

# Hiding, Shirking, or Pleasing: Spousal Disagreement among Ugandan Maize Farmers

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## Abstract

To gain a better understanding of intrahousehold bargaining processes, surveys increasingly collect data from co-heads individually, especially on decision-making, asset ownership and labour contributions. However, answers provided by co-heads to the same set of questions often differ substantially. Recent research suggests that while some of this disagreement is due to random measurement error and cognitive bias, co-heads also seem to hide information from each other. We document differences in answers between male and female co-heads in monogamous smallholder maize-farming households in Uganda. We first confirm that not all disagreement can be explained by measurement error or bias. Using a field experiment, we then test if disagreement is due to co-heads strategically hiding decisions and actions from each other. We also test an alternative explanation where discord is attributed to co-heads' tendency to respond in line with prevailing gender norms and social customs. While the interventions did seem to reduce discord in survey response about decision-making, we do not find that information hiding nor reporting in line with gender norms and customs are the primary drivers.

*Keywords:* gender, farm households, disagreement, information hiding, norms, Uganda

## 1 Introduction

Increased attention to the internal dynamics of agricultural households by both researchers and practitioners has led to various innovations in data col-

lection (Doss and Quisumbing, 2020; Alkire et al., 2013). Examples of best practice in data collection on intrahousehold decision-making processes include separate interviewing of male and female co-heads of (dual-headed) households using distinct survey instruments that may nonetheless cover common topics and questions. Studies using these instruments often find that co-heads provide different answers to even the most basic questions (Ambler et al., 2021; Annan et al., 2021; Acosta et al., 2020; Anderson, Reynolds, and Gugerty, 2017; Twyman, Useche, and Deere, 2015).

Ambler et al. (2021) demonstrate that, while part of these divergent responses may be attributable to measurement error, there is also a systematic component that reflects asymmetric information within households where one co-head does not have accurate knowledge about the decisions made, actions taken, or assets owned by the other. Furthermore, they show that disagreement is larger for assets and decisions that are easier to hide, possibly indicating that spouses strategically hide information from each other. A number of lab-in-the-field experiments similarly indicate that household members often conceal some of their resources from each other (for example, Ashraf, 2009; Fiala and He, 2016; Castilla and Walker, 2013; Hoel, 2015).

In this paper, we investigate spousal disagreement in survey responses from monogamous smallholder maize-farming households in eastern Uganda. Drawing on Ambler et al. (2021), we explore the same three types of explanation for discord—random measurement error, bias caused by men and women interpreting questions differently, and asymmetric information where men and women have only partly overlapping information sets. We go one step further and, using a field experiment, formally test if this asymmetric information between husbands and wives should be attributed to spouses strategically hiding information from each other. This is done by randomly assigning a sample of households to a video-based intervention designed to facilitate mutual monitoring, and then comparing spousal disagreement to a control group. Furthermore, we test for an alternative explanation: that discord is not the result of asymmetric information, but is instead caused by spouses answering survey questions in line with prevailing gender norms. Inspired by recent research on the use of role models to change attitudes and behaviour in traditionally male dominated sectors, we also test the impact of our video-based intervention that aims to promote a mental image of maize farming as a cooperative or joint venture in which both spouses play an equal role (Porter and Serra, 2020; Bernard et al., 2015).

We consider spousal disagreement with respect to the role of both female

and male co-heads in decision-making and labour provision. For disagreement about the female co-head’s role in decision-making, the focus is on hiding, defined as the likelihood that the female co-head reports she was involved in decision making but the male co-head says she was not. For disagreement about the male co-head’s role in decision-making, we consider the likelihood that the male co-head reports he was involved in the decision but the female co-head says he was not. For labour provision, we focus on shirking, defined as instances where the one co-head reports to have worked less than how much the other co-head reports they worked. We examine shirking by both female and male co-heads.

We find that measurement error alone cannot explain observed spousal disagreement in survey responses. We also reject the idea that differences in how male and female co-heads interpret the questions is the main driver behind observed disagreement. For decision making, we find that both interventions significantly reduce disagreement about the role of the female co-head. Disagreement about the role of the male co-head is only reduced by the video-based intervention that is intended to facilitate mutual monitoring. However, further inquiry into the impact pathways do not allow us to determine the exact mechanisms for the impact. Finally, we conclude that the video-based intervention does not affect shirking.

The remainder of the paper is organized as follows. The next section provides an overview of the literature on spousal disagreement. Section 3 presents the experimental design and the rationale underlying the intervention, followed by an outline of our hypotheses and how they are tested. Section 5 offers a brief description of the context and characteristics of the households in our sample, and describes the variables used in the analysis. We then examine our results in Section 6. A last section concludes with a discussion of our study’s implications.

## 2 Literature

Our review of prior work on spousal disagreement focuses mainly on the empirical literature on intrahousehold resource allocation and decision-making in (dual-headed) agricultural households in low- and middle-income countries, and draws primarily on analyses that use observational data from surveys in which both male and female co-heads are interviewed separately and are asked the same set of questions. Such studies often focus on research

questions related to women’s empowerment and autonomy. For example [Jejeebhoy \(2002\)](#) asks both co-heads questions on the locus of decision-making on a variety of issues, as well as specific questions concerning women’s mobility and access to resources. [Ghuman, Lee, and Smith \(2006\)](#) collect data from both co-heads on a range of autonomy-related topics, including the need of the female co-head to obtain the male co-head’s permission to go to different types of places, the female co-head’s capacity to decide on their children’s affairs, whether the female co-head is allowed to have a job, and her role in deciding on the number of children and on household expenditures.

A common finding in studies that ask the same set of questions to different individuals within the household is that substantial disagreement often arises between co-heads, even on questions that would seem easily and objectively verifiable, such as the number of children or type of material used for house construction. This divergence may simply be attributable to measurement error by the respondents. But [Ghuman, Lee, and Smith \(2006\)](#) suggest that such divergence may also be partly due to the fact that the response categories do not have the same cognitive or semantic meanings to women and men. [Seymour and Peterman \(2018\)](#) note that co-heads often give inconsistent answers when asked about who made a particular decision. They then test whether female unilateral decision-making is equally empowering if the male co-head disagrees that the woman took the decision alone, as compared to when the male co-head agrees. They conclude that disagreement may signal underlying power dynamics within the household that are likely to be relevant when assessing individual-level agency and empowerment. [Annan et al. \(2021\)](#) similarly examine underlying power dynamics, focusing on cases where the female co-head reported she made decisions, while the male co-head said the female co-head was not involved. They refer to this type of disagreement as “women taking power” and show that it is positively correlated with a range of outcomes for women and children. They conclude that more research is needed to establish causality and identify which interventions affect disagreement.

[Ambler et al. \(2021\)](#) provide a particularly insightful conceptual framework that teases out the various perspectives on spousal disagreement. First, they note that if disagreement solely derives from measurement error, disagreement should be symmetric, and the female co-head’s responses should not differ systematically from the male co-head’s responses. Second, they point out that if disagreement results from asymmetric measurement error in which men and women interpret questions differently (as suggested by [Ghu-](#)

man, Lee, and Smith (2006) and Anderson, Reynolds, and Gugerty (2017)), then answers should differ systematically between co-heads, but disagreement should be similar for different questions asked in a survey (or at least for a sets of similar questions like questions related to asset ownership or different decisions). Finally, they argue that finding differing rates of disagreement across survey questions, and higher rates of disagreement for assets and activities that are easier to hide in particular, points to the presence of intrahousehold information asymmetries. Using observational data collected in Bangladesh, they find evidence that such information asymmetries in the form of hidden assets and decisions are present in their sampled households.

However, we feel that differential disagreement on different decisions, asset categories, or activities need not always reflect the act of one co-head intentionally deceiving another. There may be other reasons why spouses agree more in one area and less in another area. One reason may be that spouses respond in line with what society expect from them, such that disagreement related to decisions, actions, and asset ownership is also partly shaped by prevailing gender stereotypes and norms, i.e., role congruity. For example, in a case study in northern Uganda, Acosta et al. (2020) find that men often report unilateral decision-making in areas where they are assumed to bear final responsibility, even if women had some degree of involvement. Women rather report these scenarios as joint decisions. Hence, it is important to understand the local cultural context to differentiate spousal disagreement as a function of information asymmetries stemming from intentional hiding versus other gender-related systematic biases.

### 3 Experimental design and interventions

In addition to random error and cognitive bias due to spouses interpreting questions differently, the previous section shows that the emerging literature on spousal disagreement in survey responses suggests two potential mechanisms. First, spousal disagreement may be due to the cultural context in which these questions are asked and answered, with co-heads responding in line with what would be expected in society (Acosta et al., 2020). Second, the literature also suggests that spousal disagreement reflects information asymmetries between co-heads, predominantly cause by co-heads hiding decisions, actions and assets from each other (Ambler et al., 2021). We designed two corresponding interventions to empirically test these two explanations in

a field experiment. A first intervention attempts to challenge preconceived ideas of what decision-making by a male or female co-head involves and who is expected to make decisions in a farm-household by promoting a cooperative approach to maize farming, in which maize cultivation and management activities are seen as a joint responsibility of both co-heads. A second intervention tests if these asymmetries can be influenced by providing co-heads equal access to information about best practices in maize farming prior to the point in time when decisions are made on cultivation and management, as this would facilitate mutual monitoring.

At the heart of both interventions is a short video that is shown twice to individual co-heads using tablet computers. The aim of the video is to increase viewers' knowledge of recommended practices in maize farming such as timely planting, row planting, and the use of improved inputs, primarily hybrid seed and inorganic fertilizer. It does this through an aspirational story in which a farmer (or farmers) recounts how he/she/they used to be poor but managed to increase yields over time by applying a set of recommended techniques and inputs.<sup>1</sup> It also suggests that farmers should view maize farming as a business that needs continuous investment over time, and includes some simple intertemporal cost-benefit calculations to illustrate this, followed by encouragements to follow the example of the model farmer(s) featured in the video.

The first intervention, referred to as T1 in the remainder of the paper, involves varying the gender composition of the actors featured in the video and randomizing which version of the video is viewed by farmers. The second intervention, which we refer to as T2, randomly varies the gender composition of the co-head(s) of the household who view the video. These variations and the rationale behind them are explained below.

We begin with a conceptual explanation that ties to our first intervention (T1): projecting a cooperative image of farming as a household, thereby challenging the local consensus that maize farming is a male activity. Consider that within households, individual members often have differing spheres of influence reflecting prevailing gender roles (Lundberg and Pollak, 1993). In many agricultural households, including in Uganda, women tend to have a stronger voice in the cultivation of crops that are predominately cultivated

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<sup>1</sup>The techniques and inputs that are demonstrated in the videos are the ones recommended by the National Agricultural Research Organization (NARO) and are also used by the public agricultural advisory system. More details can be found in [placeholder for reference removed for double blind review].

for home consumption, while men have a stronger voice in the cultivation of crops that are marketed (Peterman et al., 2011). While the existence of such gendered patterns are widely acknowledged, they are not always easily captured in household survey data, as gender is only one of the determinants of crop portfolio choice (Carr, 2008; Doss, 2002).

In Uganda, maize, which is in part a cash crop, is considered to be mostly, though not exclusively, in the influence sphere of men (Peterman et al., 2011). Generally, men make the more strategic decisions such as what plots to plant maize on, when to start planting, and what seeds to use. Men also generally decide on how much labor is needed, while women assist men. In many situations, labor division in maize farming is organised according to gender roles, with men performing tasks such as land clearing and marketing of surplus output, while women perform weeding and post-harvest processing tasks. While these are broad and stylized characterizations of Uganda’s maize production system, their widespread acceptance as conventional wisdom makes maize farming a topic ripe for this study. The fact that maize is not exclusively in the male domain provides scope to strengthen women’s involvement in decision-making about maize.

We expect that differing spheres of influence between male and female co-heads and the gendered division of labor may contribute to spousal disagreement in survey responses. Therefore, our first intervention randomly varies which version of our video is screened to our study participants. One version features a couple comprised of a male and a female actor-farmer who present themselves as role models to convey a world view in which both male and female co-heads participate equally in maize farming. Another version of the video features only a male actor-farmer.<sup>2</sup> This approach capitalizes on recent evidence exploring the influence of role models on aspirations, investment choices, and other future-oriented behaviors (Bernard et al., 2015); on increasing women’s participation in otherwise male-dominated sectors (Porter and Serra, 2020; Beaman et al., 2012); and the influence of engaging media content to expose large numbers of people to role models (La Ferrara, Chong, and Duryea, 2012; Riley et al., 2017).

To test the hypothesis that male and female co-heads disagree less if they view farming as a joint spousal activity, we randomly assign 261 households from our sample to view the cooperative image version of the video, such that both the male and female co-heads in the household watch the video

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<sup>2</sup>A third version of the video features only a female actor, but is not used in this study.

together. This group functions as the treatment group. We also randomly assign 240 households from our sample to view the version of the video featuring only a male actor-farmer, again with both the male and female co-heads watching together. Because the only difference between the two videos is the gender composition of the actors featured (a couple of male and female actor-farmers versus a male actor), any difference in outcomes between the two groups should be attributed to the role model effect of the cooperative image intervention.

Next, we turn to our second hypothesis about asymmetric information within the household. Consider the farm-household as a collection of individuals, each with their own preferences, skills, assets, and access to resources. In many contexts, the household’s existence and the welfare of its members depend on their collective capacity to invest in common goods by drawing on each individual’s skills, assets, and resources. As such, households can be considered as collective action institutions, and many of the problems encountered in common pool resource management, such as free-riding and overextraction of resources, apply to the household (Doss and Meinzen-Dick, 2015).

One way to attenuate collective action problems is by increasing mutual monitoring (Agrawal, 2001). For instance, if one co-head can assess the actual time that the other co-head spends on land preparation, then the latter is less likely to engage in labor shirking. However, for mutual monitoring to work, co-heads require information against which to compare information gained through monitoring, since merely observing an outcome may be insufficient to determine if a co-head is shirking, hiding, or otherwise mismanaging his or her collective obligations to the household. For instance, it may be difficult for the female co-head to check if her spouse overreports time spent on land preparing if she does not have a good understanding of what land preparation entails.

In a second treatment (T2), we therefore ensure that both co-heads begin with symmetric information on recommended agronomic practices for maize farming, as this is assumed to facilitate mutual monitoring. To do so, we show the video that showcases recommended practices in maize farming to both male and female co-heads together in a random sample of 261 households.<sup>3</sup> This group acts as the treatment group. In another random sample of 540

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<sup>3</sup>We show the version of the video that features a couple (male and female actor-farmers), that is, the video used in the treatment group of the previous intervention.



households, the control group, the same video is shown, but only to one of the two co-heads.<sup>4</sup> As the only difference between the two groups is related to who viewed the video (the male and female co-heads together versus an individual co-head), any difference in outcomes between the two groups should be attributed to a reduction in information asymmetries between co-heads.

## 4 Hypotheses and tests

In this section, we outline the different hypothesis and how they will be tested. While the focus will be on testing the impact of the interventions on spousal disagreement, we also use our data to test for random error and cognitive bias (due to spouses interpreting questions differently) using the framework outlined in [Ambler et al. \(2021\)](#).

A first hypothesis we will test is that disagreement between husband and wife is simply due to random noise. [Ambler et al. \(2021\)](#) show that if random measurement error is the only factor leading to disagreement, then disagreement should be symmetric. One would thus expect, for instance, that the likelihood that the female co-head says she was involved in a particular decision while the male co-head says she was not is about the same as the likelihood that the male co-head says the female co-head was involved in that decision, while the female co-head says she was not. Testing if disagreement between male and female co-heads is simply due to random measurement error is thus equivalent to testing if two proportions are significantly different from each other, which we will do using a Pearson  $\chi$ -squared test for equality of proportions.

Once it is established that disagreement can not be fully explained by random noise alone, [Ambler et al. \(2021\)](#) test for asymmetric measurement error. They define asymmetric measurement error as “...measurement error that occurs systematically and leads to different patterns of responses for men and women” (p. 770). They go on to explain that this could be due to differences in understanding or interpretation of the questions, or differences in perceptions of what it means to make a decision, what constitutes agricultural labour, or what it entails to own an asset. This type of disagreement is categorized as measurement error because it does not adequately reflect what happens in reality.

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<sup>4</sup>We made sure that in about half of the cases the video was shown to the male co-head alone and in the other half of cases to the female co-head alone.

Ambler et al. (2021) test for asymmetric measurement error by checking if the probability of disagreement about a spouse’s role in decision making, labour provision, or marketing is equal across the various decisions and activities under consideration. This is done by performing a series of t-tests that test for the equality of disagreement between pairs of decisions or asset holdings. We employ a more principled and conservative approach, where we use a Wald test for joint significance (using a cluster-robust and an Approximate Hotelling  $T^2$  test). We start from the following equation:

$$y_{i,d} = \alpha_d + \varepsilon_{i,d} \quad (1)$$

where,  $y_{i,d}$  represents disagreement within the household  $i$  about a particular decision  $d$ .<sup>5</sup> We then test the joint null hypothesis that disagreement levels are equal across decisions, which amounts to constraining the intercepts ( $\alpha_d$ ) to be equal to each other. If we reject the null, this means that disagreement about decision-making between spouses cannot be fully explained by asymmetric measurement error.

It is important to note the implicit assumption that asymmetric measurement error has its origin at the level of the individuals within the household (for example the female co-head has lower education leading her to systematically underestimate effort), and so should not lead to heterogeneity within the household. Therefore, instead of referring to this as asymmetric measurement error, we see this more as bias caused by factors that emanate from the individual level. Generally, this individual level variation will manifest itself in differing cognitive capacities of co-heads and differences in how questions are interpreted by male and female co-heads (Ghuman, Lee, and Smith, 2006). Obviously, this can also be affected by cultural factors,<sup>6</sup> but gender norms and customs also create variance at the level of the different decisions and activities, which we exploit to provide an explicit test below (equation 3). In this paper, we will refer to this type of disagreement as cognitive bias, rather than categorizing this as a type of measurement error.

Ambler et al. (2021) argue that rejecting both types of measurement error indicates that disagreement reflects a real difference in what spouses know from each other, a situation they refer to as asymmetric information within

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<sup>5</sup>We will refer to decision making here to keep the exposition simple, but in the analysis we also consider disagreement between spouses on labour contributions.

<sup>6</sup>Ambler et al. (2021) explicitly state that asymmetric measurement error could also be caused by cultural factors that lead to men under-reporting women’s roles.

the household. While they admit that some of this disagreement may be unintentional, they also note that the fact that disagreement seems to be highest among assets that are more easily hidden (small livestock, poultry, and small durables) suggests that at least part of this hiding is strategic. We provide an explicit test for the hypothesis that some disagreement is related to asymmetric information within the household by comparing average disagreement between co-heads in households that were exposed to the intervention designed to facilitate mutual monitoring (T2) to average disagreement between spouses in households that did not receive this intervention. This is done using the following OLS regression:

$$y_{i,d} = \alpha + \beta.T_i + \varepsilon_{i,d} \quad (2)$$

where  $T_i$  denotes the treatment status of household  $i$ , which is a dummy that takes the value of one for households that received the intervention and zero for the control group. We expect that providing both co-heads with information that facilitates mutual monitoring will lead to a reduction in disagreement, and so  $\beta < 0$ .

Finally, if disagreement is due to strategic hiding, we expect that facilitating mutual monitoring would be relatively more effective for decisions that are easier to hide. Following this line of reasoning, we define  $H_d$ , a measure of how easy it is to hide decision-making related to  $d$ , and first explore correlations between disagreement and this measure. We then estimate conditional average treatment effects by interacting the treatment indicator with the measure of how easy it is to hide decision or activity  $d$ :

$$y_{i,d} = \alpha + \beta.T_i + \gamma.H_d + \delta.T_i * H_d + \varepsilon_{i,d} \quad (3)$$

Finding that  $\delta < 0$  can then be taken as further evidence in support of the hypothesis that disagreement is driven by co-heads strategically hiding decisions for each other.

We mentioned earlier that disagreement may also result from spouses responding in line with expectations in society. While [Ambler et al. \(2021\)](#) consider this form of disagreement part of symmetric measurement error, we argued earlier that disagreement that arises from spouses responding in line with expectations may differ between different decisions that are made within the household. For instance, disagreement between co-heads on the role of women in weeding may be very different from disagreement related to the role of women in land preparation. In the former case, as weeding

is seen as a typical female activity, men may have no problems admitting that their female co-head did all the work. For the latter case, as society expects men to do the often heavy work of land preparation, men may be more reluctant to disclose that their female co-head also spent considerable time on this task. This is in line with what [Acosta et al. \(2020\)](#) find in northern Uganda, where men often exaggerate their own role in areas where they are expected to bear final responsibility.

We thus test if part of the disagreement that [Ambler et al. \(2021\)](#) attribute to asymmetric information may actually be the result of spouses reporting in line with expectations, and estimate models similar to 2 and 3. Now, the treatment status of household  $i$ ,  $T_i$ , is a dummy that takes the value of one if spouses were exposed to the video intervention projecting a cooperative approach to farming (T1), and zero if a video was shown where only a male actor-farmer featured in the video. If cultural norms indeed drive disagreement, we expect the intervention to reduce disagreement ( $\beta < 0$ ). For this hypothesis, we also define a measure indicating whether the man within the household is deemed responsible for decision  $d$  according to prevailing norms and customs ( $H_d$ ), and again explore correlations between disagreement and this measure. We also interact  $H_d$  with the treatment, as we expect that challenging gender norms by projecting a cooperative way of farming will have the largest effect on activities or decisions that are most sensitive to gender norms and customs. Finding that  $\delta < 0$  can then be taken as further evidence that disagreement is driven by co-heads reporting in line with expectations and gender norms.

## 5 Study context and data collected

The study was conducted among monogamous maize-farming households in five districts of eastern Uganda, an area known for maize production. Participating households were recruited using a two-stage cluster sampling approach to obtain a representative sample of this population. Specifically, we first selected 50 parishes randomly and in proportion to the number of villages within each parish. In the selected parishes, all villages were included in the study. Within each village, we listed all households, and randomly selected 10 households from the list to participate in the study. This resulted in an effective sample of 2,548 households. The interventions described in Section 3 were implemented in random subsets of this sample.

We focused on the second maize-growing season of 2017, which ran from about August 2017, when fields were prepared, to January 2018, when maize was harvested. Interventions were administered twice, once in August 2017 when farmers were preparing fields, and one month later during planting time. Concurrent with the first intervention in 2017, we also collected information on household characteristics. End-line data was collected after the harvest in February 2018.

According to our baseline data, households in our study area cultivated on average about 1.5 plots of maize. Yields during the first season of 2017 were extremely low (about 270 kilograms per acre) as a result of a fall armyworm outbreak that significantly affected the maize crop. Baseline data indicated that the average household in our sample consisted of eight individuals. Female co-heads in these households were on average 35 years old and 30 percent had completed their primary education. Male co-heads were on average 43 years old and 42 percent have completed their primary education. Only 11 percent of households reported that they had access to agricultural extension services in the year prior to our survey. Only 17 percent of households used fertilizer on at least one plot, and 38 percent reported using improved seed bought from a shop or agro-input dealer during the last cropping season (April-July 2017). About three quarters of households reported owning a mobile phone.

A first area in which we explore disagreement between male and female co-head is in decision-making related to maize farming. In our endline survey, we asked the male co-head of household to list all maize plots that the household was cultivating during the season preceding the endline survey (that is, the second agricultural season of 2017). We then cycled through the different plots and asked a series of questions for each plot, and repeated the same questions separately with the female co-head. For a range of key decisions that need to be made and that are known to significantly affect maize yields, we asked who made the decision on that particular plot. Respondents could answer that decisions were made by (1) the respondent himself or herself alone, (2) the respondent's spouse alone, (3) the respondent jointly with his or her spouse, (4) someone else inside or outside the respondent's household, (5) the respondent together with someone else inside or outside the household, or (6) the respondent's spouse together with someone else inside or outside the household. Respondents could also indicate that they did not know who made the decision.

The first decision we consider is simply who decided that maize should

be planted on the particular plot. A second decision relates to timing of planting, recognizing that planting date is a strong agronomic determinant of yields.<sup>7</sup> The third decision considers the spacing of seed and the seeding rate, which reflects the fact that row planting at a rate of one seed per mound is also a strong determinant of yield.<sup>8</sup> We also consider decisions related to weed control. For weeding, we differentiate between decision-making related to strategies used to combat striga infestation (a parasitic weed that feeds off the roots of the maize plant) and weeding more generally. Finally, we look at decision-making related to maize marketing, and ask who took the decision to sell any part of the maize that was harvested.

We also collected detailed information on labor time. On each maize plot, we asked each co-head separately how much time, expressed in labor days over the entire agricultural season, he or she worked on a particular activity. We also asked each co-head to give an estimate of how much time the other co-head worked on the plot on that particular task. The activities we inquired about are land preparation, planting, weeding, spraying, and harvesting.

In addition to the outcome variables and the treatment indicators, there are two additional variables in equation 3 that require attention. First, to test if strategic hiding is the main cause for disagreement, we construct an indicator (H2) of how easy it is for co-heads of households to monitor particular decisions, activities, or actions. To do so, we asked 30 local experts to score each activity (eg. time spent on weeding) in terms of its ease of monitoring on a scale between zero and 100, with zero being impossible to find out the actions of one's co-head and 100 being very easy to find out. We only scored for labour contributions and not for decision-making, since the latter is extremely difficult to monitor. The indicator H2 takes a value of one for an activity of the average expert score was larger than 40, indicating

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<sup>7</sup>NARO recommends that maize planting start immediately after the first rains of the season. This often results in significant time pressure on household members' labor time, especially when large areas need to be planted.

<sup>8</sup>There is a wide range of seed methods used by farmers in Uganda. While some simply broadcast seeds, NARO recommends row planting because it results in significantly higher yields since it reduces competition between plants for sunlight and soil nutrients. Farmers also often plant more than one seed per hill because they fear some seeds may not germinate. However, planting more than one seed per hill also tends to increase competition for light and nutrients, leading to stunted plant growth. It is therefore recommended to use only one seed per hill and engage in gap filling when seeds do not germinate after one week.

that it is difficult to monitor; and zero otherwise.<sup>9</sup>

Second, to test if gender norms and customs are driving spousal disagreement, we also created an indicator (H1) for the extent to which a particular action or decision is culturally believed to be more in the male domain. This was done by asking the same 30 experts to indicate who, within the household, is typically expected to make the particular decision or perform a particular action. This was again scored on a scale running from zero (typically the female co-head alone) to 100 (typically the male co-head alone). The indicator H1 takes a value of one for an activity or decision if the average expert score is larger than 55, situating it in the male domain; and zero otherwise.

## 6 Results

We provide separate analyses for disagreement between co-heads related to decision-making and disagreement between spouses related to labour contributions. We consider disagreement related to the role of the female co-head and the role of the male co-head separately.

### 6.1 Decision-making

To investigate disagreement between responses from male and female co-heads about who made various decisions related to maize cultivation, we construct indicators based on the answers of both co-heads. To assess (dis)agreement about the role of the female co-head in decision-making, we define three different categories: (1) both co-heads agree on the woman's role in decision making<sup>10</sup>; (2) the female co-head says that she was involved (either alone or jointly with the male co-head), but the male co-head says she was not; and (3) the male co-head says the female co-head was involved (either alone

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<sup>9</sup>We convert the indicator to a dummy to keep the analysis simple. While the threshold may seem arbitrary, it was chosen to maximize variability. However, results were not sensitive to the choice of the threshold or even conversions into a binary indicator. The same is true for H1 below.

<sup>10</sup>This includes cases where neither spouse says that the wife was involved in decision making as well as cases where both spouses say that the wife was involved in decision making (either alone or as part of the couple).

or as part of the couple), but the female co-head says she was not.<sup>11</sup> Similarly, to assess (dis)agreement about the role of the male co-head, the three categories are: (1) spouses agree on the man’s role in decision-making; (2) the male co-head says that he was involved (either alone or jointly with the female co-head), but the female co-head says he was not; and (3) the female co-head says the male co-head was involved (either alone or as part of the couple), but the male co-head says he was not. Categories (2) and (3) can be pooled to obtain an indicator for disagreement over the co-head’s involvement in decision-making.

Table 1 shows agreement and disagreement about the female co-head’s involvement in decision-making (top panel) and the male co-head’s involvement in decision-making (bottom panel). The top panel shows that co-heads mostly agree on the female co-head’s role in decision-making. Focusing on disagreement, we see that on the average plot the likelihood that the female co-head says she was involved in a particular decision but the male co-head disagrees (category 2) is always higher than the likelihood that the male co-head says his female co-head was involved but the female co-head disagrees (category 3) except for the decision to sell maize. P-values from a Pearson  $\chi$ -squared test for equality of proportions for category 2 and 3 indicate that in all but one case, we reject the null of random measurement error. We also reject the null hypothesis that disagreement about the female co-head’s role in decision-making is equal across different decision categories, based on a Wald test after estimating equation 1 (p-value = 0.012). This means that discord cannot be explained by cognitive differences between spouses alone (i.e., asymmetric measurement error or cognitive bias).

The bottom panel shows that spouses agree even more about the role of the male co-head in decision-making. The likelihood that the male co-head claims he was involved in the decision while the female co-head disagrees is now consistently higher than the likelihood that the female co-head says the male co-head was involved but the male co-head says he was not. Also here, the p-values from the same Pearson  $\chi$ -squared test indicate that we reject the null of random measurement error. Comparing disagreement about the role of the husband across different decision-making domains also leads us to reject the hypothesis that this disagreement is only due to cognitive bias

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<sup>11</sup>[Annan et al. \(2021\)](#) provide an alternative interpretation of categories 2 and 3. In particular, they refer to this as instances where the woman “takes power”, whereas category 3 is considered to be situations where the woman is “given power”.



(p-value = 0.000).

Table 1 also shows the male task score ( $H_d$  in equation 3 in Section 4). Disagreement related to the role of the male co-head is highest for the decision to sell maize (34 percent), which is also the task with the highest  $H_d$  score (82/100). This implies that the male co-head insists he made decisions about marketing, which is typically a male activity, even though the female co-head made the decision. We do not see a clear pattern for disagreement related to the role of the female co-head in decision-making.

Table 2 reports regression results for the analysis of the intervention’s impact based on equations 2 and 3. The outcome variable  $y_{i,d}$  used is disagreement wherein the co-head reports that he or she was involved but the other co-head reports that he or she was not, which suggests that the former co-head made the decision secretly (category 2).<sup>12</sup>

The first column of the table corresponds to equation 2 and tests if the intervention designed to change the likelihood that spouses respond in line with norms and customs (T1) had an impact on category 2 disagreement. The top panel shows that for 22.6 percent of the decisions that were made, the female co-head says she was involved but the male co-head claims she was not. We also see that among households that were exposed to the intervention aimed at reducing the influence of norms and customs, this type of disagreement reduced to 17.1 percent and the difference is statistically significant. This suggests that at least part of the disagreement is due to co-heads responding in line with gender norms and customs.<sup>13</sup>

The second column in the table shows that disagreement also reduces in response to the intervention that tries to facilitate mutual monitoring between co-heads (T2). In the control group where co-heads did not receive the same information, female co-heads reported they were involved but male co-heads disagreed on 19.8 percent of decisions. In the treatment group where both co-heads start off with exactly the same information, disagreement was

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<sup>12</sup>We confine attention to category 2 only (instead of total disagreement which pools category 2 and 3) because we consider decision making a good (as opposed to labour, which we will consider a bad below). If a decision, action, or consequence is considered desirable for the individual, spouses may want to hide information about it and under-report, in which case category 2 is the relevant outcome. If a decision, action, or consequence is considered undesirable for the individual, spouses may want things to appear better than reality and over-report, in which case category 3 is the relevant outcome.

<sup>13</sup>The underlying assumption here is that the co-head that is farthest from the—unknown—truth adjusts most towards this truth.

reduced by 2.7 percentage points. This suggests that co-heads may also hide decision-making from each other.

The third column regresses  $H_d$ —an indicator of the sensitivity of the particular decision to prevailing gender norms defining it as a male domain—on disagreement about the female co-head’s role in decision-making. We do not find that the indicator is correlated with disagreement.

The fourth column in Table 2 corresponds to equation 3 and includes (a) the indicator for the treatment that challenges norms and customs by projecting a cooperative approach to farming, (b) the indicator for susceptibility of the decision to gender norms, and (c) an interaction between the two. We see that the treatment still leads to a reduction in disagreement. However, and contrary to expectations, we do not find that the intervention reduced disagreement differently for decisions that are assumed to be in the male domain than for decisions that are culturally less strongly assigned to the male domain. This goes against our hypothesis that the change in disagreement in response to intervention T1 is mediated by gender norms and customs.

The bottom panel repeats the analysis, but the dependent variable is now an indicator for instances where the male co-head says he decided but the female co-head says he was not involved in the decision. As we saw earlier, disagreement about the male co-head’s role is lower. The first column confirms that in the control group where households were not exposed to the intervention challenging norms and customs (T1), male co-heads claim a larger role than female co-heads admit in 16.9 percent of decisions. This percentage is not significantly different in the treatment group, which suggests that the role of men in agricultural decision-making is less socially contested.

In the second column, we do see that the intervention aimed at facilitating mutual monitoring (T2) reduced disagreement. In the control group where only one of the co-heads was shown a video on what maize farming entails, male co-heads report they were involved but the female co-head disagreed in 18.8 percent of the decisions. In the treatment group where both co-heads were exposed to the same information, disagreement was reduced by 3.1 percentage points. This suggests that male co-heads may also hide decision-making from the female co-head.

The third column in the table shows no significant correlation between spousal disagreement related to the role of the male co-head and the indicator that attempts to measure how sensitive a decision is in terms of gender norms defining it as a male domain. Apparently, the likelihood that the male co-head reports he was involved while the female co-head claims he was not is

significantly higher for decisions that were judged to be more in the male domain (specifically, the decisions to sell, plant maize, and fight striga) than for decisions that were seen less a responsibility for the man (the decision on when to weed). However, the statistically insignificant coefficient of the interaction term of the intervention challenging norms and customs and the indicator that captures if the decision is typically in the male domain in the fourth column again rejects the hypothesis that this disagreement is driven by gender norms and customs.

## 6.2 Labour Provision

For labour contributions, we define the three categories of (dis)agreement as follows. A first category (1) consists of cases where there is agreement on the female co-head’s labour contribution. For disagreement, we differentiate between cases where (2) the female co-head reported having spent more time on a particular task than the male co-head thinks she did, and (3) the female co-head reported having spent less time than the male co-head thinks she did. Labour contribution (and hence disagreement about it) is also measured at the plot level. As for decision-making, we consider disagreement related to labour provided by the female co-head and disagreement related to labour provided by the male co-head separately.

As mentioned above, we consider labour to be a “bad”, with co-heads preferring to work less rather than more. The category of interest here is therefore category (3), where co-heads are shirking on their responsibilities, putting in less hours than what the other co-head believes.

One complication here is that labour time is measured as a continuous variable: days spent on the activity. As a result, the margin of error will also depend on the activity. For example, for an activity such as spraying pesticides, female co-heads report that they spend on average only 0.4 days. Female co-heads report that they spend considerably more time on weeding (23.8 days). These differences in magnitude will also have consequences for the likelihood that co-heads agree. For instance, in the former case, there is agreement about the female co-head’s labour time contribution on 77 percent of plots, while for weeding, this is only the case on 9 percent of plots. We try to mitigate this problem by defining agreement in relation to the underlying variable, indicating that there is agreement if estimates are “close enough” to each other. Specifically, if the labour time difference is within one standard deviation of the average time reported by male and female co-head, we

consider there to be agreement.

The top panel of Table 3 shows that co-heads again generally agree on the labour contribution of the female co-head. Agreement seems to be highest for the female co-head’s role in spraying. This is not surprising because spraying pesticides involves carrying a heavy knapsack sprayer and handling dangerous substances, and is generally considered to be the responsibility of the male co-head in the household. As such, in most cases co-heads agree that the female co-head had no role in this activity. This is also reflected in scores of the experts, who overwhelmingly state this is a typical male task (87/100).

The table further shows that agreement is lowest for female co-head’s labour provision in weeding, which the experts claim is predominantly a female task. Interestingly, we find a relatively high share of plots where the female co-head says she worked more than what the male co-head believes. But there are also signs of shirking behaviour. For example, on 15 percent of the plots, there are indications that the female co-head shirks on her weeding activities (i.e., the male co-head says the female co-head worked more than female co-head reports). Pearson  $\chi$ -squared tests comparing rows 2 and 3 show that we reject equality of the two disagreement categories for all labour types, suggesting that disagreement on female co-heads’ labour time is not caused by random measurement error alone. We also reject the null hypothesis that disagreement about the female co-head’s labour contribution is equal across different labour categories, based on a Wald test after estimating equation 1 (p-value = 0.000). This again indicates that discord cannot be explained by cognitive differences between spouses alone (i.e., cognitive bias or asymmetric measurement error).

The bottom panel shows results for disagreement over the male co-head’s labour contribution, which are similar to the results discussed above. Shirking by the male co-head is relatively high for labour allocated to spraying, a typical male activity that is also difficult to monitor according to our experts. Surprisingly, male shirking is equally high for weeding, a typically female task. We again reject random measurement error or cognitive bias as driving disagreement (p-value = 0.000).

Next, we conduct a series of regressions to test if disagreement is due to strategically hiding labour contributions within the household, or whether disagreement reflects norms and expectations about who, according to society, should do what activity. The top panel in Table 4 reports results where the outcome variable is the proportion of activities on which the female co-

head reports to have worked less than what the male co-head believes; the bottom panel reports on regressions where the dependent variable is the proportion of activities on which the male co-head report to have worked less than what the female co-head believes.

As evidenced in the results in the upper panel, neither the intervention facilitating mutual monitoring (T2) nor the intervention challenging customs and norms (T1) seems to have an effect on shirking behaviour by the female co-head. We find shirking by the female co-head to be lower for activities that are considered in the male domain. More surprisingly, we also find that shirking by the female co-head is lower for activities that are harder to monitor. We do not find any significant interaction effects between the intervention challenging customs and norms and the indicator for male domain sensitivity, nor between the intervention facilitating mutual monitoring and the indicator for ease of monitoring. In the bottom panel, we also find no evidence that our interventions affect shirking by the male co-head.

## 7 Conclusion

Household surveys that are serious about capturing gender-related insights on intrahousehold decision-making related to the allocation of labour and other household resources often collect data from separate interviews with male and female respondents. This is an important means of reducing biases introduced by responses from the (typically male) household head or “most knowledgeable person” in the household, and represents an important advancement in the study of intrahousehold power dynamics, especially in non-separable agricultural households where production and consumption decisions are so closely intertwined. A common finding in these surveys is that male and female co-heads often give substantially different answers to the same questions. While some discordance is inevitable due to random measurement error, recent studies have searched for patterns in this disagreement, and suggest that systematic disagreement between spouses may be key in understanding these intrahousehold dynamics.

In this study, we follow [Ambler et al. \(2021\)](#) and reject the notion that all disagreement between male and female co-heads in monogamous Ugandan maize-farming households is due to random measurement error or cognitive bias due to spouses differently understanding or interpreting the questions. We then test if discord is mainly driven by co-heads hiding information from

each other, or if it is due to co-heads responding in line with what society expects from them given prevailing gender norms and roles. This is done through a field experiment, with one video-based intervention designed to facilitate mutual monitoring by co-heads and another video-based intervention designed to encourage spouses to view maize farming as a cooperative or join household enterprise rather than in the domain of the male co-head (as society tends to). We explore possible impact pathways by looking at conditional average treatment effects, as we expect that the interventions would be most effective for decisions, activities and assets that are easier to hide or more susceptible to gender norms and customs assigning these to the male domain.

We find that co-heads generally agree with each other. Disagreement cannot be fully explained by either random measurement error or cognitive bias. Rather, we find that disagreement about the role of the female co-head in decision-making was reduced after co-heads were exposed to our intervention designed to reduce the influence of gender norms and customs. We also find that disagreement about the role of both male and female co-heads in decision-making reduced in response to our intervention designed to facilitate mutual monitoring. Contrary to expectations, we did not find that the intervention designed to reduce the influence of gender norms and customs was more effective for decisions that are considered to be more in the male domain. When looking at labour shirking behaviour on the part of female co-heads and male co-heads respectively, we did not find that the intervention designed to increase mutual monitoring had an impact, nor that activities that are more easily hidden would be affected more. We also did not find that the intervention challenging role congruity, gender norms and customs made a difference, or more so for activities defined as typical male tasks according to gender norms and roles.

In conclusion, our findings sheds new light on the measurement and interpretation on spousal responses to household survey questions. And while our findings are specific to a very specific population, geography, and system, they can be readily adapted to other contexts and replicated. Continued adaptation and replication allow us to learn more about the impact of social, cultural, and economic changes on intrahousehold dynamics, and even the welfare outcomes of new dynamics.

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Table 1: Agreement and disagreement about spouses' roles in agricultural decision making

|  | plant<br>maize | timing<br>of planting | spacing<br>and seed rate | strategies to<br>fight striga | frequency<br>weeding | sell<br>maize |
|--|----------------|-----------------------|--------------------------|-------------------------------|----------------------|---------------|
| <i>disagreement about female co-head's role in decision making</i>         |                |                       |                          |                               |                      |               |
| (1) Agree:   | 0.63           | 0.64                  | 0.64                     | 0.62                          | 0.65                 | 0.67          |
| Disagree:  | 0.37           | 0.36                  | 0.36                     | 0.38                          | 0.35                 | 0.33          |
| (2) Female co-head says she decided<br>but male co-head says no            | 0.20           | 0.19                  | 0.21                     | 0.23                          | 0.21                 | 0.13          |
| (3) Male co-head says female co-head decided<br>but female co-head says no | 0.17           | 0.17                  | 0.15                     | 0.15                          | 0.14                 | 0.20          |
| p-value (2)==(3):  | 0.000          | 0.105                 | 0.000                    | 0.000                         | 0.000                | 0.000         |
| Number of plots:   | 3,723          | 3,723                 | 3,723                    | 3,632                         | 3,723                | 2,548         |
| <i>disagreement about male co-head's role in decision making</i>           |                |                       |                          |                               |                      |               |
| (1) Agree:   | 0.74           | 0.72                  | 0.75                     | 0.68                          | 0.74                 | 0.67          |
| Disagree:  | 0.26           | 0.28                  | 0.25                     | 0.32                          | 0.27                 | 0.34          |
| (2) Male co-head says he decided<br>but female co-head says no             | 0.16           | 0.18                  | 0.16                     | 0.20                          | 0.18                 | 0.23          |
| (3) Female co-head says male co-head decided<br>but male co-head says no   | 0.10           | 0.10                  | 0.09                     | 0.12                          | 0.09                 | 0.11          |
| p-value (2)==(3):  | 0.000          | 0.000                 | 0.000                    | 0.000                         | 0.000                | 0.000         |
| Number of plots:   | 3,723          | 3,723                 | 3,723                    | 3,632                         | 3,723                | 2,548         |
| Male task score (/100):  | 62             | 50                    | 55                       | 60                            | 41                   | 82            |

Table 2: Disagreement about decision making

|  | (1)                 | (2)                 | (3)               | (4)                  |
|--|---------------------|---------------------|-------------------|----------------------|
| <i>disagreement about female co-head's role in decision making</i> |                     |                     |                   |                      |
| constant   | 0.226<br>(0.016)    | 0.198<br>(0.011)    | 0.191<br>(0.013)  | 0.225<br>(0.019)     |
| challenge gender norms (T1)  | -0.055**<br>(0.022) |                     |                   | -0.066***<br>(0.026) |
| facilitate monitoring (T2)   |                     | -0.027*<br>(0.018)  |                   |                      |
| male domain (H1)   |                     |                     | 0.013<br>(0.011)  | 0.001<br>(0.017)     |
| interaction (T1*H1)  |                     |                     |                   | 0.024<br>(0.021)     |
| Number of observations   | 4076                | 6477                | 4076              | 4076                 |
| <i>disagreement about husband's role in decision making</i>        |                     |                     |                   |                      |
| constant   | 0.169<br>(0.014)    | 0.188<br>(0.010)    | 0.153<br>(0.011)  | 0.166<br>(0.018)     |
| challenge gender norms (T1)  | -0.012<br>(0.018)   |                     |                   | -0.025<br>(0.023)    |
| facilitate monitoring (T2)   |                     | -0.031**<br>(0.016) |                   |                      |
| male domain (H1)   |                     |                     | 0.020*<br>(0.010) | 0.006<br>(0.015)     |
| interaction (T1*H1)  |                     |                     |                   | 0.028<br>(0.021)     |
| Number of observations   | 4076                | 6477                | 4076              | 4076                 |

Table 3: Agreement and disagreement about spouses' roles in labour contributions

|   | land prepare   | planting | weeding | spraying | harvesting |
|---|--|----------|---------|----------|------------|
|   | <i>disagreement about female co-head's labour contribution</i> |          |         |          |            |
| (1) Agree:  | 0.66   | 0.67     | 0.61    | 0.79     | 0.69       |
| Disagree:   | 0.35   | 0.33     | 0.4     | 0.21     | 0.31       |
| (2) female co-head says she worked more than male co-head thinks            | 0.19   | 0.19     | 0.25    | 0.14     | 0.17       |
| (3) male co-head says female co-head worked more than female co-head admits | 0.16   | 0.14     | 0.15    | 0.07     | 0.14       |
| p-value (2)=(3):  | 0.001  | 0.000    | 0.000   | 0.000    | 0.006      |
| Number of plots:  | 3,181  | 3,373    | 3,096   | 3,377    | 3,350      |
|   | <i>disagreement about male co-head's labour contribution</i>   |          |         |          |            |
| (1) Agree:  | 0.61   | 0.68     | 0.62    | 0.60     | 0.70       |
| Disagree: Disagree:   | 0.39   | 0.31     | 0.38    | 0.41     | 0.31       |
| (2) male co-head says he worked more than female co-head thinks             | 0.26   | 0.17     | 0.21    | 0.24     | 0.17       |
| (3) female co-head says male co-head worked more than male co-head admits   | 0.13   | 0.14     | 0.17    | 0.17     | 0.14       |
| p-value (2)=(3):  | 0.000  | 0.002    | 0.000   | 0.000    | 0.001      |
| Number of plots:  | 3,217  | 3,373    | 3,137   | 3,383    | 3,376      |
| Male task score (/100):   | 56   | 46       | 28      | 87       | 48         |
| Ease of monitoring (/100):  | 57   | 74       | 57      | 45       | 65         |

Table 4: Disagreement about labour provision

|  | (1)               | (2)              | (3)                 | (4)                 | (5)                | (6)                |
|--|-------------------|------------------|---------------------|---------------------|--------------------|--------------------|
| <i>disagreement about female co-head's labour contribution</i> |                   |                  |                     |                     |                    |                    |
| constant   | 0.130<br>(0.012)  | 0.128<br>(0.008) | 0.146<br>(0.011)    | 0.143<br>(0.009)    | 0.143<br>(0.016)   | 0.141<br>(0.011)   |
| challenging gender norms (T1)                                  | 0.006<br>(0.017)  |                  |                     |                     | 0.007<br>(0.022)   |                    |
| facilitate monitoring (T2)                                     |                   | 0.009<br>(0.014) |                     |                     |                    | 0.005<br>(0.020)   |
| male domain (H1)   |                   |                  | -0.032**<br>(0.013) |                     | -0.031*<br>(0.019) |                    |
| hard to monitor (H2)   |                   |                  |                     | -0.021**<br>(0.010) |                    | -0.023*<br>(0.012) |
| interaction (T1*H1)  |                   |                  |                     |                     | -0.001<br>(0.026)  |                    |
| interaction (T2*H2)  |                   |                  |                     |                     |                    | 0.006<br>(0.022)   |
| Number of observations   | 3188              | 5037             | 3188                | 5037                | 3188               | 5037               |
| <i>disagreement about male co-head's labour contribution</i>   |                   |                  |                     |                     |                    |                    |
| constant   | 0.169<br>(0.013)  | 0.144<br>(0.008) | 0.171<br>(0.011)    | 0.140<br>(0.009)    | 0.172<br>(0.016)   | 0.134<br>(0.011)   |
| challenge gender norms (T1)                                    | -0.014<br>(0.018) |                  |                     |                     | -0.001<br>(0.023)  |                    |
| facilitate monitoring (T2)                                     |                   | 0.011<br>(0.014) |                     |                     |                    | 0.020<br>(0.020)   |
| male domain (H1)   |                   |                  | -0.024*<br>(0.014)  |                     | -0.008<br>(0.021)  |                    |
| hard to monitor (H2)   |                   |                  |                     | 0.012<br>(0.011)    |                    | 0.016<br>(0.013)   |
| interaction (T1*H1)  |                   |                  |                     |                     | -0.031<br>(0.028)  |                    |
| interaction (T2*H2)  |                   |                  |                     |                     |                    | -0.015<br>(0.024)  |
| Number of observations   | 3184              | 5060             | 3184                | 5060                | 3184               | 5060               |