilak ropiyiani X te ltung'ani obo le nkaji Ta lapa le esiet, eng'or ltumuren .tanaa etuesha aitibiraki nikirewakini 1000 te Ltung'ani obo le nkaji payie iasishere te ramat e nkaji. Tanaa iyieu,kaidim atirikoki ltung'ani otimiraka yio Inia ripet

Woman 2: Sounds interesting - I will speak to the agent to learn more.

Keining'o ajo keisupati kulo omon pii-kalo aiparishere ltung'ani omir ripet

Livestock Framing

Woman 1: It has been a tough season - no rain at all. How is the drought affecting your family?

Kotogolo ana ng'amata meti nchan pii , aji eikunita nkolong'/lamei nkang' ino?

Woman 2: We lost half our goats and cattle. It's going to be hard to pay school fees this year, and if the children have any medical expenses we will probably have to sell even more livestock.

Kotuata yio nkiteeng'ata e nkishu o nkineji.kogoliki yio laata e skool tale ari, o si tinimaniki ebisiong'u nkera, kuna kuni suom naatelekunye naake kimir alakie sipitali

Woman 1: Have you heard about the new insurance program? It sends money to your M-Pesa account when droughts strike. We also lost half our goats and cattle, but we'll be able to replace them using the insurance money.

Itining'o ana ripet ng'ejuk? Kereu ropiyiani te simu (M-pesa) nkata e nkolong'. Kotuata yio ntare o nkishu, keikash naa amu kindim taa ainyang'u nkule te nenia ropiyiani e ripet.

Woman 2: That sounds very helpful. How do I get this benefit?

Panijo kotuwua keretisho kulo omon. Aji aiko payie atum ana reto?

Woman 1: Well, it's not free – you have to pay a X KSh per goat or X*5 KSh per cow in August, before the rainy season begins. If the rains are poor, they send 1000 Ksh for each goat or 5000 KSh for cow to help revive your herd.

If you're interested, I can introduce you to the agent who sold us our insurance.

Maara taa pesheu, keyiari nilak ropiyiani X te nkine nabo o ropiyiani X te nkiteng' nabo Ta lapa le esiet, eng'or ltumuren.tanaa etuesha aitibiraki nikirewakini 1000 te nkine nabo o si 5000 te nkiteng' nabo payie iramatie mboo ino. Tanaa iyieu,kaidim atirikoki ltung'ani otimiraka yio Inia ripet

Woman 2: Sounds interesting - I will speak to the agent to learn more.

Keining'o ajo keisupati kulo omon pii-kalo aiparishere ltung'ani omir ripet

B Additional Regression Results

Table 5: Effect of Family Framing: Men

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Family Framing	0.010+	0.010+	0.011*	0.009	0.009	0.010+
	(0.099)	(0.098)	(0.034)	(0.131)	(0.137)	(0.064)
Budget				-0.011***	-0.012***	-0.010***
				(0.000)	(0.000)	(0.000)
R^2	0.004			0.024		
N	3972	3972	3972	3972	3972	3972
Round Effects		X	X		X	X
Enumerator Effects			X			X

All standard errors are clustered at the participant level.
+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 6: Effect of Family Framing: Women

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Family Framing	0.013*	0.013*	0.018**	0.012+	0.012+	0.016**
	(0.039)	(0.039)	(0.006)	(0.054)	(0.055)	(0.009)
Budget				-0.005**	-0.005*	-0.005*
				(0.007)	(0.011)	(0.020)
R^2	0.007			0.018		
N	4025	4025	4025	4025	4025	4025
Round Effects		X	X		X	X
Enumerator Effects			X			X

All standard errors are clustered at the participant level.
+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

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Table 7: Gendered Effect of Family Framing

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Family Framing	0.013*	0.013*	0.016**	0.012+	0.012+	0.014*
	(0.038)	(0.038)	(0.009)	(0.059)	(0.060)	(0.016)
Man	0.005	0.005	0.005	0.004	0.004	0.004
	(0.393)	(0.392)	(0.357)	(0.483)	(0.477)	(0.435)
Man x Family Framing	-0.003	-0.003	-0.003	-0.002	-0.002	-0.003
	(0.732)	(0.730)	(0.685)	(0.791)	(0.786)	(0.740)
Budget				-0.007***	-0.007**	-0.006**
				(0.001)	(0.001)	(0.003)
R^2	0.006			0.019		
N	7997	7997	7997	7997	7997	7997
Round Effects		X	X		X	X
Enumerator Effects			X			X

All standard errors are clustered at the participant level.
+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 8: Effect of Family Framing: High Empowerment Households

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Family Framing	0.007	0.007	0.001	0.006	0.006	0.000
	(0.231)	(0.233)	(0.914)	(0.302)	(0.307)	(0.935)
Budget				-0.004*	-0.005*	-0.004*
				(0.024)	(0.031)	(0.040)
R^2	0.003			0.010		
N	3616	3616	3616	3616	3616	3616
Round Effects		X	X		X	X
Enumerator Effects			X			X

All standard errors are clustered at the participant level.
+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 9: Effect of Family Framing: Low Empowerment Households

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Family Framing	0.015*	0.015*	0.026***	0.015*	0.015*	0.025***
	(0.014)	(0.013)	(0.000)	(0.016)	(0.016)	(0.000)
Budget				-0.010***	-0.011***	-0.009***
				(0.000)	(0.001)	(0.000)
R^2	0.009			0.030		
N	4381	4381	4381	4381	4381	4381
Round Effects		X	X		X	X
Enumerator Effects			X			X

All standard errors are clustered at the participant level.
+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 10: Effect of Family Framing: Women in High Empowerment Households

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Family Framing	0.006	0.006	0.002	0.005	0.005	0.001
	(0.480)	(0.484)	(0.745)	(0.551)	(0.548)	(0.832)
Budget				-0.003+	-0.003+	-0.002+
				(0.053)	(0.068)	(0.089)
R^2	0.002			0.008		
N	1785	1785	1785	1785	1785	1785
Round Effects		X	X		X	X
Enumerator Effects			X			X

All standard errors are clustered at the participant level.
+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 11: Effect of Family Framing: Women in Low Empowerment Households

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Family Framing	0.019*	0.019*	0.032**	0.018*	0.018*	0.030**
	(0.036)	(0.037)	(0.004)	(0.042)	(0.043)	(0.006)
Budget				-0.008**	-0.009**	-0.008**
				(0.006)	(0.009)	(0.008)
R^2	0.013			0.031		
N	2240	2240	2240	2240	2240	2240
Round Effects		X	X		X	X
Enumerator Effects			X			X

All standard errors are clustered at the participant level.
+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 12: Effect of Family Framing: Men in High Empowerment Households

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Family Framing	0.008	0.008	0.000	0.007	0.007	-0.002
	(0.337)	(0.345)	(0.957)	(0.421)	(0.445)	(0.804)
Budget				-0.008**	-0.010*	-0.008*
				(0.008)	(0.011)	(0.026)
R^2	0.003			0.016		
N	1831	1831	1831	1831	1831	1831
Round Effects		X	X		X	X
Enumerator Effects			X			X

All standard errors are clustered at the participant level.
+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 13: Effect of Family Framing: Men in Low Empowerment Households

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Family Framing	0.011	0.011	0.020**	0.011	0.011	0.019**
	(0.177)	(0.168)	(0.006)	(0.178)	(0.175)	(0.009)
Budget				-0.014***	-0.015***	-0.011***
				(0.000)	(0.000)	(0.001)
R^2	0.005			0.033		
N	2141	2141	2141	2141	2141	2141
Round Effects		X	X		X	X
Enumerator Effects			X			X

All standard errors are clustered at the participant level.
+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

C Empowerment Index

The empowerment index used in this study was informed by the work of (Alkire et al., 2013) on the Women's Empowerment in Agriculture Index, but was modified to fit the livestock-based livelihoods of pastoralists. Our data collection occurred prior to the publication of the Women Empowerment in Livestock Index Galiè et al. (2019), but does capture 5 of the 6 domains identified in that index.[10].

The index we calculate is based on equal weighting of the following 10 questions, each of which is answered on a scale from 1 to 5 (1=None, 2=Little, 3=Somewhat, 4=Mostly, 5=Fully). We consider households where the index is greater than 3 high empowerment households and ethos where it is less than 3 low empowerment households.

- To what extent are you involved in household decisions regarding buying food for the household?
- To what extent are you involved in household decisions regarding purchasing household items (like cups)?
- To what extent are you involved in household decisions regarding paying for children's medical expenses?
- To what extent are you involved in household decisions regarding paying for children's school fees?
- To what extent are you involved in household decisions regarding which children to send to school?
- To what extent are you involved in household decisions regarding purchasing livestock for yourself?
- To what extent are you involved in household decisions regarding purchasing livestock for the whole family or household?
- To what extent are you involved in household decisions regarding selling livestock you own?
- To what extent are you involved in household decisions regarding selling livestock your household own?
- To what extent are you involved in community-level decisions?

[10]The domains are (1) decisions about agricultural production; (2) decisions related to nutrition; (3) access to and control over resources; (4) control and use of income; (5) access to and control of opportunities; and (6) workload and control over own time. This index captures information about all of those with the exception