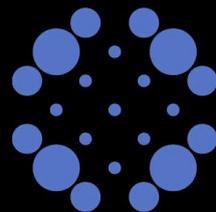


# Joint Land Certification and Intra-household Decision-making: Towards Empowerment of Wives?

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**CLTSUMB**

# Joint Land Certification and Intra-household Decision-making: Towards Empowerment of Wives?<sup>1</sup>

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## Abstract

*We have used gender-disaggregated household panel data from 2007 and 2012 in combination with dictator games and hawk-dove games to assess the effects of joint land certification of husbands and wives on wives' involvement in land-related decisions within households. Wives' stated preferences for stronger land rights to women and husbands' stated preferences for the traditional weak position of women were significantly affecting the wives' degree of within-household involvement in land-related decisions in opposite directions. Within-household generosity as expressed in dictator game experiments between husbands and wives, was correlated with stronger involvement of wives in land-related decisions.*

**JEL codes:** Q15, J16, D03.

**Key words:** joint land certification, gender, empowerment of wives, experiments, Ethiopia.

## 1. Introduction

Gender discrimination in land distribution is widespread in many parts of the world, including Africa (Deere and Doss, 2006). Female land rights have been found to enhance food consumption and education of children and change other types of household expenditure (e.g. Allendorf, 2007; Doss, 2006). Income given to women is more likely to be used for investments in education, children's nutrition, and housing than income in the hands of men (e.g. Hoddinott and Haddad, 1995; Duflo, 2003).

These research findings related to women's empowerment and the role of household assets in relation to within-household empowerment of wives have resulted in increasing international interest and policy attention as evidenced by policy reforms in many countries aiming to strengthen women's rights, including their property rights to land (Agarwal 1997; 2003; Holden and Tefera 2008a). Reforms that emphasize joint ownership of land for husbands and wives have

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been implemented in a number of developing countries in recent years, including in Peru and Ethiopia (Wiig in press; Holden et al. 2011).

There is a vast literature on intra-household decision making, from the unitary household model expanded in various ways by Gary Becker (1964; 1981) to the cooperative and non-cooperative bargaining models (Manser and Brown 1980; McElroy and Horney 1981; Lundberg and Pollak 1993). These latter models show that extra-household factors, such as legal reforms can affect within-household bargaining outcomes and welfare distribution. Important contributions that focus more explicitly on land include Agarwal (1997; 2003), who addresses many of the complex issues that are not adequately captured by earlier bargaining models, such as gender asymmetries, the roles of social norms, subjective perceptions and opinions, and voice. Despite legal reforms, women's property rights, in practice, will often depend on how laws are interpreted and implemented at the local level. The relative influence of laws versus local norms varies with women's social position/class, education, degree of urbanization. With a wide gap between a new law and the traditional norms, there may be a gradual transition before the law is implemented (if it at all happens), that may take considerable time. Alesina et al. (2013) have shown that traditional gender roles are particularly strong in societies with traditional plough agriculture and such traditional gender roles can be very persistent and undermine the effect of law reforms that aim to change these norms and the position of women in society.

Positive impacts from the low-cost land registration and certification in Ethiopia is now well documented (Deininger et al. 2008; 2011; Holden et al. 2009; 2011a; 2011b), including impacts on female-headed households (Holden et al. 2011a; Holden and Ghebru 2013; Ghebru and Holden 2013; Bezabih et al. 2012). However, the intra-household effects have not yet been well researched in the regions where emphasis was given to empowerment of women through joint certification of husbands and wives. At the same time there is high interest among donors to further strengthen and support the land administrative reforms in Ethiopia as evidenced by support from several donors such as USAID, DFID and The World Bank to scale up and strengthen what is perceived as a successful reform. The objective of this paper is to provide valuable additional insights about the effects of joint land certification on women's position and empowerment within households as well as within communities. These insights may provide inputs for identifying ways for further refinements of the reforms. Impact studies like this one are likely to have substantial impact on donors' willingness to fund or support these types of policy interventions because of increased emphasis on evidence-based allocation of development assistance in order to maintain popular support for aid in donor countries. Policy interventions that strengthen women's position, rights and welfare are very popular among many donors and have a central position in international organizations.

This paper builds on research in two regions in Southern Ethiopia where joint land certificates to husbands and wives have been issued since 2005 based on new land laws that were enacted from

2004. Women traditionally have a weak position in the patriarchal societies in Southern Ethiopia and have themselves been considered the property of men, as evidenced by payment of bride prizes, arranged marriages where girls typically had very little influence over whom to marry, a widow being required to remarry the brother of her late husband in order to remain on the household land, and kidnapping of young girls as a quite common traditional practice to get a wife in some of the communities. The step from being mere property to becoming equal owner can therefore be long and tough even with legal reforms supporting women's equal land rights (Holden and Tefera 2008a).

We benefit from having a detailed baseline survey in 2007 when the reform was under way with a special focus on the intra-household and gender effects of the reform. This survey covered more than 600 household of which 15% were polygamous households. The sample is also diverse in terms of ethnic and religious background of households with three ethnic groups (Oromo, Sidama, Wollaita<sup>2</sup>) and three religions (Moslem, Protestant, and Orthodox) represented. The sample also contains substantial variation in degree of market integration and population densities with some of the most densely populated rural areas in Ethiopia included. This allows us also to assess the effects of extreme land scarcity on within household competition for land. The sample's farming system diversity includes annual and perennial crop zones, subsistence-oriented rain-fed production and cash crop-oriented production with irrigation.

The survey included separate interviews of husbands and wives repeated in 2012. The individual data collection includes questions to assess the participation and decision-power of men and women in land-related issues, knowledge of the law, and perceptions, opinions and experience questions such as experience of land-related disputes. In addition social experiments were used in 2012 to assess the intra-household sharing behavior and bargaining behavior.

We aim to test the following hypotheses in our research on the impacts of joint land certification on women's empowerment related to land through combining analysis of household panel data and social experiments; that the land tenure reform including joint land certification of husbands and wives has strengthened women's position and their involvement in land-related decisions; that wives' attitudes towards women's land rights and husbands' preference for the traditional position of women affect wives' involvement in land-related decisions in opposite directions; and that these attitudes are affecting the intra-household "climate" measured in form of mutual generosity and hawkishness among the spouses through dictator and Hawk-dove games; that the reform has had stronger effect in communities that are better integrated into markets; that assets brought into the family at marriage affect the bargaining position of husbands and wives; and that there is more resistance against the reform where oxen ploughs are more used in agricultural production (Alesina et al. 2013).

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<sup>2</sup> A small share of the sample also belongs to the Amhara ethnic group.

The 2005 reform had by 2007 had some but limited impact on women's ability to influence farm management (Holden and Tefera 2008a; 2008b). This may be due to the strong traditions of male dominance in household-farm decision-making. By 2012 it appears that women have become more involved in farm management decisions. Especially, they have become more involved in crop choice decisions. They have also become more involved in land rental decisions. As measurement of women's empowerment related to land management we have used the extent of participation and influence in a set of land management decisions, including crop choice and land renting decisions. We found that the joint land certification has enhanced the wives' knowledge of their rights and their influence in land-related decisions while about a third of the husbands attempted to retain their dominant position and preferred that women had the traditional weak rights. Better market integration was associated with stronger influence by women in land-related decisions.

Social experiments were used to reveal the "intra-household climate" in form of the extent of reciprocal generosity and the extent to which women themselves are capable and willing to stand up and enhance their bargaining power. We have used two types of experiments in an attempt to reveal information about these characteristics. First, to reveal information about the extent of generosity we have used dictator games played with both husbands and wives independently. Second, to reveal the extent of bargaining toughness ("hawkish" behavior) we have used hawk-dove games where husbands and wives played against each other.

The dictator games revealed that men were at least as generous towards their wives as their wives were towards their husbands but there was substantial variation across households. Generosity appeared to be reciprocal. The hawk-dove games revealed that wives played tougher and were more hawkish than their husbands when they played against each other. While the husbands played gradually less hawkish in a sequence of games towards their wives, the wives continued to play very hawkish throughout the series of games.

The structure of the paper is as follows; we review relevant empirical literature in part two, and provide a theoretical framework in part three. Data and methods are presented in part four including descriptive statistics. The results are presented and discussed in part five before we conclude.

## **2. Review of relevant empirical literature**

Ester Boserup (1970) proposed that differences in gender roles have their origins in the form of traditional agriculture practiced in the pre-industrial period. She found interesting differences between shifting cultivation and plough cultivation. She claimed that men have a stronger advantage over women in plough agriculture because of upper body strength for controlling the plough and the animals during plowing. This leads to a stronger gender division of labor where men had a more dominant role in plough agriculture than in hoe agriculture.

Alesina et al. (2013) assess the historical origin of the existing cross-cultural differences in beliefs and attitudes regarding the appropriate role of women in society. They test the hypothesis that traditional agricultural practices such as plough agriculture resulted in less equal gender norms by assessing attitudes and female participation in the workplace, politics and entrepreneurial activities. They find that the hypothesis holds across countries, within countries, and across ethnicities within districts. They also test the cultural persistence by testing the children of immigrants living in Europe and the United States. They find that immigrants coming from a society with traditional plough agriculture exhibit less equal beliefs about gender.

Udry (1996) assessed the efficiency in farming in Burkina Faso where husbands and wives operated separate plots within the household and found substantial inefficiencies in the use of household resources in farming.

Fafchamps and Quisumbing (2005) studied marriage, bequest and assortative matching in rural Ethiopia, using household data from 1997 from the four main regions of the country. They found that most of the land is passed on to sons at time of marriage, while daughters received very little or no land, and that the distribution of wealth at the time of marriage was very inequitable both for grooms and brides. They also found assortative matching, such that more wealthy grooms marry more wealthy brides, thus strengthening the tendency of inequitable distribution of resources across generations. The inequitable distribution also continued at the time of inheritance, as the majority of women inherit nothing.

Iversen et al. (2011) use experiments to investigate intra-household cooperation in Uganda and find that limited cooperation and opportunistic behaviour within households are common. They suggest that more should be done to develop non-cooperative models for intra-household decision-making.

Kebede et al. (2013) have used a variety of experiments in one urban and two rural sites in Ethiopia played by married couples and found significant deviations from Pareto-optimal behavior by the majority of the couples, giving reasons to question the Pareto-optimality assumptions that follow from the unitary and collective household models.

Bezu and Holden (2013) uses dictator games in combination with survey data for a diverse rural sample of households in Southern Ethiopia. They find that the spouses operate separate cash budgets and to a very limited extent share cash or help each other out with cash if one of them faces an urgent need. Husbands were more likely to share cash with their wife than the other way around. Based on this review we think it is safe not to jump to the assumption that resource allocation within households is Pareto-optimal and prefer to rely on the separate spheres model of Lundberg and Pollak (1993) which allows for Pareto-efficient as well as Pareto-inefficient outcomes. While our study does not explicitly test for intra-household Pareto-efficiency, we

assess the extent of cooperation and involvement of wives in land-related decisions and whether they sometimes fail to agree and arrive at consensus decisions.

### **3. Theoretical framework**

#### **3.1. Household bargaining models**

Household bargaining models and game theory can serve as a useful starting point for understanding the complex land rights and intra-household decision-making issues and provide a basis for formulating testable hypotheses. One may look at the joint certification as a natural experiment, which affects households that have received such a certificate.

The Nash-bargained household model (McElroy, 1990; McElroy and Horney, 1990) labels divorce as a threat point, and the introduction of joint land certificates may alter the bargaining power as well as the threat points so that the balance of power changes and the probability of divorce may also change because the threat points change. However, this will also depend on the extent to which the rights according to the land law and land certification are enforced or involve high enforcement costs. The model may serve as a basis to assess whether joint certification has affected within-household outcomes as well as the probability of divorce and the outcomes in terms of how land was shared in cases of divorce. Several studies have shown that better outside family opportunities for household members affect their intra-household access to resources (McElroy, 1990). Assets brought into marriage and the timing of marriage versus the timing of receiving joint certificates can be used to test whether these influence intra-household resource allocation as well as land distribution, in cases of divorce or the death of the husband.

However, intra-household decisions may not be the outcome of cooperative bargaining. The separable spheres model (Lundberg and Pollak, 1993) puts forth a picture in which conflicts within households do not necessarily lead to divorce but rather to non-cooperative outcomes within households, where the fallback position may be based on a traditional division of labor and other resources. This model will be used as a basis for analyzing intra-household conditions after land certification. To what extent is there a cooperative or non-cooperative solution within households with respect to control over land resources and household decisions over land? And to what extent has this changed after the introduction of joint land certificates?

On the one hand, the initial weak household tenure rights due to earlier tenure reforms may cause men and their families also to perceive their land rights to be weak before receiving land certificates. The men may also therefore see the benefits of receiving these joint certificates although the certificates imply a re-allocation of power over land within households. On the other hand, if the men and their kin family perceived the enhanced land rights of women through joint certification as a threat to their land rights they may react opportunistically and may be willing to fight for their traditional decentralized property rights. This could lead to increased within-household tensions. It could lead to a new Nash bargaining equilibrium within households

or to a new non-cooperative solution within households (Lundberg and Pollak 1993). Such tensions could also lead to increased intra-household tensions, violence, more divorces, and disputes in the court system.

We start from a very general standard household bargaining model

$$(1) \quad N = (U^m - U^{*m}(A^m))(U^f - U^{*f}(A^f))$$

Where  $N$  is the bargained product,  $U$  is utility,  $U^*$  is the threat point which also coincides with the reservation utility, superscripts  $m$  and  $f$  represents husband and wife in the household, and  $A$  is a vector of assets, rights and other factors that may affect individual bargaining power within households. In the models of Manser and Brown (1980) and by McElroy and Horney (1981) the threat points represented divorce but in the Lundberg and Pollak (1993) model the threat points were other non-cooperative situations within marriage. Non-cooperative bargaining models, unlike cooperative bargaining models, do not assume efficient outcomes in decision-making and therefore open for inspection of efficiency issues. The disadvantage of non-cooperative bargaining models is that they do not offer any strong predictions or clear guidelines on which variables are relevant to include (Pollak 2005). There are a large number of non-cooperative games than can be played by two players with efficient or inefficient outcomes and possibly with multiple equilibria that can be played as one-shot games or as repeated games. We postulate, however, that spouses who play a cooperative game in form of a sequence of sub-games are likely to be more generous towards each other and wives in such households are likely to be more involved in land-related decisions and have husbands that are less likely to emphasize the traditional weak position of women.

Common variables that have been considered to affect the bargaining power of spouses include assets they have brought into marriage, laws and regulations that affect how resources would be distributed among the parties in case of divorce, the opportunities (reservation utility) each party has outside marriage or within marriage, the cultural norms for behavior within marriage, legal and informal protection in case of abuses, and cognitive and other human capital abilities of the spouses, and social networks of the spouses (Fafchamps et al. 2009; Pollak 2005)

In our case we are particularly interested in the effect of the legal reform which provides equal land rights to wives and husbands and that should imply equal sharing of land upon divorce and provision of joint land certificates as written documentation of shared land rights. Wives' empowerment or participation in decisions in the household could be seen as a welfare effect in itself or as a means of achieving higher welfare outcomes for family members in directions closer to the preferences of wives in the household, at least when cooperative solutions are found within the household and when the bargaining costs are below the gains from bargaining. However, such bargaining may not always yield cooperative solutions and there could be a net

loss to the household. For individual household members there can be positive or negative net outcomes from such bargaining.

In our study we have chosen to look at the intermediate outcome in terms of decision-power of women or degree of change in involvement and influence over land-related decisions. This is then represented by  $N$  in equation (1) and depends in a reduced form on a set of factors as indicated in equation (2):

$$(2) \quad N = N(A^m, A^f) = N(Assets^j, Attitude^j, Certificate^h, Culture); \quad \text{where } j = m, f, h$$

where  $h$  is jointly owned, the vector of assets can be brought to marriage by each of the spouses or jointly obtained during marriage, attitude represents both preferences and awareness of rights by husband and wife, culture captures ethnic differences and religion. Women's empowerment

may increase with the amount of assets they brought into marriage;  $\frac{\partial N}{\partial Assets^f} > 0$ . Opposing

attitudes by husband and wife can pull in opposite directions;  $\frac{\partial N}{\partial Attitude^f} > 0$ ;  $\frac{\partial N}{\partial NegAttitude^m} < 0$

where  $NegAttitude^m$  represents the negative attitude of husbands towards women's land rights.

Receipts of land certificates may strengthen the land rights of women;  $\frac{\partial N}{\partial Certificate} > 0$ . More

exposure to markets, education and the external world may enhance women's position while traditional culture may push in direction of the traditional weak position of women. The general resource situation of the household may also affect the bargaining. With more limited resources it is possible that bargaining will be tougher as the husband may be more reluctant to give up his control over more scarce resources. We return to the more detailed specification of variables in the following section on data and methods.

Research in behavioral economics has revealed that many individuals demonstrate other-regarding preferences in diverse societies (Henrich et al. 2001) and various theories have been launched to explain this. The dictator game has become a preferred tool for investigating individual generosity towards other persons (see Engel 2011 for a meta-study). Usually such experiments have been applied for assessing sharing behavior with anonymous persons. We expanded it to sharing behavior within households and particularly as a device to tease out the mutual generosity between husbands and wives. We think this mutual generosity influences the attitudes in equation (2) and propose that mutual generosity facilitates more involvement of wives in land-related decisions through changes particularly in the husband's attitude towards women's land rights. This hypothesis builds on psychological game theory where generosity observed in dictator games among spouses may be seen as a reciprocal sub-game outcome in repeated games between the spouses (Geanakoplos et al. 1989; Rabin 1993; Dufwenberg and Kirchsteiger 2004). On the other hand, spouses that are tougher in bargaining against their spouse may also be more able to achieve what they want. Such bargaining power may also be

revealed having the spouses play bargaining games against each other. We used a sequence of Hawk-dove games played by the spouses against each other to generate a variable for the “hawkishness” of each of them.

Based on the theoretical framework and empirical literature we set out to test the following hypotheses about joint land certification and women empowerment in Ethiopia.

H1. Women’s land rights and decision-making power over land has been significantly strengthened by the new land laws and issuing of joint land certificates;

H2. A husband’s and wife’s attitudes towards women’s land rights (wives’ preferences for and husbands’ preferences for the traditional position of women) affect the degree of involvement of women in land-related decisions;

H3. Women’s position and attitudes are positively related to assets they brought into marriage and negatively related to assets their husbands brought into marriage.

H4. Women’s position and attitudes are positively related with degree of market integration and education of family members (Henrich et al. 2001; 2010)..

H5. Women’s empowerment and position is weaker in the plough-based farming systems than in the perennial zone (Boserup 1970; Alesina et al. 2013).

H6. The positive impact of the reform on empowerment is larger the more generous men are towards their wives as generosity of men implies less resistance against women’s land rights.

H7. Husbands behave more like hawks and women more like doves in the hawk-dove games and the hawkishness of husbands is positively related to their resistance towards women’s land rights and negatively affects women’s empowerment while more hawkish wives also claim their land rights.

#### **4. Survey locations, data and methods**

##### **4.1. Survey locations and sampling**

Most of Ethiopia is dominated by plough agriculture where a pair of oxen is used to pull the plough. Exceptions are the perennial zone where the plow is less used and the pastoral areas. Our sample includes districts dominated by traditional plough agriculture (Sashemene and Arsi Negelle districts) as well as two areas in the perennial zone, one dominated by rain-fed subsistence-oriented production (Wollaita) and one dominated by perennial cash crop production with supplementary irrigation (Wondo Genet). The Oromo ethnic group dominates in Sashemene and Arsi Negelle districts, the Sidama ethnic group dominates in Wondo Genet, and the Wollaita ethnic group dominates in Wollaita. A substantial number of Oromos have, however, also settled in Wondo Genet and a separate district, Wondo Genet Oromo, has been established recently and the new district is included in Oromia Region, rather than in SNNP Region that Wondo Genet district and Sidama zone belongs to together with the sample from Wollaita.

The degree of market integration varies across the locations with Sashemene being a market centre. Sashemene and Wondo Genet are located quite close to Awassa, the largest town in this

part of Ethiopia and the administrative centre of SNNP Region. Arsi Negelle and Sashemene are located along the main road between Awassa and Addis Ababa and therefore have very good market access. The cash crop producing area Wondo Genet is also located close to Sashemene and has good roads facilitating market-oriented cash crop production. Wollaita is located in a more remote rural setting and has poorer market access and is characterized by more traditional subsistence-oriented production where enset (false banana) is the main staple crop, population densities are extremely high and implying very small farm sizes and high levels of poverty. Communities (*kebelles* or “Peasant Associations”) were sampled strategically within each district to obtain additional within-district variation in distance to market. Within each community households were sampled randomly from lists of households obtained from the community administration.

#### 4.2. Household-individual panel survey.

The first author carried out a baseline survey in 2007, covering 613 households (15% polygamous with up to 4 wives), in four districts in Oromia and the SNNP Regions (Holden and Tefera, 2008a, b). This survey focused explicitly on the initial impacts of joint certification on husbands and wives in the two regions and included detailed data collection for all land plots of households and separate interviews with husbands and wives on their knowledge of the land laws, perceptions of their land rights, division of labor within households, opinions and expected impacts of joint land certification. Separate interviews were carried out for each of the wives in polygamous households. These interviews included specific questions about who was responsible for and made a range of land-related decisions and whether the spouse was consulted, or whether the decisions were joint decisions. Other questions were related to how land had been divided upon divorce or death of the husband in the past.

Separate village level survey instruments were also used to collect information about each village and how the land registration and certification was implemented (Holden and Tefera, 2008a). Separate survey instruments were also used to interview local conflict mediators to identify how women were treated in land-related disputes. At the time of the 2007 survey, the land of 80% of the households had been registered, and 60% of the households had received their land certificates. This detailed baseline data gives a unique opportunity to identify impacts through a new survey of the same households and individuals in 2012. Empowerment and attitude variables were constructed (see details below) based on stated responses.

Parametric econometric methods are used for the analyses of the survey data for testing the hypotheses. These include ordered probit models, probit models, censored tobit models and fractional response models. To assess the robustness of the results alternative specifications with district and village fixed effects were used with robust or cluster-corrected standard errors. More specific details are presented in relation to each model.

#### 4.3. Social experiments.

The survey in 2012 was combined with social experiments to elicit the intra-household generosity among spouses and the relative bargaining power of household members and relate these results to the actual decision-making. Dictator games were run separately for husbands and wives and thereafter Hawk-dove games were run where husbands and wives played a sequence of six games against each other to elicit their hawkishness towards each other as an indication of their bargaining power (Bezu and Holden 2013; Ashraf, 2009).

#### **4.4. Construction of variables**

The following approaches were used to construct variables to measure empowerment and attitudes towards the new land rights that aim to strengthen women's position in households:

##### **Measurements of empowerment:**

We assessed the extent of participation in a set of land management decisions, including crop choice and land renting decisions, and whether participation has led to a change in these decisions. This is constructed from the responses to the following questions:

- i) Are you involved in the land investment and production decisions of any of the plots?  
1=Yes, 0=No
- ii) Have any of the discussions resulted in changes in how the household makes decisions or manages its land resources? 1=Yes, 0=No
- iii) The wife's name on the land certificate affects her power over the land = 1 if codes 2, 3, 4, 5, 6 below, = 0 otherwise.

1=Has no effect, 2=She would have a stronger position in case of divorce or husband's death, 3=She would involve more in land-related decisions within marriage (e.g. crop choice and input use), 4=She would control more of the income from production on the land, 5=She would be more involved in land-renting decisions, 6=She would do more work on the land, 7=It depends on each family,

An indicator variable for degree of empowerment with values from 0 to 3 was constructed based on the responses in these three questions. The value 1 was given for wives who responded positively in each question. The number of (out of 3) positive responses then give the degree of perceived empowerment.

##### **Husbands' preference for traditional position of women:**

An index is generated from the response to three questions:

- i) Widow should not be allowed to marry outside the family of the late husband = 1, = 0 otherwise;
- ii) Widow should marry brother of late husband =1, = 0 otherwise
- iii) Husband decides if disagreement between husband and wife =1, = 0 otherwise
- iv) The index was created by summing the responses to these three questions.

##### **Wives' stated preferences for strengthened women's land rights**

An index was generated by summing the responses to three questions:

- i) Wife can deny husband to rent out land = 1, = 0 otherwise;

- ii) Wife expects joint land certificate = 1, = 0 otherwise;
- iii) Wife expects equal land sharing upon divorce = 1, = 0 otherwise;

We hypothesize that it has a positive effect on the degree of involvement of wives in household land-related decisions.

#### **4.5. Descriptive statistics**

We will give a brief review of some descriptive statistics in this section to clarify important contextual conditions. The share of households in our survey sample that had received a land certificate increased from 61.7% in 2007 to 82.4% in 2012 out of a total sample of 615 households. Only 5.8% of the households perceived that tenure security has decreased in this period while 57% perceived that tenure security has increased.

Perceptions of the effects of land certification on within-household discussions of land-related decisions were elicited. Crop choice and land renting are the two types of decisions that have surfaced as most commonly discussed after the reform and were mentioned by more than 60% of the households. Division of labor, investment decisions on the land, house construction and allocation of land for the children were other issues stated as more subject to discussion among the spouses after land certification.

When we asked whether any of these discussions have led to any changes in decision-making, of those that responded that there had been more discussions, 53.7% stated that there had been changes in decision-making.

The types of most important issues that had resulted in changes in decisions as seen by the spouses were crop choice, improved land management, productivity and income generation.

About 6.5% of the sample of married couples stated that they have faced land management issues that they have failed to agree upon.

Again crop choice, land and income management came out as common issues in addition to land renting where they have had problems agreeing upon.

We asked who makes the decisions when the spouses cannot agree and it appears that in most cases the husband will decide or the decision is postponed. This may be the kind of non-cooperative outcomes within families that the Lundberg and Pollak (1993) model allows for.

The distribution of the wives' land-related empowerment index variable is presented in Table 1. Female-headed and polygamous households are dropped from this sample as we are primarily interested in the responses in male-headed households monogamous households with land certificate. The index shows that a large percentage (55%) of the respondents is at index levels 2 and 3, which demonstrates substantial levels of empowerment.

Table 1. Distribution of wives' land-related empowerment indicator

Indicator level	Freq.	Percent	Cum.
0	20	6.2	6.2
1	126	39.3	45.5
2	93	29.0	74.5
3	82	25.6	100.0
Total	321	100.0	

Source: Own survey data.

The distribution of wives' land rights attitude index is presented in Table 2. For this index we also have responses from 2007 and are able to see whether there is a change in the attitudes from 2007 to 2012. A chi-square test demonstrates that there has been a highly significant change in the attitude index from 2007 to 2012 in direction of wives having become more conscious about their land rights over time.

Table 2. "Wives' land rights attitudes"- index distribution by year for wives in monogamous households with land certificates

Index score	Stats	2007	2012	Total
0	Freq.	38	24	62
	Percent	11.3	7.5	9.4
1	Freq.	43	7	50
	Percent	12.8	2.2	7.6
2	Freq.	117	58	175
	Percent	34.7	18.1	26.6
3	Freq.	139	232	371
	Percent	41.3	72.3	56.4
Total	Freq.	337	321	658

Note: Pearson  $\chi^2(3) = 71.9$  Pr = 0.000 for difference in distribution from 2007 to 2012.

The distribution of the husbands' preferences for traditional position of women index is presented in Table 3 for husbands in monogamous households with land certificate. We see that about 64% of the husbands favored a at least one of the women's traditional positions.

Table 3. "Husbands' preference for traditional position of women"- index in 2012

Index score	Freq.	Percent	Cum.
0	115	35.8	35.8
1	122	38.0	73.8
2	70	21.8	95.6
3	14	4.4	100
Total	321	100	

Table 4 provides overview statistics for more variables used in the econometric analysis.

Table 4. Descriptive statistics for household and individual data

	Mean	Median	St. Err.	N
Wives' empowerment index	1.68	2	0.041	494
Age of household head	45.50	43	0.650	494
Household size	7.39	7	0.140	494
Average education level in household	2.92	2.8	0.085	485
Male work force	1.98	2	0.062	494
Female work force	1.90	2	0.055	494
Polygamous household, dummy	0.19	0	0.018	493
Tropical livestock units	3.73	2.8	0.179	494
Age difference husband-wife, years	6.34	6	0.565	454
Land certificate dummy	0.82	1	0.017	494
Farm size, ha	0.85	0.625	0.032	491
Land individually owned by husband	1.79	1	0.104	453
Land individually owned by wife	0.19	0	0.044	480
Husband's assets brought to marriage, 1000EB	2.14	0.6	0.222	453
Wife's assets brought to marriage, 1000EB	0.18	0	0.031	482
Wife's share of livestock	0.03	0	0.007	443
Husband's allocation to wife in dictator game, EB	16.73	20	0.453	387
Wife's allocation to husband in dictator game, EB	14.29	20	0.461	388
Husbands' probability of playing Hawk in HD game	0.25	0.17	0.014	417
Wives' probability of playing Hawk in HD game	0.43	0.33	0.016	417
Wives' land rights attitude index	2.59	3	0.036	494
Husbands' preference for traditional position of women index	0.98	1	0.039	494

*Source:* Own survey and experimental data

## 5. Results

### 5.1. Wives' empowerment in land-related decisions

We start by assessing a number of ordered probit models that related the wives' empowerment index with various possible explanatory variables in Table 5. The first model (OP1) uses district fixed effects while the other models use community (kebele) fixed effects.

Wives' empowerment is strongly positively correlated with wives' land rights attitude index which was significant at 0.1% level in all models. This seems to support that women who are aware of and emphasize their rights also are able to get more involved in household decision-making over land. However, the husbands' preference for the traditional position of women index was also highly significant and with a negative sign (significant at 1% level in all models),

indicating that women are less successful in getting involved in land-related discussions in households where husbands resist to accept women's land rights.

Table 5. Factors associated with wives' participation in land-related decisions (empowerment indicator) in monogamous male-headed households

	OP1	OP2	OP3	OP4
Wives' land rights attitude index	0.292****	0.333****	0.332****	0.358****
Husbands' land rights attitude index	-0.231***	-0.235***	-0.234***	-0.228***
Age of household head	-0.001	-0.001	-0.001	0.000
Household size	0.015	0.031	0.028	0.038
Average education level in hh.	0.006	0.024	0.034	0.044
Male work force	0.054	0.039	0.034	0.033
Female work force	-0.082	-0.090	-0.085	-0.104
Farm size, ha	-0.203	-0.243**	-0.261**	-0.236*
Tropical livestock units	0.054*	0.049*	0.052*	0.038
Wife's name on certificate, dummy	0.205	0.282	0.253	0.326
Religion dummies, baseline= Muslim				
Protestant			-0.673**	-0.487
Orthodox			-0.695**	-0.455
Other			-0.512	-0.211
Ethnic group dummies, baseline= Oromo				
Sidama				-0.025
Wollaita				-0.759
Amhara				-0.234
Other				0.680
District dummies, baseline= Sashemene				
Arsi Negelle	0.125			
Wondo Genet	-0.478**			
Wollaita	-0.720****			
Wondo Oromia	0.110			
Kebelle fixed effects				
Cut1 constant	-1.297***	-1.190**	-1.308***	-1.316**
Cut2 constant	0.302	0.457	0.345	0.335
Cut3 constant	1.185***	1.368***	1.263**	1.258**
Prob > chi2	0.000	0.000	0.000	0.000
Number of observations	315	315	315	307

Note: Results from ordered probit models. Standard errors corrected for clustering at community level in models with district fixed effects. Robust standard errors in models with community fixed effects. Significance levels: \*: 10%, \*\*: 5%, \*\*\*: 1%, \*\*\*\*: 0.1%.

We included a dummy variable for the wife's name being included on the land certificate. The variable was not significant in any of the models but had a positive sign. This variable is likely to be endogenous and we do not have any good instruments to predict it. We assessed factors that

are correlated with wife's name being included on the land certificate in monogamous households. The results are included in Appendix Table A1. Household size was positively associated and male work force was negatively associated with wives having their names on the certificates. Both variables were significant at 5% level in all model specifications.

Wives' empowerment in land-related decisions appeared to be significantly weaker for polygamous households, the variable was significant at 10% level in three of the models and with a negative sign. The OP1 model shows that wives' empowerment is weakest in Wollaita, the most remote and least market-integrated district. It is not surprising that this more subsistence-oriented community is lagging behind in the empowerment of women related to land. This is also an area where land is very scarce and farm sizes are extremely small.

The empowerment effect appears to have been stronger for Muslim than Protestant and Orthodox households and among Oromo than among Sidama and Wollaita ethnic groups. This is opposite of the claim of Alesina et al. (2013) that traditional gender roles are more persistent in plough-based agricultural areas. Our findings indicate that empowerment of women has been strongest in the locations where plough agriculture dominates and where the majority of the population are Muslims. We found no significant effect of household education, age of household head, female and male work force, while livestock endowment was positively related to wives' empowerment (significant at 10% level in all models).

In Table 6 we have investigated factors that may explain or be correlated with the attitudes towards women's land rights variables. We have included additional disaggregated asset variables. We have included models with district fixed effects and community fixed effects as robustness check of the results. We emphasize only variables that are significant and with consistent sign in both types of models. Inclusion of experimental variables in particular caused a loss in number of observations and we have included models with these variables in the Appendix Table A2.

Table 6. Factors correlated with wives' and husbands' land rights attitudes indices.

	Wives' land rights attitude index	Wives' land rights attitude index	Husbands' preference for traditional position of women index	Husbands' preference for traditional position of women index
Age of household head	0.006	0.004	-0.008	-0.007
Household size	0.034	0.028	0.002	0.008
Average education level in hh.	0.098*	0.077	0.026	0.032
Male work force	-0.066	-0.074	-0.064	-0.080
Female work force	0.102	0.097	0.078	0.061
Polygamous household, dummy	0.011	0.185	-0.117	-0.141
Land individually owned by husband	-0.037	-0.050	0.067**	0.076**
Land individually owned by wife	-0.179**	-0.206	0.003	-0.011
Husband's assets brought to marriage, 1000EB	0.047**	0.080***	0.011	0.011
Wife's assets brought to marriage, 1000EB	0.012	0.043	-0.168*	-0.169
Tropical livestock units	-0.053**	-0.051**	0.044***	0.038**
Wife's share of livestock	0.095	0.007	-0.633	-0.519
Age difference husband-wife	-0.009	-0.010	0.017***	0.013**
Land certificate dummy	0.024	-0.040	-0.180	-0.089
Farm size, ha	-0.006	-0.264	-0.222**	-0.157
Ethnic group dummies, baseline= Oromo				
Sidama	0.591*	0.479	0.125	0.160
Wollaita	-0.020	-0.062	0.311	0.305
Amhara	0.010	-0.429	-1.032**	-1.056**
Other	-0.011	-0.159	0.373	0.407
Religion dummies, baseline= Muslim				
Protestant	-0.626**	-1.568****	0.164	0.195
Orthodox	-0.687*	-1.651***	0.229	0.335
Other	-0.637	-1.524**	-0.507	-0.461
District baseline= Sashemene				
Arsi Negelle	0.481*		-0.203	
Wondo Genet	-0.082		-0.167	
Wollaita	0.806		0.188	
Wondo Oromia	0.072		0.102	
<i>Kebelle</i> fixed effects	No	Yes	No	Yes
Cut 1 constant	-2.510****	-2.702****	-0.628**	-0.323
Cut2 constant	-1.409****	-1.504***	0.599*	0.956**
Cut3 constant	-0.185	-0.166	1.754****	2.177****
Prob > chi2	0.009	0.000	0.000	0.000
Number of observations	382	382	382	382

Note: Results from ordered probit models. Significance levels: \*: 10%, \*\*: 5%, \*\*\*: 1%, \*\*\*\*: 0.1%.

We see that the wives' land rights attitude index is significantly higher for wives from marriages where the husband brought more non-land assets into the marriage (significant at 5 and 1% levels) and negatively related to the livestock endowment of the household (significant at 5% level in both models). It is possible that livestock is associated with more traditional orientation while non-land assets are related to a more "modern" lifestyle. The women's attitudes index is significantly stronger in Muslim households than in Protestant and Orthodox households. In addition many of the community dummy variables (not included in the Table) were significant, implying large local variation between communities while few of the individual variables were significant. This shows that social processes are important for women's attitudes and vary substantially locally. The policy implication may be that awareness campaigns may have substantial impact on the effectiveness of joint certification in terms of empowering women. The change in awareness is likely to be a combined effect of joint certification, changes in the laws in favor of women, and social influences through education, media, market integration and women's associations. The wife's name on the certificate can be important but is not sufficient to ensure more involvement of women in land-related decisions.

The husbands' land rights attitude index is significantly (at 5% level in both models) related to the land husbands brought into marriage, indicating that they are more negative towards women's land rights the more land they brought into marriage. Husbands are also more negative the more livestock the household possesses (significant at 1 and 5% levels), consistent with the finding for wives attitudes. Livestock endowment may be related to more traditional lifestyle and gender roles. A larger age gap between the husband and wife is correlated with more resistance towards women's land rights (significant at 1 and 5% levels). The religion, district and community dummy variables were insignificant indicating smaller variation across communities and religions for husbands than wives. A small group of Amhara in the sample appeared to be significantly less opposed to strengthened women's land rights.

We also ran versions of the models with dictator game and Hawk-dove game variables included. The Hawk-dove game variables were not significant in any of the models while the dictator game variables were significant in some models. Appendix Table A2 includes models with the generosity variables from the dictator games. The wives' land rights attitude index was significantly higher in households where the husband appeared more generous in the dictator games (significant at 5 and 10 % levels in the two models). The generosity variables from the dictator games were insignificant in the models for husbands' attitudes. Most of the other results remained robust with the smaller sample including experimental variables.

## **5.2. Summary of experimental findings**

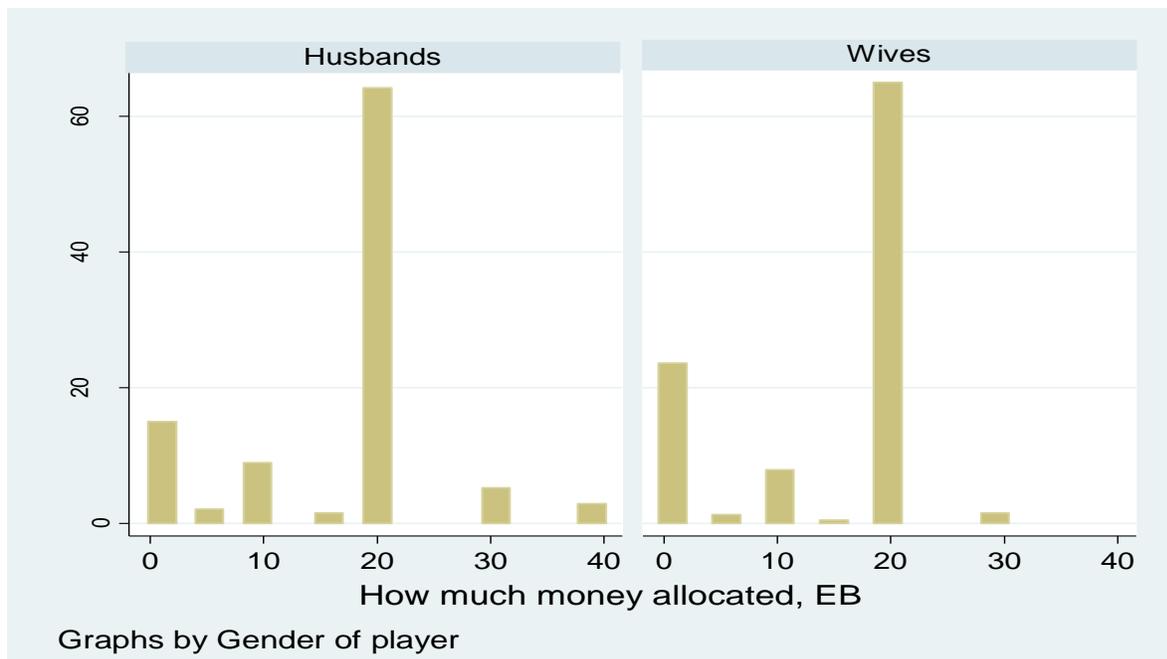
We will now look at the experimental outcomes and assess factors that are correlated with husbands' and wives' decisions in the dictator and Hawk-dove games. We were unable to include all male-headed households in the sample in these experiments as both spouses were not

available for the experiments in all cases. What we assess is whether and how game behavior is affected by individual and household characteristics.

Is the spouses' generosity towards each other related to the resources they brought into marriage? Is it related to their attitudes towards women's land rights. Is the hawkishness of the spouses when playing Hawk-dove games against each other related to their generosity towards each other and to their attitudes towards women's land rights and to other individual and household characteristics?

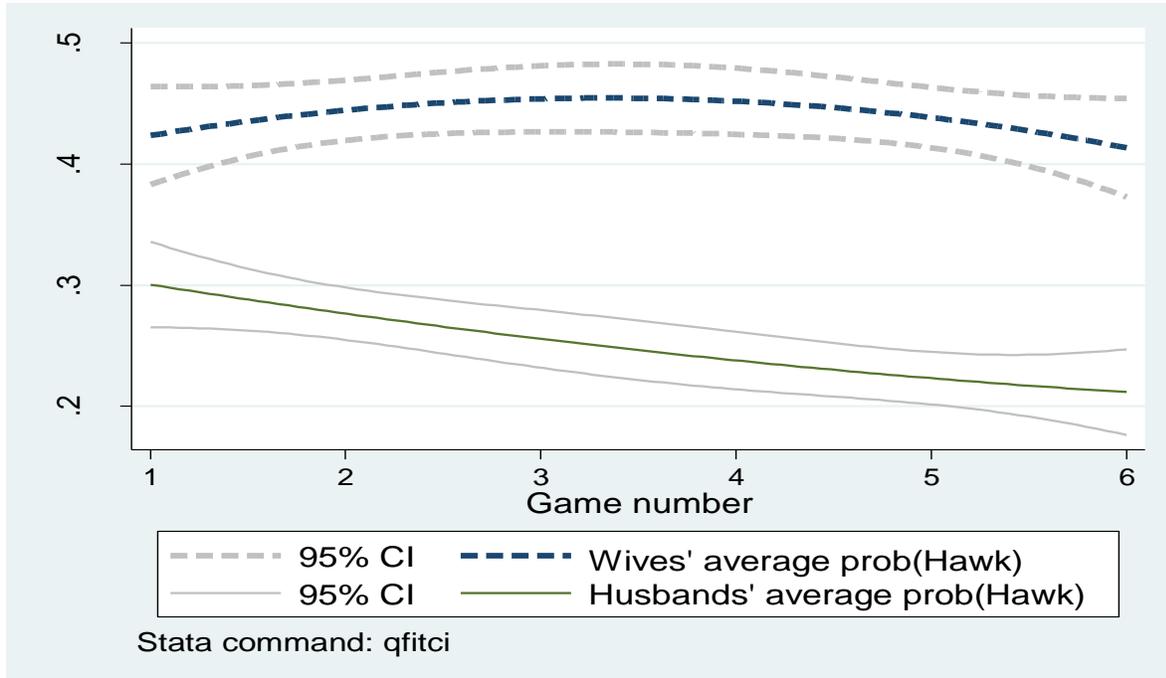
The distribution of allocations by husbands and wives to each other in the dictator games is presented in Figure 1. We see that more than 60% of the husbands and wives shared the 40EB equally with the spouse. A higher percent of the wives allocated nothing to the husband than the other way around. A higher percentage of the husbands also allocated amounts higher than 50% than wives did.

The mean probabilities of playing Hawk over six rounds of Hawk-dove games played by husbands and wives against each other are presented in Figure 2. We see that the probability of playing Hawk was about 30% in the first round for husbands and declined towards 22% in the last round, while for wives it started at about 42% and remained above 40% throughout the six rounds.



Source: Bezu and Holden 2013

Figure 1. Distribution of allocations (out of 40 Ethiopian Birr) to the spouse by husbands and wives in monogamous households.



Source: Own data

Figure 2. Probability of playing Hawk by husbands and wives by game number in H-D-games

Table 7 shows factors associated with the level of generosity towards the spouse by husbands and wives in the dictator games using models with district and community fixed effects for robustness assessment.

Table 7. Factors associated with husbands' and wives' generosity towards their spouses in dictator games

	Husband's allocation to wife	Husband's allocation to wife	Wife's allocation to husband	Wife's allocation to husband
Wives' land rights attitude index	2.130*	1.077	-2.649**	-2.860**
Husbands' land rights attitude index	-0.655	-0.027	-0.661	-0.092
Age of household head	0.008	-0.009	-0.066	-0.065
Household size	-0.413	-0.341	0.075	0.169
Average education level in household	-1.031**	-1.183***	0.889*	0.682
Male work force	1.033*	1.061*	-0.678	-0.778
Female work force	0.676	0.528	-2.049**	-1.838**
Polygamous household, dummy	-3.769**	-2.816*	2.728	3.598*
Land individually owned by husband	-0.288	-0.188	0.270	-0.074
Land individually owned by wife	-1.735	-1.735	-1.063	-0.073
Husband's assets brought to marriage, 1000EB	-0.010	-0.028	0.027	-0.002
Wife's assets brought to marriage, 1000EB	0.333	0.402	-0.369	-0.357
Tropical livestock units	0.186	0.147	-0.338	-0.317
Wife's share of livestock	12.447	8.024	-5.890	-8.428
Age difference husband-wife	-0.005	0.008	0.035	0.047
Household has land certificate, dummy	2.592*	1.604	-1.278	-1.208
Farm size, ha	0.865	0.835	1.387	1.607
Wife's allocation to husband in dictator game	0.336****	0.251****		
Husband's allocation to wife in dictator game			0.391****	0.291***
Husband's hawkishness in HD-game	-0.290	-0.951	-2.977	-4.614*
Wife's hawkishness in HD-game	-1.547	-1.154	-0.030	-0.547
District baseline= Sashemene				
Arsi Negelle	-1.591		-2.099	
Wondo Genet	1.067		-0.644	
Wollaita	-6.228***		0.152	
Wondo Oromia	-2.135		-2.461	
Kebelle fixed effects	No	Yes	No	Yes
Constant	8.961	12.011**	21.376****	22.763****
Sigma constant	8.907****	8.486****	10.262****	9.605****
Prob > chi2	0.000	0.000	0.003	0.000
Number of observations	296	296	296	296

*Note:* Results from censored tobit models with district fixed effects or village fixed effects. Standard errors corrected for clustering at community level in models with district fixed effects. Robust standard errors in models with community fixed effects. Significance levels: \*: 10%, \*\*: 5%, \*\*\*: 1%, \*\*\*\*: 0.1%.

Husbands' generosity towards the wife was significantly negatively correlated with the average education level in the household (significant at 5 and 1% levels) while it was positively correlated with the male work force in the household (significant at 10% level in both models).

Polygamous husbands allocated significantly less to the wife they played with than monogamous husbands (significant at 5 and 10% levels). Wife's allocation to the husband was significantly positively correlated (significant at 0.1 % level in both models) with the husband's allocation to his wife, demonstrating mutual generosity among spouses (Bezu and Holden 2013). The husbands' generosity towards the wife was significantly lower in Wollaita than in the other districts (significant at 1% level). This is the area with poorest market access and highest level of poverty.

The wives' generosity was negatively related to their attitudes index score for women's land rights (significant at 5% level in both models) and negatively related to the female work force in the household (also significant at 5% level in both models). Again we find a strong positive correlation between the independent responses of husbands and wives. There was a weak indication that hawkishness of husbands was associated with less generous behavior of wives and that polygamous wives were more generous towards their husband than monogamous wives, in contrast to the polygamous husbands. However, these variables were only significant at 10% level in the models with community fixed effects.

We will now assess factors associated with the hawkishness of husbands and wives when playing against each other in repeated Hawk-dove games. The results are presented in Table 15 using fractional response models with robust standard errors. We have used models with district fixed effects and community fixed effects. The dependent variable is the probability that husbands/wives played Hawk in six rounds of Hawk-dove games and where the probability is estimated as the average outcome (Hawk=1, Dove=0) of the six rounds for each player.

For husbands' hawkishness we see that hawkishness declines with age of the husband (significant at 10% level in both models). The husbands are less hawkish the more assets their wives brought into marriage (significant at 5% level in both models). This could be a pure asset effect as well as a correlation between possession of non-land assets and more modern life style and a better relationship between husband and wife. Wives who brought more assets into marriage may also demand and get more respect from their husbands. Husbands also responded to more hawkish wives by being less hawkish (significant at 0.1% level). There was also an indication that generous wives, as measured by the wives' allocation to their husbands in the dictator game, had less hawkish husbands (significant at 5% level in the model with community fixed effects only).

In the models with wives' hawkishness as the dependent variable only the game responses of the husband in form of his degree of hawkish responses affected wives' hawkishness significantly. Overall, wives played these games much more aggressively than their husbands. This was a surprise to us. It is also strange that the wives' degree of hawkishness is not significantly related to any other included variables.

Table 8. Factors associated with husbands' and wives' hawkishness in Hawk-Dove games

	Husband's hawkishness in HD-game	Husband's hawkishness in HD-game	Wife's hawkishnes s in HD- game	Wife's hawkishnes s in HD- game
Wives' land rights attitude index	0.059	0.149	0.155	0.193
Husbands' preference for traditional position of women index	-0.088	-0.041	-0.131	-0.125
Age of household head	-0.017*	-0.018*	0.014	0.013
Household size	-0.052	-0.058	0.025	0.011
Average education level in hh.	0.010	0.013	-0.029	-0.018
Male work force	0.084	0.082	-0.098	-0.087
Female work force	0.160	0.172*	0.071	0.092
Polygamous household, dummy	-0.004	0.001	-0.219	-0.157
Land individually owned by husband	-0.067	-0.059	-0.030	-0.045
Land individually owned by wife	-0.029	0.071	0.286	0.297
Husband's assets brought to marriage, 1000EB	0.000	-0.007	-0.013	-0.011
Wife's assets brought to marriage, 1000EB	-0.335**	-0.395**	0.133	0.112
Tropical livestock units	0.031	0.019	0.049	0.045
Wife's share of livestock	-2.068	-2.435	-1.976	-1.990
Age difference husband-wife	0.015	0.018	-0.008	-0.005
Household has land certificate, dummy	0.237	0.287	-0.129	-0.035
Farm size, ha	0.160	0.233	0.100	0.111
Wife's allocation to husband in dictator game	-0.014	-0.022**	-0.009	-0.007
Husband's allocation to wife in dictator game	0.000	-0.004	0.001	-0.001
Husband's hawkishness in HD-game			-1.600****	-1.706****
Wife's hawkishness in HD-game	-1.397****	-1.471****		
District baseline= Sashemene				
Arsi Negelle	-0.218		-0.189	
Wondo Genet	0.017		0.348	
Wollaita	0.149		0.098	
Wondo Oromia	-0.207		0.076	
Kebelle fixed effects	No	Yes	No	Yes
Constant	-0.096	0.429	-0.786	-0.626
Prob > chi2	0.000	0.000	0.000	0.000
Number of observations	296	296	296	296

Note: Fractional response models with robust standard errors. Significance levels: \*: 10%, \*\*: 5%, \*\*\*: 1%, \*\*\*\*: 0.1%.

## 6. Discussion of hypotheses

We will now discuss our results in relation to our key hypotheses that we aimed to test. The first hypothesis (H1) states that women's land rights and decision-making power over land has been significantly strengthened by the new land laws and issuing of joint land certificates. We found strong evidence in support of this hypothesis as women's attitudes in favor of women's land rights had been significantly strengthened from 2007 and we found a positive correlation between women's attitudes and their involvement in land-related decisions. Hypothesis H1 can therefore not be rejected.

Hypothesis H2 stated that a husband's and wife's attitudes towards women's land rights and position (wives' preferences for strengthened land rights for women and husbands' preferences for the traditional position of women) affect the degree of involvement of women in land-related decisions. As already discussed, we found a significant positive correlation between women's positive attitude towards women's land rights and their involvement in land-related decisions (Table 5). We also found a significant negative correlation between husbands' preferences for the traditional position of women and women's participation in land-related decisions. Both these variables were highly significant. We can therefore not reject hypothesis H2.

Our hypothesis H3 states that women's position and attitudes are positively related to assets they brought into marriage and negatively related to assets their husbands brought into marriage. Table 7 shows very little evidence in favor of this hypothesis. Individual land brought to marriage by the wife was significantly negatively related to the wives' land rights index in the model with district fixed effects and insignificant in the other model. Assets brought to marriage by husbands were positively related to wives' land rights attitude index in both models. Livestock owned by the household was negatively related to the wives' land rights attitude index and positively related to their involvement in land-related decisions. This indicates a more complex relationship between assets at marriage and women's empowerment than our hypothesis suggested. We therefore have to reject the hypothesis.

Hypothesis H4 that women's position and attitudes are positively related with degree of market integration and education of family members finds support in our data as the degree of change in women's empowerment is weakest in the district (Wollaita) with lowest level of market integration. However, we must make some reservations due to quite high collinearity between market integration, religion and ethnicity in our data.

We find little evidence that hypothesis H5; women's empowerment and position is weaker in the plough-based farming systems than in the perennial zone (Boserup 1970; Alesina et al. 2013); is explaining variation in our data. Women's empowerment in land-related decisions are significantly stronger in the areas where plough agriculture dominates (Arsi Negelle and Sashemene), however, these areas are also those with the best market access, possibly supporting that market integration has stronger impact than the cultivation systems.

Related to the social experiments and more specifically the dictator games for sharing between the spouses hypothesis H6 was proposed that the positive impact of the reform on empowerment is larger the more generous men are towards their wives as generosity of men implies less resistance against women's land rights. We found that wives' allocation to their husbands in dictator games were significantly negatively associated with their land rights attitude index (Table 14). We also found that husbands' allocation to their wives in dictator games was positively related to wives' land rights attitude index in Table A2 (significant at 5 and 10% levels). This evidence therefore seems to support our hypothesis H6.

Our hypothesis H7 stated that husbands behave more like hawks and women more like doves in the hawk-dove games and the hawkishness of husbands is positively related to their resistance towards women's land rights and negatively affects women's empowerment while more hawkish wives also claim their land rights. We found, contrary to the hypothesis that wives on average were significantly more hawkish than their husbands in the Hawk-dove games they played against each other. We did not find any significant relationship between husbands' hawkishness in these games and their resistance towards women's land rights or their preference for the traditional position of women. Husbands were less hawkish the more assets their wives had brought into marriage and the less hawkish their wives were in the Hawk-dove games. We can therefore reject hypothesis H7.

## **7. Conclusions**

We can conclude that the joint land certification reform in Southern Ethiopia has had a positive impact on women's attitudes in favor of strengthened land rights of women and this has also contributed to increased involvement of women in land-related decision-making. Issuing of joint land certificates appears to have been a useful policy tool to promote more involvement of women in land-related decisions within households. We found substantial variation across communities in the wives' land rights attitude index pointing in direction of substantial local variation in the social processes that are likely to influence women's positions on these issues. This indicates that information meetings and awareness raising are critical activities that may enhance the impacts of the reform. Budgets for such activities may be a critical constraint for land administrations and this is an area where donor funds can be usefully invested and have a strong positive impact on women's empowerment. Our study covered very diverse farming systems and different ethnic groups in Ethiopia indicating that our findings are applicable to diverse socio-economic conditions. The findings may therefore be generalizable to other areas in Ethiopia and perhaps other parts of Africa. The low-cost approach in Ethiopia can provide useful insights for other African countries although it is always important to design reforms that fit local contexts as there is no guarantee that a success one place can be replicated elsewhere. Piloting and adjusting designs of tenure reforms in a step-wise way is important to increase the chances of success and prevent large failures.

Husbands' preferences for the traditional position of women showed much less local variation and were associated with the age gap between the husband and the wife, the amount of land the husband had brought into marriage and household livestock ownership. More generous husbands appeared to have wives that emphasized stronger land rights to women. It is likely that men's resistance may decline with more campaigns emphasizing the importance of more equal rights. However, our data did not allow us to test this.

Future research should focus more on the welfare outcomes of the reform, how the intra-household climate for collaboration affects efficiency of household production and its welfare distribution within households. Another priority area should be the relationship between the reform and the extent of increased involvement of women in decision-making and organization of activities at community level.

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## 9. Appendix

Table A1. Factors associated with wife's name on the certificate in monogamous households

	WN1	WN2	WN3
Wives' land rights attitude index	0.033	-0.026	-0.016
Husbands' land rights attitude index	0.004	-0.036	-0.150
Age of household head	0.018**	0.018**	0.011
Household size	0.133**	0.132**	0.134**
Average education level in hh.	-0.063	-0.069	-0.074
Male work force	-0.218**	-0.234**	-0.231**
Female work force	0.047	0.054	0.055
Farm size, ha	0.229	0.154	0.337
Tropical livestock units	0.039	0.048	0.043
Religion dummies, baseline= Muslim			
Protestant		0.072	-0.689
Orthodox		0.209	-0.627
Ethnic group dummies, baseline= Oromo			
Sidama		-0.008	0.013
Wollaita		0.888	1.113
Amhara		-0.240	-1.012
Other		0.374	0.382
District dummies, baseline= Sashemene			
Arsi Negelle	0.154	0.214	
Wondo Genet	1.043***	0.897	
Wollaita	1.054****	0.020	
Wondo Oromia	-0.429	-0.440	
Kebelle fixed effects	No	No	Yes
Constant	-1.026	-0.736	-0.539
Prob > chi2	0.001	0.020	0.001
Number of observations	315	299	261

*Note:* Results from probit models. Four communities were dropped in the model with community fixed effects because they predicted certification perfectly. Standard errors corrected for clustering at community (*kebele*) level. Significance levels: \*: 10%, \*\*: 5%, \*\*\*: 1%, \*\*\*\*: 0.1%.

Table A2. Factors correlated with wives' and husbands' land rights attitudes indices: With dictator game variables.

	Wives' land rights attitude index	Wives' land rights attitude index	Husbands' preference for traditional position of women index	Husbands' preference for traditional position of women index
Age of household head	-0.001	-0.006	-0.007	-0.007
Household size	0.052	0.049	0.007	0.009
Average education level in hh.	0.121*	0.079	0.034	0.050
Male work force	-0.041	-0.043	-0.063	-0.079
Female work force	-0.003	-0.008	0.032	0.047
Polygamous household, dummy	0.391	0.595**	-0.164	-0.185
Land individually owned by husband	-0.039	-0.033	0.062*	0.063*
Land individually owned by wife	-0.116	-0.310	0.096	0.144
Husband's assets brought to marriage, 1000EB	0.055**	0.080**	0.014	0.013
Wife's assets brought to marriage, 1000EB	0.043	0.083	-0.231**	-0.212*
Tropical livestock units	-0.076***	-0.082***	0.031	0.030
Wife's share of livestock	-1.495	-2.068	-0.808	-0.505
Age difference husband-wife	-0.010	-0.012	0.015**	0.013*
Land certificate dummy	0.076	-0.101	-0.048	0.038
Farm size, ha	0.070	-0.072	-0.273**	-0.248*
Husband's allocation to wife in dictator game	0.023**	0.017*	-0.010	0.000
Wife's allocation to husband in dictator game	-0.015	-0.020*	-0.010	-0.003
Ethnic group dummies, baseline= Oromo				
Sidama	0.890**	0.804**	0.154	0.307
Wollaita	0.243	0.303	0.192	0.341
Amhara	0.403	0.230	-1.530***	-1.450***
Other	0.229	0.170	0.405	0.465
Religion dummies, baseline= Muslim				
Protestant	-0.727**	-1.844***	0.224	0.181
Orthodox	-0.580	-1.677***	0.443	0.446
Other	-0.862	-1.859***	-0.495	-0.517
District dummy variables, baseline= Sashemene				
Arsi Negelle	0.678**		-0.375	
Wondo Genet	0.002		-0.325	
Wollaita	0.938*		-0.064	
Wondo Oromia	0.206		-0.010	
Community fixed effects	No	Yes	No	Yes
Cut 1 constant	-1.222**	-1.478**	-1.118***	-0.546
Cut2 constant	0.013	-0.100	0.115	0.738

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Cut3 constant			1.207***	1.877****
Prob > chi2	0.000	0.000	0.000	0.000
Number of observations	319	319	319	319

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*Note:* Results from ordered probit models. Significance levels: \*: 10%, \*\*: 5%, \*\*\*: 1%, \*\*\*\*: 0.1%.