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Land ownership and women's empowerment – Combining survey and experiments in Peruvian rural households

A background paper for the WDR 2012 report on Gender

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1 Introduction

Gender equality has become an integral part of policies in poor developing countries. The perspective of women's rights as a human right not to be refuted by culture or political majority decision-making is rather new. In addition to being an aim in itself, gender equality seems to increase economic productivity through changing household resource allocation. A growing empirical literature shows more development and improved wellbeing in households with influential women (Godoy et al. 2006). National and international policies in developing countries have hence started to explicitly favor women at the cost of men, e.g. family support cash transfer programs that are paid only to women, additional investments in female schooling and explicit priority of women in public policies and laws.

The new land law made for the formalization of property rights in Peru has defacto led to a redistribution of land from men to women. Fuentes and Wiig (2009) find that the share of co-ownership rose from 13 percent in year 2000 to 43 percent in 2004 after formalization of land titling in Peru, reducing the male individual land ownership accordingly. The political intention is to empower women.

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The main theoretical explanation for such empowerment effect is that a woman with capital will achieve a better living standard compared to a woman without capital in case of marriage breakdown. This improves her threat point in a bargaining model illustrating household decision-making and change the resulting Nash equilibrium in her favor according to Manser and Brown (1980). Furthermore, rents from her capital will be part of total household income. Social norms in general indicate that people who contribute more to the common good also has the right to decide more regarding its consumption.

We do not analyze the impact of joint titling directly, but rather test the basic assumption behind the well intentioned policy change of imposing joint ownership of land in Peru: Will a woman with more land ownership actually be more empowered when it comes to influencing household decision-making?

This research project applied different methodological approaches during fieldwork in 2010 to investigate land ownership and empowerment. The qualitative interviews indicate that relative land ownership between the spouses affects household decision making in favor of the most affluent. We find some support for this in our quantitative analysis. A tobit regression model is run on 225 household observations where experiments took place and the individual responses by man and woman differed, i.e. hence it constitutes a subset of the full household survey of 1280 household.

We construct our dependent variable *Empowerment* using the public goods game experiments by comparing the contribution in the round of joint decision making to the contribution by respectively woman and man in secrete rounds of individual decision making. Our *Empowerment* variable will have a larger value, the closer the joint decision is to the woman than the man, i.e. zero if joint is identical to the man's contribution and one if identical to the woman's contribution, as we assume bargaining between the spouses over the joint decision.

A separate survey for the same household covers the main socioeconomic indicators and contains detailed modules on ownership and inheritance of agricultural land. This enables tracing of the effects of different aspects of land ownership as explanatory variables on empowerment in different regressions models.

The estimation results from 225 households large sample give support to our hypothesis that capital ownership enhances women's empowerment. A dummy male land ownership by men has a significant negative impact women's empowerment, while there is no effect for the corresponding land ownership variable for women. However, the endogeneity of ownership probably leads to biased coefficient estimators as empowered women have a higher probability of land ownership. Furthermore, empowerment might improve the income earning capacity of the household and hence raise funds to purchase more land. Our main estimation strategy is then rather to use a variable on inherited land as it is less dependent of the behavior and personal characteristics of the spouses. The dummy for land inheritance by the woman is significantly positive at 1 percent level. The effect of male land inheritance is however also positive, the effect although lower and significant only at a 5 percent level. This result is also supported in econometric models using inheritance as instrument for land ownership.

The positive effect of male landownership indicates that "wealth" and not only the relative capital stock between the spouses matters for relative decision making. Qualitative interviews indicate that women might benefit from male ownership of land after divorce of three different reasons. (i) Land inheritance and/or intervivo transfers are actually perceived as transfers of land from the parents of one of the spouses to the couple as unit, (ii) compensation if the husband is to blame for the marriage breakup and/or (iii) women keep land in custody for their children if they become the main post-marriage provider.

2 Background and literature

There are still few studies that investigate empirically the assumed empowerment effect of capital ownership which lies at the heart of gender sensitive policies. The most common empowerment indicators are outcomes which are thought to reflect differences in preferences between women and men. The outcome variables that are used are; health, education, spending on children, labor participation, etc. Positive changes in these outcomes are thought to reflect more intra-household bargaining-power of the woman. Another strand of the empirical literature simply records the respondent's perception of women's influence on household decision making. We choose a different approach by asking couples to participate

in experiments where the comparison of joint to individual decision-making outcomes reveals the women's decision making power.

2.1 Peru

Women in Peruvian rural communities are in general thought to have a weak position. Men control the public spaces as community assemblies and irrigation boards, both excluding women from assemblies and holding the leadership positions themselves. However, little is known about what actually goes on inside the rural household, how power is divided between the different household members and what determines the level of influence of each household member.

Intra-household violence and male alcohol abuse is common in rural Peru. This is often taken for a sign of a weak position of women within the households. Other characteristics of the household indicate a rather strong position of women. It is common in poor households in Peru as in other developing countries that women actually control the household economy. She takes the role as the accountant of the household, both keeping the money physically and making sure that expenditures are held within the household budget constraint. Even men support the idea that women are more capable than men in controlling the household economy². However, accounting does not necessarily imply the right to decide over how joint money is being spent. She might simply be a "subordinate" effectuating the order of her husband. However, asymmetric information and physical control empowers the woman, as she knows more about available funds and needs and can furthermore implicitly resist to execute negotiated purchases by "dragging her feet". More important, knowing more of the need and possibilities than her husband makes it easier to argue for solutions to her preference. In our qualitative interviews we find that women tend to control smaller purchases and sales of products, while men decide over more valuable transactions and investments.

A fundamental discussion on gender equality in the Peruvian countryside is whether discrimination of women is traditional or a new phenomenon. Collins (1986) claims there is a rather egalitarian division of labor in rural areas of Southern Peru where self-subsistence is still common. Both parts will then depend upon each other and all tasks are thought to be

² 68 percent of the household economies are managed by the woman, 6 percent by the man and 25 percent by both, according to the women themselves in the separate individual part of our household survey. The response by men differs only slightly.

equally valuable for the survival of the household. However, within the market economy male labor is valued more highly, and this perception of relative value of the sexes is absorbed as norms by the household. The man is expected to decide more simply because he earns and contribute more to the household, something which Sen (1990) denominates as the norm of “perceived contribution response”. Deere (1982) on the other side claim that increased market integration in Peru has led to labor migration by men, and women have increasingly taken more responsibilities for the family farm and daily decision making in the household. There is furthermore a trend for feminization of agriculture in Latin America.

2.2 Literature Review

“Empowerment”, or “power”, is hard to relate unambiguously to empirical, material outcomes. The term reflects the ability to decide over your own as well as others’ destiny. It also relates to the amount of possibilities you achieve or is given, and your ability to convert these possibilities into your preferred outcomes. Sen (2000) applies the concept of “capabilities” for this set of possibilities open to a given individual, but stresses that the outcome differs according to this person’s preferences. The typical example would be the ascetic who puts less value on material consumption³.

The second type of preference structure that obscures the relation between empowerment and material outcomes is altruism. If you care for others rather than yourself, both observed outcomes and process of decision making would favor others. Actions in the public goods game reflect altruism towards the other community members as such, but in our empowerment measure altruism towards your partner also plays a part. This perceived low empowerment might then be misleading simply because another more favorable outcome for that individual would be possible. Agarwal (1997) postulates that women tend to care more for other household members compared to men, for example men spend more on buying more personal consumption goods such as tobacco, alcohol, etc (Hoddinott & Haddad 1995)⁴. Women are thought to spend more on health, education, etc. but they demonstrate a

³ In the “post-material” state of the current western world the feeling of unwanted abundance has also entered the middle classes, leading people to save for some undefined need in the future rather than consumption today. They prefer not to consume even though they have the “power” to buy whatever they want. However, this point is less relevant in the Peruvian countryside where 35 percent of the population is still defined as poor (INEI, 2009)

⁴ However, the interpretation of such consumption as selfishness is not straightforward. Individual adaptation to social expectations of seemingly unproductive behavior might be optimal also for the family, e.g. job opportunities are often circulated between drinking buddies.

preference for individual luxury goods like jewelry and costly traditional clothes in the Peruvian highland.

How will our research agenda on control over agricultural land enter the main theoretical models on household decision making? The unitary household model of Becker (1991) presumes at least one altruist household member. The existence of such will lead to redistribution between its household members to maximize of the sum of individual utility. Redistribution of capital between individuals within or after marriage will not lead to a change in the individual consumption pattern. Households in developing countries dominated by a single person are often taken to be the empirical representation of this model. Such “dictators” (or “patras familias”) might care more or less for the other household members, i.e. different degrees of altruism in his/her preferences. He might hence impose his own will or his role is only to coordinate the need of all household members. Wiig et al. (2009) find that male household leaders in the strong matrilineal culture of southern Malawi are merely figureheads presenting consensus reached by the various women in the larger household to the outside world. Such observed “unitary” model is then in fact a complex set of intra household negotiations.

The seminal theoretical papers of Manser and Brown (1980) and Lundberg and Pollack (1993) introduces explicit household bargaining instead. The former develops a cooperative bargaining model with explicit utility functions for each spouse. Marriage dissolution with the resulting utility level represents the threat point of the game. The Nash equilibrium solution maximizes the weighted sum of differences between the utility of the negotiated solution and the utility of the threat point for the woman and the man respectively. The main idea is that the spouses agree and make binding agreements on individual behavior to achieve an outcome that is better for both compared to the threat point.

Lundberg and Pollack (1993) use a similar bargaining model. The threat point is however a non-cooperative behavior within the marriage as dissolutions can be prohibitively expensive (for example due to social sanctions). The main assumption is that each individual controls individual income, and will contribute to a collective good taking the other spouse contribution as given in the threat point. Land ownership by women will then increase their individual income as far as she really controls the land rent from her own property.

These discussions on cooperative bargaining solutions focus too narrowly on the threat point according to Agarwal (1997). The distribution of total surplus from collaboration will in her view depend on norms, expectations, social pressure, knowledge, individual preferences, but power etc. that affects the negotiation process itself. Indicators of human capital, culture and social interaction are hence elements of the “negotiation power” parameter linked to the difference between outcome and threat point in the Nash cooperative bargaining model solution. These theoretical papers take negotiation process related power as fixed values when discussing the effect of varying capital and income. Agarwal also refers to Sen (1990) which postulates that distribution of surplus according to contribution and/or need are two possible contrary principles that anyhow often coexist. More land rent to the women will hence not only affect the threat point of no cooperation, but also influence the outcome through the effect of the “according to contribution” norm in the negotiation process itself.

Surprisingly few empirical studies document empirically the effect of land ownership on women’s empowerment in developing countries. Furthermore, the use of different indicators in the literature makes comparison difficult as the influence of women, hence empowerment, might differ over tasks, place and time. The endogeneity of capital is another problem that is only possible to overcome with panel data or valid instrument variables. Few such datasets exists as more explicit indicators of empowerment are seldom included in large surveys and register data.

There are five main categories of empowerment indicators in the literature. Our study speaks to the trend of using actual behavior of individuals in the expanding economic experiments literature. Carlsson et al. (2009) elicits joint and individual risk preferences of Chinese couples, and do not find any differences between joint and individual behavior. The study of Carlsson et al. is probably the closest to our study, as it uses relative decisions as a household-specific measure of women’s influence. They find that men overall have larger influence on joint decisions than women, but that women have a larger influence in households in which women have higher income, larger share of total household income, or in which she is a member of the communist party. Female contribution to household income has a significant and positive effect on this empowerment measure, but there is also a household wealth effect. This indicates that women controls part of the joint (and even the husbands) income when

interpreted in light of the theoretical cooperative bargaining models. However, other authors find a significant trend towards either the higher or lower individual contribution. Bateman and Munroe (2005) find that the contribution in joint decision making in risk games tend to be lower than the average of individual choices, i.e. agree closer to the most risk averse alternative. De Palma et al. (2010) estimate joint and individual risk aversion parameters based on a risk eliciting choice list experiment. They find that joint decisions are less risk averse than individual decisions, contrary to the findings of Bateman and Munro. They also estimate the overall respective influence of men and women on the joint decision, finding that men have larger influence in early rounds, while women's influence increase in later rounds.

In the second category, female income and capital are used as empowerment indicators in themselves. Empowered women will surpass potential resistance to labour participation outside the home by their husbands, and this literature further assumes that she will control at least part of her income herself. Peterman (2010) traces a significant effect of exogenous changes in land inheritance and ownership rights at community level on individual women's employment and earning opportunities in a 13 year longitudinal household panel study in Tanzania. However, endogenous feedback effects can't be ruled out even in this fixed effect panel model. When female labor participation increases, more empowered women can press for improved ownership and inheritance rights to land. Labor economics using register data in developed countries often analyze income and labor participation by gender, which hence can be interpreted in the gender empowerment indicators.

The third type of empowerment indicator is the revealed consumption in combination with assumed gender differences in preferences. Ashraf et al. (2010) find that female savings products shift consumption towards product of female preference, while Rangel (2006) found that an exogenous shift in the divorce threat point through the legal introduction of alimony rights in Brazil increased investment in schooling for especially older girls. Hoddinott and Haddad (1995) show that the household expenditure share on food increases and share on tobacco and alcohol decreases as the women's share of total income increases.

The fourth possibility is to ask respondents to directly evaluate in a survey women's rights within the given household to decide. Allendorf (2007) find that women who own land are

more likely to be reported to have the final say in household decisions in rural Nepal. Hoddinott and Haddad (1995) and (Doss 2005) also use similar indicators of empowerment.

Fifth, different cultures might have different ideas of what is the domain of female and male decision making. It is hence difficult to use one type of decisions as a general indicator of empowerment across nations and cultures. Some authors use indirect measures that are thought to be general outcomes of empowerment in all cultures, e.g. matrimonial violence, age difference of couple, employment, etc. Mason and Smith (2003) find that such empowerment indicators differs between cultures in six Asian countries.

The use of empowerment indicators in regression analysis often disregards the potential endogeneity effect on the explanatory variables. The solution might be to find “Natural experiment” situations as in (Lundberg et al. 1997; Rangel 2006) or in the construction of social experiments, see e.g. Ashraf et al. (2010). Our analysis on land ownership in Peru suffers from the same endogeneity problem. A common solution in the literature has hence been to use individual asset holdings at the time of marriage (see e.g. Namoro & Roushdy 2008; Quisumbing & Maluccio 2003; Thomas et al. 1999). We use inherited assets instead of the stock of assets the man and woman had at the time of marriage, assuming that acquiring those assets is independent of the bargaining and power structures that exist between the spouses. How much assets a woman or a man inherits depend only on their parents’ capital stock and willingness to give to their offspring (before or after death).

3 Methodology

The analysis is based on three different data collection approaches in the PeruLandGender research project fieldwork that took place in October - December 2010. The main household survey was conducted in 1280 households in eight highland districts in four departments, Cusco, Apurímac, Ayacucho and La Libertad, while the additional experiments were conducted on a subset of 285 household couples in one district in the Apurimac department and two districts in the Cusco department. However, in this paper we only use data from 3 districts in Cusco and Apurímac where we have also conducted experiments. Data from qualitative fieldwork informed the formulation of the survey questionnaire and also the quantitative analysis of this paper.

The research group was divided into a survey team and an experimental team. The survey team finished their work in a given community before the experiment team entered. Both the survey and the experiments were conducted in the participants' homes. All interviewers and instructors were women in the experiment team, in order to equalize possible gender effects.

3.1 Sampling

Sampling of districts was made using both a purposive and probabilistic strategy. The districts were chosen using the following three criteria: (i) high levels of land titling, (ii) more than half of those parcels should be titled jointly and (iii) coexistence of both *Recognized peasant communities* and “private” communities⁵. Then, within district we first excluded communities in high altitudes as livestock owners there was limited involvement in agriculture, and then drew at random four communities from the corresponding category of community. Elected communities that did not want to participate were replaced by random selection from the remaining communities of the given kind within the district.

When visiting the selected communities, a list of households considered to own at least one parcel of land were made in collaboration with the president of the community and other authorities. 20 households were then drawn at random, and replacements in case of absence or refusal to participate were also drawn at random from the remaining on the list.

Sampling and data collection was originally done with the aim of studying the rural land titling program's effect on intra-household dynamics and female empowerment. This treatment effect design of being a CCR or not is not exploited in this analysis. However, in both systems the community members have defacto individual tenure rights and hence do not represent a real difference in property culture. We find considerable number of parcels in “private” communities do still not have an individual title, but also a non-negible amount of individual PETT titles in the CCR.

⁵ The titling agency PETT was only supposed to issue individual titles in the latter as land is formally commonly owned in the former. In an impact analysis comparing communities within the same district one minimizes the potential omitted variable bias as we assume that the culture, the history and the current socio-political context is more or less the same within the district. In this analysis a district dummy will correct for these cultural effects.

3.2 Household survey

There are few good indicators of intra-household decision-making in the existing Peruvian data sets. We hence designed our own household survey questionnaire including interviews with the principal couple⁶ in the household, i.e. both man and woman separately. Data collection was conducted by the Peruvian survey company CUANTO using Quechua speaking surveyors in the regions where this language dominated.

The household questionnaire had three parts: one that asked for household information, one with questions directed to the woman of the principal couple of the household and an identical questionnaire directed for her male partner. The household modules include among others socioeconomic information, questions about division and allocation of labor, plot level information about the tenure regime, agricultural investments and production, an income module, assets holdings and questions on the household's access to credit. The household module was always conducted with both man and woman present and at the end their relative response rates were recorded by the surveyors.

The individual questionnaires were conducted in privacy with the man and woman in the household. The individual questionnaires do repeat some of the questions on assets and ownership to assets to control if answers coincide with answers given in the household module. It also includes questions on intra-household decision-making, income pooling and transparency, intra-household violence, contraceptive use and perceptions about behavior related to gender roles and relations.

3.3 Experiments

The experimental team entered the community one or several days after the survey team finished their data collection in each particular community. The games were conducted in the participants' homes, with face-to-face instructions and visual illustrations to increase understanding. We ran three different games; a trade game, a standard public good game, and a risk game. All games were first run with each spouse separately, then with the two together. Each individual hence participated in six games and all six games were paid additively; the

⁶ With the term "Principal couple" we mean the couple in the household that contributes most to the household economy and takes most of the decisions within and on behalf of the household.

three games in the individual part and the three games in the joint part. The whole session in one household lasted around 1.5-2 hours. However, we will in this analysis report only from the public good game in which we believe outcome best reflects relative power between the spouses within the household. This is partly because individual decisions are dispersed in the public goods game, hence the scope for bargaining power is bigger, and partly because the empowerment variables from the public goods game to a higher extent was correlated with other empowerment indicators from the survey questionnaire.

The experiments were conducted with the following procedure. One instructor entered the household after having made an appointment with the couple. She introduced the couple to the experimental setting (see instructions in the appendix) when both spouses were seated together. To the extent possible, it was made sure that the couple was alone with the instructor, without children or other household members present. The couple was told that they were going to earn money in the games, but the amount would depend on how they and other participants in the community played. Earnings would hence have to be paid out after 2-5 days later when all participants in the community had played. Initially, participants were only told they would play individually, and they agreed amongst themselves who should start. At the time of the individual parts, they were not aware that a joint part followed, for them not to consider a possible deviation between individual and joint decision *ex ante*. After the introduction, one spouse left the room and came back when called upon. The instructor started each individual session by asking a few survey questions, about general life satisfaction, health and trust (these questions lasted ca 5 minutes). The instructor then went through each of the three games in a randomized order, which was repeated in the individual game of the other spouse as well as the joint part to keep all effects constant within the household. After both individual experimental parts were conducted, the two spouses were reunited, and were told they would participate in the same three games again, however this time they would have to make a joint decision in each game. For each game, the instructions were repeated briefly, to make sure both spouses recalled the rules of the games clearly. They were told that they were now to make joint decisions in each game, but the instructor did not tell them what procedure (agree, discuss, flip coins, etc.) they should follow to reach a joint decision. The first answer by one of the parts was accepted as long as the other spouse did not object. In that

case, they were told to produce one single answer while the instructor stepped away to leave the two alone⁷.

The game analyzed in this paper is the standard linear public good game (see Ledyard, 1995) with each group consisting of four randomly selected and anonymous players within the community. Each player got an initial endowment of 7 Soles and had to decide how much to contribute to the *group earnings* (g) and how much to retain for him or herself ($7-g$) The total contributed by all group members would be doubled by the experimenters, and then split equally between the four group members. The marginal payoff for individual contributions to the public good is hence $2/4=0.5$ The payoff (V) function faced by each participant (i) was the following:

$$V_i = 7 - g_i + \frac{1}{4} 2 \sum_{j=1}^4 g_j$$

Great care was taken to ensure that each participant understood the rules of the game in the individual part. Several pre-determined examples were used and individual and group earnings were illustrated visually with actual coins in order to increase understanding. It was made clear that participants would not receive any money immediately independent of amount contributed. Participants were not informed about any results from the individual part of the experiment before they entered the joint part, to reduce possible learning effects across parts and games. In the joint part, the couple was told they were going to make exactly the same decision as in the individual game, but now they had to decide upon the same contribution level. New groups of 4 would be drawn, but the spouses would still be in different groups. They just had to make the same contribution level to their respective groups. Hence the individual payoff structure and incentives were exactly the same in the individual and joint part.

The participants did not know the identity of their co players, only that they came from the same community and that their spouse was *not* part of the same group. Groups were drawn after all experiments were finished in each community. If the number of participants in the

⁷ If the couple did not agree about a joint decision, the instructor would move some meters from the table/decision area, to leave the two in a more “natural decision setting”. This was to induce the more common bargaining situation in which the couple is alone without foreign observers. The instructor would stay within reach, possibly listening to their bargaining, until she was called back by the couple.

community was not dividable by four, the excess individuals would be matched randomly with already allocated individuals.

Payments were made after all experiments had been conducted in each community, so that each participant received his/her payments the same day. The earnings were placed in a sealed envelope which was given to the individual participant together with oral information on the results and their earnings in each particular game. The participants were not told how much the other group members contributed, but only the total contribution to the group, and their own earnings. Anonymity of decisions was emphasized throughout the instructions and participants were under no circumstances informed about the decisions of their spouse or other community members. Average individual earnings from all 6 games were around 45 Peruvian soles, varying between 20 and 70.

3.4 The Empowerment indicator

We use the joint decision in each game, relative to the individual decisions, to obtain a game specific measure of relative bargaining power that is interpreted as the *Empowerment* variable. A joint decision is assumed to be a function of individual preferences revealed in the individual games, relative bargaining power, and the joint process. We report a continuous and censored measure of female bargaining power, reported as the difference between the joint and the male decision, relative to the difference between the male and the female decision. Due to the limited choice set we also expect some joint decisions to lie outside the individual decision spectra (for example if the individual decisions are very close). These households will be reported as full bargaining power to the spouse which lies closest to the joint decision. The formula for female bargaining power, and hence empowerment, is as follows.

$$Empowerment = \begin{cases} 1 & \text{if joint decision outside individual interval on woman's side} \\ abs\left(\frac{joint\ decision - male\ decision}{female\ decision - male\ decision}\right) & \text{if joint decision in the interval between the two individual decisions} \\ 0 & \text{if joint decision outside individual interval on man's side} \end{cases}$$

Households in which the two individual decisions are exactly equal will give no information about relative bargaining power, hence these observations are set to missing. A female bargaining power reported as 0.5 thus implies a joint decision non-equal to and equally close

to the individual decisions. A value of 1 implies full bargaining power of the women, and a value of 0 implies full bargaining power of the man.

The female bargaining measure has a lower censoring at 0 and an upper censoring at 1, therefore we use a tobit regression model in our analysis. Inclusion of the joint process implies that decisions made together might differ from those made individually. This should be especially relevant in sensitive choice situation, in which you don't want to reveal your true preferences in front of your spouse⁸. It might be more difficult to stick with certain preferences when you have to argue verbally for their benefits. There might also be learning effects from discussions, or that joint choices to a larger extent reflect the preferences of the whole household, which might be different than an individual's preferences. One might for example think that household economic needs will obtain a larger weight in a joint discussion than in an individual's decision. Thus we need to take possible differences between joint and individual decisions into account when analyzing bargaining power. If a couple contribute more in the public good game when together than when alone, the spouse who contributed more initially will be reported to have full bargaining power, even though this might not reflect the true picture. In our analysis of female bargaining power we control for whether the woman individually contributed more than the man, in order to reduce this bias.

4 Results

4.1 Descriptive public goods game behavior

Men contribute significantly more than women in the individual public goods game experiments, on average 3.25 soles of the initial endowment of 7 soles (46 percent) compared to 2.81 (40 percent) for women. However, the average for both sexes is within the interval in most studies which lay between 40 and 50 percent contribution (Ledyard, 1995).

⁸ Ashraf (2009) finds that men behave differently when alone and when observed by their wives, when deciding how much to save in a private account and how much to spend on household consumption (consumption in this case would imply giving the money to the wife).

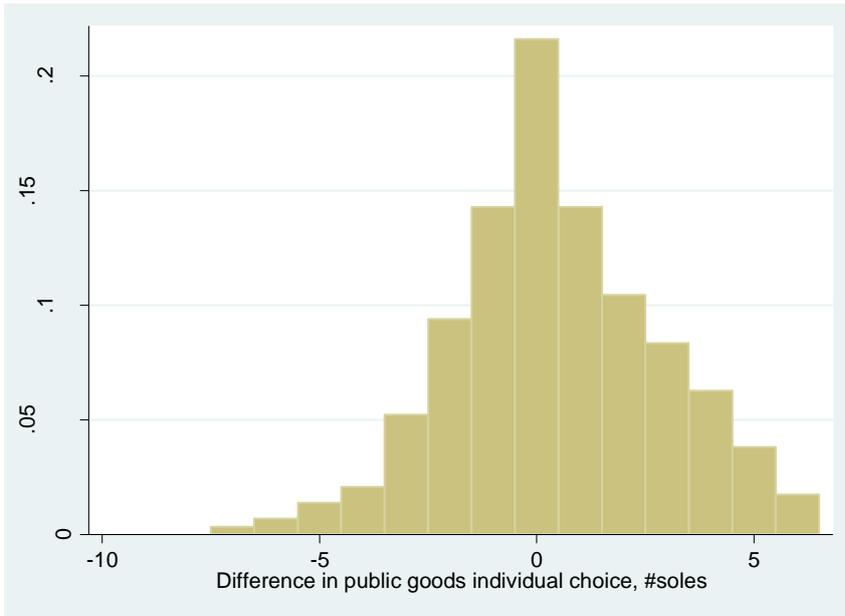


Figure 1: Difference between female and male individual public goods game contribution within the 285 households, # soles.

When measuring the difference in contributions by household between women and men given in Table 1 we find the opposite gender pattern. Men contributed most in 33.4 percent of the cases (below zero in Figure 1), while women contributed more in 44.9 percent of the cases (above zero in Figure 1). Both spouses made equal contributions in 21 percent of the households and these observations are then taken out of the sample since it becomes impossible to calculate our empowerment indicator based on the relative closeness of the individual contributions to the joint decision. We hence proceed describing the remaining 225 household observations where individual decision differed between woman and man.

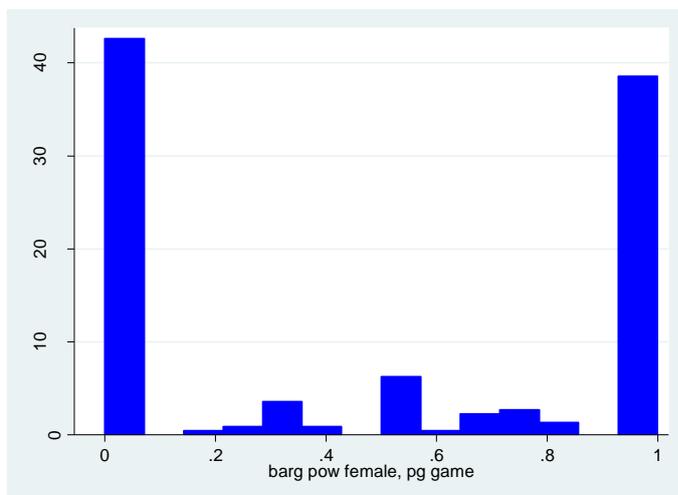


Figure 2: Distribution of public good game female bargaining power in percent of the 225 households where contributions differed between the spouses, zeros indicate no women empowerment while one most woman empowerment.

We see that only in 19 percent of households the joint decisions were between the individual choices, while in the rest of the households the joint decisions were either equal or more extreme than one of them. In 28 percent the joint decision was equal to the man's contribution and 14 percent more extreme. Similarly, in 12 percent of households the joint decision was equal to the woman and in 27 percent of the cases more extreme. The polarization of joint choices is common in the group decision literature, as well as the seemingly inconsistency that joint choices are either larger or smaller than both the individual choices (Shupp & Williams 2008; Sutter 2009; Teger & Pruitt 1967). The tendency of groups to make more extreme or polarized choices than individuals in judgmental decision tasks is often explained by Social Comparison Theory in psychological literature, assuming that people want to appear as socially desirable in front of others and group decisions hence are moved towards norm conforming behavior (Cason & Mui 1997; Davis 1973). The norm in public goods game might be either high or low contributions, depending on whether the responsibility is felt higher towards the group or the household, hence the effect might move couples in both directions. There is a general drift towards higher contributions in the joint setting, indicating that most couples take higher contributions to be the social norm.

Compliance to social norms then plays an important role. The public goods game resembles communal works where men tend to participate more than woman, i.e. 92 percent of men in all household work on average 12 days per year while the corresponding figure for women is 68 percent and 5 days. This correlates with the general higher average contribution of men than women in the public goods game.

The average joint contribution is 3.37 soles, and higher than the average individual contributions by either sex (see graphical distribution Figure 7.1 in appendix). Both the gender differences and the differences between joint and individual contributions hold in both departments, though overall contributions are significantly higher in Apurimac than in Cusco (2.99 versus 3.79).

Note that public good game bargaining power is rather evenly distributed between men and women in figure 2. Average female bargaining power in the trade game is 0.48, which is not

significantly different from 0.5. However, the joint decision appears to be a binary choice as either equal or more extreme than the woman's or man's. Restricting possible contributions to whole monetary units of soles implies only 7 possible choices. In table 1 we see that most individual choices of the spouses were quite close, leaving few options for in between choices of the couple later. Frequencies of joint choices relative to individual choices are listed in Table 7.1 in the appendix.

4.2 Regression analysis

4.2.1 Basic model

Ownership and access to capital is expected to affect women's empowerment mainly through improving her opting out of marriage option as hypothesized by Manser and Brown (1980). The better her material wellbeing if marriage breaks up, the less risky it becomes for her to demand influence within the household. Our main research interest is hence to investigate whether access to land (capital) increases the influence of women in household decision making in the expected positive way.

Variable name	Stata	Coef.	Std. Err.	t	P>t	95% Conf. Interval	
Trend	gr_fhigherd	1,059575	0,343202	3,09	0,00	0,382974	1,736176
District1	disapuhuan	0,574132	0,579285	0,99	0,32	-0,567891	1,716154
District2	discusanda	0,632083	0,588024	1,07	0,28	-0,527167	1,791333
Literacy women	edulitwom	-0,115559	0,386336	-0,30	0,77	-0,877195	0,646078
Spanish secondary woman	lanspasecwom	0,273837	0,492556	0,56	0,58	-0,697205	1,244879
Marriage years	maryea	0,006367	0,026166	0,24	0,81	-0,045217	0,057951
Age diff couple	agecoudif	-0,061249	0,034980	-1,75	0,08	-0,130209	0,007712
Age woman	agewom	0,013300	0,026495	0,50	0,62	-0,038933	0,065533
Daughter above 15	hhmemfem3	0,164739	0,430196	0,38	0,70	-0,683363	1,012842
Son above 15	hhmemmal3	-0,757965	0,385654	-1,97	0,05	-1,518257	0,002327
Distance district capital	distfoot	0,001606	0,001788	0,90	0,37	-0,001919	0,005130
Social program numbers	socpronumb	-0,281532	0,277801	-1,01	0,31	-0,829197	0,266134
Recognised community	ccr	-0,594579	0,458020	-1,30	0,20	-1,497536	0,308379
Inheritance assets woman	inh_asset_f	-0,914207	0,506336	-1,81	0,07	-1,912415	0,084001
Inheritance assets man	inh_asset_m	-0,417334	0,528771	-0,79	0,43	-1,459772	0,625104
Inheritance land women	landinhwom	1,090991	0,414503	2,63	0,01	0,273826	1,908156
Inheritance land man	landinhman	0,725519	0,364046	1,99	0,05	0,007826	1,443212
Constant	_cons	-0,610298	1,692831	-0,36	0,72	-3,947604	2,727007
	/sigma	1,894654	0,267977			1,366354	2,422953

225 observations, LR-Chi2 35,26; Pseudo R2 0,075; 96 left censored, 42 uncensored and 87 rightsensored

Table 1: Basic Tobit regression model explaining *Empowerment* using inheritance of land as main explanatory variable reflecting land ownership (source: PeruLandGender data set)

This basic regression results are given in Table 1 and then compared to alternative formulations in variants in the appendix. We prefer to apply inheritance rather than ownership of land due to the possible endogeneity problem. Households with more empowered women might achieve a more efficient allocation of household labour power and household resources in general, increasing income which further leads to acquisition of land. Furthermore, ownership is self-reported in the survey and we hence expect that more women or joint ownership is reported, the more empowered she is. We see that the dummy *Inheritance land women* is significantly positive at 1 percent level, while the corresponding dummy *Inheritance land man* is significant at 5 percent level. This supports our hypothesis as the coefficient value of 1.09 for the former is higher than the 0.72 for the latter. Other combinations of land ownership and instrument variable models will be explored further in the following subchapter.

However, also land and capital that belongs to the man might improve her intra-marriage bargaining power (and hence empowerment) as she will normally get some of this capital after marriage break up. There are three main reasons for this transfer of especially land: (i) Even when land is defined as his property under formal law does local customs in some areas and situations imply that land is defacto joint property. (ii) Land can be given to her as some form of compensation if the husband is considered responsible for marriage breakup. (iii) Land is given to her in custody for the children if she becomes responsible for raising them after the husband has left the household. The positive wealth effect for his or joint land property is however expected to be weaker than for land individually owned by her. The wealth effect might also be negative if the living standard after marriage breakup is valued relatively to what she enjoyed while married rather than in absolute terms, e.g. middle income housewife lose status in society and have to start working after separation.

The literature has also found effects of household and individual characteristics on women's empowerment. Our indicator of empowerment is based on experiments, and that strand of the literature often finds that people play differently when they make choices individually, compared to in groups. Contributions to public goods game are considered the norm of social behaviour, e.g. similar to different cooperation situations in their daily lives. We hence expect the couple to agree on the level of contribution that is closest to the highest of the individual choices. The included variable *Trend* is a positive dummy if the individual choice of the

woman is higher than the individual choice of the man. The effect is significantly positive at 1 percent level and hence reflects that the joint choice is closer to the women simply because she had contributed most at the individual level.

Intelligent and informed household members do normally have considerable influence on household decision-making. However, we tried several combinations of schooling and knowledge, absolute or relative to spouse, without any significant results. We hence include the dummy *Literacy women* which is positive if the woman knows to read and write to reflect the education effect. We have also tried other schooling indicators, both absolute and relative to the man, but none of the models gave a significant effect. The influence of the woman will also depend on her relative position within the household. We do not find the expected positive effect of the duration *Marriage years* measured in number for years. We somewhat surprisingly find that women younger than the man, as the *Age difference couple* measured in years are significantly negative. The explanation might be that young women negotiate influence to be willing to marry older men. The *Age woman* measured in years has no significant effect either.

More interesting it seems to be direct competition of influence by other members of the household. *Daughter above 15* is a dummy for the existence of such older female offspring in the household is not significant, while the corresponding for the dummy variable *Son above 15* is significantly negative at 5 percent level. This might reflect that such sons take her place as discussion partner with her husband in both agriculture and daily life as he grows up. In the comprehensive model (1) in Table A1 we also include dummies *Man parent in HH* if either the mother and/or father are integral parts of the household, and likewise *Woman parent in HH* if one of her parents are there. The latter is highly significant, but still not included in the basic regression model due to few positive observations and we also expect endogeneity since women in a strong position can get her husband to accept it. The existence of parents in household might reflect whether the couple actually moved into their household. A possible proxy for this is whether the coupled live in native community of him, her, both or none of them, of which we found no significant effect in un-reported models.

Gender roles are often set by society at large, and women's emancipation is considered to be a modern phenomena. At the individual level we thus expect women that are able to

communicate in Spanish will be more empowered. The indicator for contact with others and how the household depends on her contribution is a dummy for whether her main activity is housework or not, which was not significant in any of the models and hence taken out.

There is no significant effect of the dummy *Native language speaker*, and this variable is taken out in the basic model as nearly all belong to this category. The variance is larger for *Spanish secondary woman*, but this positive dummy if the woman speaks Spanish as a secondary language is not significant either. Gender culture is however a collective phenomenon as the individuals tends to copy role figures locally, also because social sanctions for not doing so exists. We hence expect women to have less influence in more traditional communities. None of the applied indicators, i.e. a dummy for living in a *Recognised peasant community*, *Distance to district capital on foot* from community measured in walking time or alternative non-reported distance specifications is significant. Gender equality is considered a political aim by both international/national and state/private organisations that work in the countryside, and they try to influence family choices either directly through gender sensitivity training or indirectly through including women in their activities. We did not find any significant effect in the expected direction for the seven categories given in survey, and we have hence kept the *Number of social programs* in the community as the still insignificant control variable in the basic model.

Agricultural land is the main form of capital in poor rural households that took part in the PeruLandGender survey. The other types of capital are not documented in detail, but the survey includes information on whether each of the spouses has inherited a house, animals and a rest category. Since these are rather rear occurrences we have instead constructed dummies of *Inheritance of other assets by woman* and *Inheritance of other assets by man*. The coefficient for the former is surprisingly negative at 10 percent significance level. However, this might be due to the positive correlation 0.18 between inheritance of land and other capital goods for women, which implies that the negative effect is counteracted by an overestimation of the positive effect of land inheritance by women.

4.2.2 Alternative models with ownership and inheritance of land

We also find some of the same effects using other measures of land ownership and land inheritance as reported in Table 7.3.2 in the appendix. The dummy for *Land ownership by*

man in model (4) is significantly negative at 5 percent level, while there is no significant effect for the corresponding variable for women. The effect becomes even more visible when we construct mutually exclusive dummy variable for different land ownership combinations in model (5). When applying the variable *Only man land ownership* compared to the reference category that all land is owned by both spouses, the empowerment variable is significantly lower at 1 percent level. In model (8) we measure land ownership in number of parcels and we also find a negative effect of *Parcels owned by man*. No such effect is found when land is measured in hectares in model (12) or value in model (13).

However, we expect simultaneity bias in the coefficient estimates as reported land ownership might depend on the empowerment of the woman. Our preferred approach is hence to use land inheritance as replacement for reported ownership as in our preferred basic model (2) in Table 7.3.1 where dummies for individual inheritance of both sexes is positive, but the latter effect being the strongest. This pattern also comes to light for other measures of land inheritance. Women are significantly less empowered in household where *Only land inheritance by man* is compared to the reference category of both couple inheriting, while *No inheritance* by any of the spouses is even more negative in model (7). The latter implies that the household “wealth” effect is strong. There are no significant effects for the alternative measures of number of parcels inherited in model (9) or the size of inherited land in model (11), while a higher value of the *Value of land inherited by woman* increases the empowerment in model (13).

Inheritance is however only a proxy for ownership. An alternative is hence to use inheritance as an instrument for ownership. The two are correlated, but the validity of inheritance as an instrument will hence depend on whether we expect it to have any direct effect on empowerment. The link might be both positive and negative. Strong women can argue for inheritance or inter-vivo transfers from their parents, but at the same time parents might treat them unfairly compared to weaker siblings simply because they are more able to get along by one self. Anyhow, in Table 7.3.3 is the women ownership instrumented by the according inheritance within the same measurement unit. We then find that women ownership in model (14) and value of land ownership in model (17) becomes significant. The alternative estimation method of instrumenting for both woman and man ownership do not alter the results in a major way. Only 42/225 observations are not censored in the dataset. In model

(18) we have run a logit regression on a dummy variable equal to one if she is equally or more empowered than the man (52 percent of the sample). The coefficient estimates given in Table A4 are similar to the tobit regression in the basic model, although with some weaker significance.

5 Conclusions

The analysis gives some evidence to support the hypothesis that land ownership influences women's empowerment according to the expectations from cooperative bargaining theory (Lundberg & Pollak 1993; Manser & Brown 1980). Female inheritance of land increases the value of empowerment indicator calculated from experiments, which depends on the relative distance between the woman's individual contributions in public goods game to the contribution made jointly with her husband or cohabitant in a separate round. The effect of land ownership and inheritance by men is also significantly positive on women empowerment, although weaker. This is consistent with information gathered in qualitative interviews which indicate that at least some land owned jointly or by the man alone will actually be in her possession after divorce, i.e. improving her threat point in cooperative intra-household bargaining. However, the difference implies that it matters for women's empowerment whether the land becomes her, his or jointly owned and policy makers are now rightfully discarding the unitary model of the household

The formalization of land property rights in Peru led joint titling to a considerable higher level than joint ownership in an informal setting. The reason is simply that the titling agency PETT made it a defacto mandatory requirement for registration as it would otherwise be brought into a prolonged legal process. The juridical justification for joint titling is however legally dubious since Peru's civil code (known as *gananciales*) states that property acquired prior to marriage or inherited is individual property. Our data in table 7.4a in the appendix shows that 76 percent of the land inherited by women is recorded as joint ownership and 81 percent for the man accordingly. Since men inherit more than women, it implies a defacto redistribution of capital from men to women. This constitutes a rather drastic intervention in a capitalistic country where the respect of private property is the fundament of the economy and society in general. There is hence a need to prove real and lasting positive impacts to justify this

intervention, especially since the full scale experiment in Peru to correct for “historical injustice” in capital distribution between sexes through land titling can be an example for other countries. In Peru, this redistribution took place without public awareness and open discussion as attention was put the titling part of the process. We see a similar candid gender revolution taking place in Colombia today as joint ownership is being introduced under the cover of what is perceived as a more important process. Article 91 of the new law for reparation to the 3.5 million victims of the civil war simply states joint ownership between spouses to issue on the title once individual rights have been accepted by the judge (Colombia 2011). No argument or justification is given in the law.

Our analysis indicates that individual female and joint ownership do empower women and a transfer of land can hence achieve the intended gender equality effects. However, forcing joint ownership through the legal system has probably not been systematically resisted in Peru as the land titling reform is not very far removed from the traditional perception of property rights (even through it contradicts the formal law). In other countries where individual rights are stronger traditionally, such top-down social change might be less successful to actually implement.

Another possible caveat of formalization is that stronger legal property rights weaken traditional rights. Intervivo transfers or inheritance of land will then imply a transfer of the title deed, most probably to the offspring alone rather than the couple as a unit. Under the civil code of “gananciales” it will now become individual property formally, while in the traditional culture the spouse had considerable rights. Distribution of land by gender will hence depend on whether parents follow the equal inheritance rights for all siblings as set in the law. Our qualitative studies indicate that male preference in inheritance of land is still strong in the Peruvian highland. The gender equalizing effect of the current imposition of joint land titling might hence be wiped out in just a generation.

6 References

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7 Appendix

7.1 Experiments descriptive

	Joint contr. less than individual contribution	Joint contr. within individual contr.	Joint contr. higher than individual contr.
Total	28 (10%)	202 (71%)	54 (19%)
Joint contr. closer to male	8 (3%)	77 (27%)	23 (8%)
Joint contr. closer to female	10 (4%)	76 (27%)	15 (5%)
Male contr. = female contr.	10 (4%)	35 (17%)	16 (6%)

Table 7.1: Frequencies of households with joint contributions less, between, or higher than the two individual contributions in the public good game. All categories also listed by whether the joint contribution is closer to the male's individual contribution, closer to the female's individual contribution, or equally close to the two individual contributions. Of the 202 households with joint contributions lying within the range of individual contributions, there are 35 households in which male, female and joint contributions are all equal, and 14 households in which individual contribution are not equal and joint contribution lies exactly halfway between male and female contribution. The corresponding percentage of the full sample, 284 households, is noted in parenthesis.

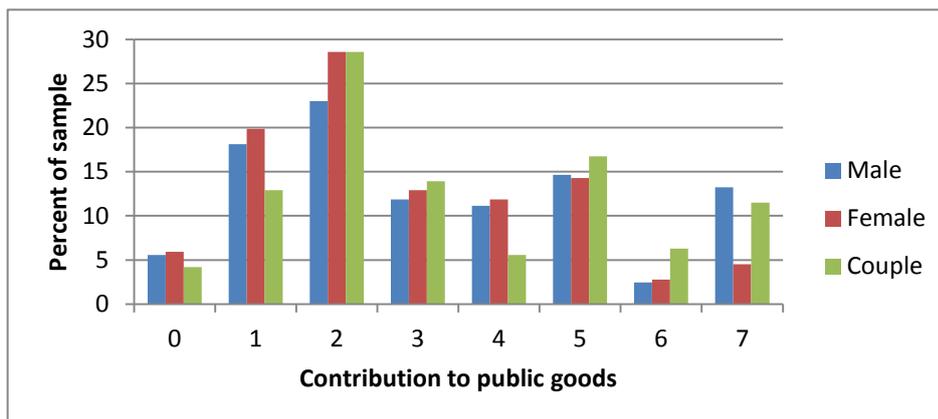


Figure 7.1: Distribution of contributions to the public good, for men individually, women individually and couples.

7.2 Regression variable summary

Variable name	Stata	Mean	Std. Dev.	Min	Max
Empowerment	gr_bpow2	0.48	0.46	0.00	1.00
Trend	gr_fhigherd	0.43	0.50	0.00	1.00
District1	disapuhuan	0.47	0.50	0.00	1.00
District2	discusanda	0.35	0.48	0.00	1.00
District3	Discushuar	0.17	0.38	0.00	1.00
Literacy woman	edulitwom	0.60	0.49	0.00	1.00
Spanish secondary woman	lanspasecwom	0.83	0.38	0.00	1.00
Marriage years	maryea	23.13	13.21	1.00	60.00
Age difference of couple	agecoudif	-4.06	4.85	-21.00	14.00
Age of woman	agewom	43.61	13.77	20.00	80.00
Daughter above 15 years	hhmemfem3	0.19	0.39	0.00	1.00
Son above 15 years	hhmemmal3	0.28	0.45	0.00	1.00
Distance to district capital on foot	distfoot	84.64	102.81	5.00	300.00
Number of social programs in community	socpronumb	4.04	1.02	2.00	5.00
Recognised peasant community	ccr	0.50	0.50	0.00	1.00
Inheritance of other assets. woman	inh_asset_f	0.17	0.38	0.00	1.00
Inheritance of other assets. man	inh_asset_m	0.13	0.34	0.00	1.00
Land ownership by woman	landwom	0.08	0.26	0.00	1.00
Land ownership by man	landman	0.14	0.35	0.00	1.00
Only land ownership by woman	landwomonl	0.03	0.16	0.00	1.00
Only land ownership by man	landmanonl	0.08	0.28	0.00	1.00
Land ownership by couple	Landcouonl	0.82	0.37	0.00	1.00
Only land ownership by others	landothonl	0.02	0.13	0.00	1.00
Only land ownership by none	landnononl	0.07	0.26	0.00	1.00
Land inheritance by woman	landinhwom	0.28	0.45	0.00	1.00
Land inheritance by man	landinhman	0.45	0.50	0.00	1.00
Only land inheritance by woman	landinhwomonl	0.15	0.36	0.00	1.00
Only land inheritance by man	landinhmanonl	0.32	0.47	0.00	1.00
Only land inheritance by none	landinhnononl	0.40	0.49	0.00	1.00
Only land inheritance by both couple	landinhcouonl	0.16	0.36	0.00	1.00
Parcels owned by woman	landnumwom	0.20	0.92	0.00	8.00
Parcels owned by man	landnumman	0.52	1.92	0.00	16.00
Parcels owned by couple	landnumcou	2.71	2.59	0.00	15.00
Parcels inherited by woman	landnuminhwom	0.73	1.58	0.00	9.00
Parcels inherited by man	landnuminhman	1.27	2.42	0.00	16.00
Land size owned by woman	landsizwom	0.08	0.49	0.00	22737.00
Land size owned by man	landsizman	0.21	1.00	0.00	11.29
Land size owned by couple	landsizcou	1.31	2.24	0	26
Land size inherited by woman	landsizinhwom	0.25	0.81	0.00	8.09
Land size inherited by man	landsizinman	0.39	0.85	0.00	5.53
Land value owned by woman	landvalwom	1661.47	9859.59	0.00	105000.00
Land value owned by man	landvalman	1783.56	8038.46	0.00	80000.00
Land value owned by couple	Landvalcou	15392.39	24109.83	0.00	200000.00

Land value inherited by woman	landvalinhwom	3838.16	12214.45	0.00	110000.00
Land value inherited by man	landvalinman	4563.80	11542.97	0.00	110000.00

Table 7.2: Summary of variables for 225 households included in regression analysis

7.3 Tobit regression models on public goods games

7.3.1 Basic tobit regression models with inherited land

		(1)	(2)	(3)
Trend	gr_fhigherd	1.118*** (3.20)	1.060*** (3.09)	
District1	disapuhuan	0.932 (1.47)	0.574 (0.99)	0.624 (1.06)
District2	discusanda	0.630 (1.08)	0.632 (1.07)	0.702 (1.16)
Literacy woman	edulitwom	-0.0631 (-0.16)	-0.116 (-0.30)	-0.103 (-0.26)
Native language speaker	lannatwom	1.090 (0.89)		
Spanish secondary woman	lanspasecwom	0.0951 (0.18)	0.274 (0.56)	0.366 (0.73)
Marriage years	maryea	0.00796 (0.31)	0.00637 (0.24)	-0.00291 (-0.11)
Age difference of couple	agecoudif	-0.0533 (-1.54)	-0.0612* (-1.75)	-0.0558 (-1.58)
Age of woman	agewom	0.0132 (0.50)	0.0133 (0.50)	0.0211 (0.78)
Daughter above 15 years	hhmemfem3	0.130 (0.30)	0.165 (0.38)	0.255 (0.58)
Son above 15 years	hhmemmal3	-0.635 (-1.64)	-0.758* (-1.97)	-0.886** (-2.25)
Man parents in HH	hhmem6	-0.474 (-0.39)		
Woman parents in HH	hhmem7	2.301* (1.77)		
Distance to district capital on food	distfoot	0.00125 (0.71)	0.00161 (0.90)	0.00128 (0.71)
Number of social programs	socpronumb	-0.351 (-1.25)	-0.282 (-1.01)	-0.202 (-0.72)
Recognized peasant community	ccr	-0.627 (-1.35)	-0.595 (-1.30)	-0.557 (-1.20)
Inheritance of other assets, man	inh_asset_f	-0.771 (-1.52)	-0.914* (-1.81)	-0.833 (-1.63)
Inheritance of other assets, woman	inh_asset_m	-0.474 (-0.39)	-0.417 (-0.39)	-0.483 (-0.39)

assets, woman		(-0.90)	(-0.79)	(-0.90)
House main activity of woman	actmaihowom	0.388 (0.97)		
Land ownership by woman	landinhwom	0.997** (2.41)	1.091*** (2.63)	0.997** (2.40)
Land ownership by man	landinhman	0.842** (2.29)	0.726** (1.99)	0.777** (2.09)
Constant	_cons	-1.671 (-0.87)	-0.610 (-0.36)	-0.705 (-0.41)
	Sigma _cons	1.867*** (7.08)	1.895*** (7.07)	1.949*** (7.06)
	<i>N</i>	225	225	225

t statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

7.3.2 Effect of different ownership and inheritance land measures on empowerment

		(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Trend	gr_fhigherd	0.988*** (2.92)	0.940*** (2.85)	1.060*** (3.09)	1.060*** (3.09)	0.981*** (2.90)	1.017*** (2.96)	0.955*** (2.75)	1.027*** (2.97)	1.042*** (3.00)	1.049*** (3.04)
District1	Disapuhuan	0.278 (0.49)	0.350 (0.63)	0.574 (0.99)	0.597 (1.02)	0.152 (0.27)	0.306 (0.51)	0.232 (0.40)	0.343 (0.59)	0.201 (0.35)	0.461 (0.79)
District2	Discusanda	0.937 (1.58)	1.082* (1.84)	0.632 (1.07)	0.641 (1.09)	0.965 (1.65)	0.884 (1.47)	0.849 (1.42)	0.871 (1.45)	0.887 (1.46)	0.882 (1.46)
Literacy woman	Edulitwom	-0.305 (-0.78)	-0.309 (-0.81)	-0.116 (-0.30)	-0.101 (-0.26)	-0.292 (-0.75)	-0.163 (-0.42)	-0.183 (-0.47)	-0.204 (-0.52)	-0.187 (-0.47)	-0.173 (-0.44)
Spanish secondary woman	Lanspasecwom	0.432 (0.86)	0.528 (1.07)	0.274 (0.56)	0.262 (0.53)	0.398 (0.79)	0.285 (0.56)	0.352 (0.69)	0.350 (0.69)	0.294 (0.57)	0.306 (0.61)
Marriage years	Maryea	-0.0121 (-0.45)	-0.0157 (-0.59)	0.00637 (0.24)	0.00660 (0.25)	-0.0138 (-0.52)	0.00234 (0.09)	-0.00460 (-0.16)	0.00287 (0.11)	-0.00260 (-0.10)	0.000593 (0.02)
Age difference of couple	Agecoudif	-0.0626* (-1.80)	-0.0756** (-2.15)	-0.0612* (-1.75)	-0.0602* (-1.72)	-0.0717** (-2.04)	-0.0561 (-1.59)	-0.0580 (-1.64)	-0.0555 (-1.55)	-0.0547 (-1.55)	-0.0614* (-1.73)
Age of woman	Agewom	0.0153 (0.57)	0.0190 (0.72)	0.0133 (0.50)	0.0137 (0.51)	0.0164 (0.61)	0.00561 (0.21)	0.0125 (0.44)	0.00553 (0.20)	0.0101 (0.37)	0.0107 (0.39)
Daughter above 15 years	hhmemfem3	0.114 (0.27)	0.172 (0.41)	0.165 (0.38)	0.146 (0.34)	0.102 (0.24)	0.123 (0.28)	0.0976 (0.22)	0.159 (0.36)	0.0919 (0.21)	0.0475 (0.11)
Son above 15 years	hhmemmal3	-0.690* (-1.83)	-0.754** (-2.00)	-0.758* (-1.97)	-0.751* (-1.95)	-0.679* (-1.81)	-0.795** (-2.01)	-0.730* (-1.89)	-0.789** (-1.99)	-0.670* (-1.74)	-0.700* (-1.82)
Distance to district capital on food	Distfoot	0.00209 (1.16)	0.00218 (1.23)	0.00161 (0.90)	0.00156 (0.87)	0.00212 (1.20)	0.00183 (1.00)	0.00179 (0.98)	0.00164 (0.89)	0.00185 (1.01)	0.00180 (1.00)
Number of social programs in community	Socpronumb	-0.231 (-0.84)	-0.212 (-0.79)	-0.282 (-1.01)	-0.299 (-1.06)	-0.179 (-0.66)	-0.250 (-0.89)	-0.216 (-0.77)	-0.274 (-0.97)	-0.223 (-0.79)	-0.335 (-1.18)
Recognized peasant community	Ccr	-0.448 (-0.99)	-0.630 (-1.37)	-0.595 (-1.30)	-0.612 (-1.33)	-0.351 (-0.78)	-0.486 (-1.03)	-0.388 (-0.85)	-0.513 (-1.10)	-0.438 (-0.95)	-0.540 (-1.17)
Inheritance of other assets, man	inh_asset_f	-0.595 (-1.27)	-0.665 (-1.43)	-0.914* (-1.81)	-0.929* (-1.83)	-0.501 (-1.06)	-0.955* (-1.88)	-0.696 (-1.46)	-0.887* (-1.79)	-0.707 (-1.48)	-0.802* (-1.66)

Inheritance of other assets, woman	inh_asset_m	-0.296 (-0.58)	-0.146 (-0.29)	-0.417 (-0.79)	-0.426 (-0.81)	-0.106 (-0.21)	-0.188 (-0.34)	-0.336 (-0.65)	-0.329 (-0.62)	-0.480 (-0.94)	-0.327 (-0.64)
Land ownership by woman	Landwom	0.764 (1.23)									
Land ownership by man	Landman	-1.295** (-2.40)									
Only woman land ownership	Landwomnl		-1.081 (-1.18)								
Only man land ownership	Landmanonl		-2.459*** (-3.43)								
Only land ownership by other HH member	Landothonl		0.684 (0.63)								
Other combination of land ownership	Landnononl		0.604 (0.97)								
Land inheritance by woman	Landinhwom			1.091*** (2.63)							
Land inheritance by man	Landinhman			0.726** (1.99)							
Only land inheritance by woman	Landinhwomnl				-0.559 (-0.90)						
Only land inheritance by man	Landinhmanonl				-0.966* (-1.73)						
No inheritance	Landinhnononl				-1.757*** (-2.87)						
Parcels owned by woman	Landnumwom					0.0266 (0.17)					
Parcels owned by man	Landnumman					-0.433** (-2.58)					
Parcels inherited by woman	Landnuminhwom						0.159 (1.46)				
Parcels inherited by man	Landnuminhman						-0.0601				

		(-0.73)									
Size of land owned by woman	Landsizwom										0.132 (0.37)
Size of land owned by man	Landsizman										-0.279 (-1.33)
Size of land inherited by woman	Landsizinhwom										0.292 (1.49)
Size of land inherited by man	Landsizinhman										-0.0692 (-0.35)
Value of land owned by woman	Landvalwom										-0.00000261 (-0.14)
Value of land owned by man	Landvalman										-0.0000133 (-0.56)
Value of land inherited by woman	Landvalinhwom										0.0000322** (2.03)
Value of land inherited by man	Landvalinhman										-0.00000894 (-0.58)
Constant	_cons	0.122 (0.07)	-0.0996 (-0.06)	-0.610 (-0.36)	1.173 (0.69)	-0.0995 (-0.06)	0.297 (0.17)	0.0429 (0.03)	0.363 (0.21)	0.169 (0.10)	0.316 (0.19)
Sigma	_cons	1.907*** (7.06)	1.843*** (7.08)	1.895*** (7.07)	1.893*** (7.07)	1.880*** (7.07)	1.940*** (7.06)	1.944*** (7.06)	1.947*** (7.06)	1.954*** (7.06)	1.930*** (7.06)
N	N	225	225	225	225	225	225	225	225	225	225

t statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

7.3.3 Instrumenting woman land ownership by woman inheritance

		(14)	(15)	(16)	(17)
Trend	gr_fhigherd	0.701*	0.854**	0.854**	0.614
		(1.65)	(2.46)	(2.43)	(1.23)
District1	disapuhuan	0.689	0.316	0.289	0.601
		(0.93)	(0.54)	(0.49)	(0.72)
District2	discusanda	0.613	0.859	0.809	0.272
		(0.82)	(1.43)	(1.34)	(0.30)
Literacy woman	edulitwom	-0.672	-0.321	-0.225	-1.131
		(-1.27)	(-0.81)	(-0.56)	(-1.52)
Spanish secondary woman	lanspasecwom	1.087	0.638	0.479	1.744*
		(1.52)	(1.18)	(0.92)	(1.69)
Marriage years	maryea	0.00443	0.00141	0.0115	-0.0255
		(0.13)	(0.05)	(0.38)	(-0.64)
Age difference of couple	agecoudif	-0.0723*	-0.0638*	-0.0562	-0.0363
		(-1.66)	(-1.77)	(-1.57)	(-0.73)
Age of woman	agewom	0.00879	0.00448	-0.00149	0.0227
		(0.26)	(0.16)	(-0.05)	(0.58)
Daughter above 15 years	hhmemfem3	0.323	0.0612	0.159	0.181
		(0.59)	(0.14)	(0.36)	(0.29)
Son above 15 years	hhmemmal3	-0.882*	-0.701*	-0.793**	-0.558
		(-1.84)	(-1.82)	(-2.00)	(-1.05)
Distance to district capital on food	distfoot	0.00253	0.00188	0.00141	0.00153
		(1.13)	(1.04)	(0.76)	(0.61)
Number of social programs	socpronumb	-0.429	-0.256	-0.240	-0.318
		(-1.19)	(-0.90)	(-0.85)	(-0.80)
Recognized peasant community	ccr	-0.437	-0.474	-0.412	-0.263
		(-0.78)	(-1.02)	(-0.89)	(-0.41)
Inheritance of other assets, man	inh_asset_f	-1.078*	-0.621	-0.766	-1.296*
		(-1.68)	(-1.27)	(-1.58)	(-1.74)
Inheritance of other assets, woman	inh_asset_m	0.369	-0.147	-0.330	0.466
		(0.52)	(-0.28)	(-0.63)	(0.55)
Land ownership by woman	landwom	7.820**			
		(2.07)			
Land ownership by man	landman	-3.141***			
		(-2.61)			
Parcels owned by woman	landnumwom		0.602		
			(1.48)		

Parcels owned by man	landnumman		-0.427**			
			(-2.55)			
Size of land owned by woman	landsizwom			0.873		
				(1.42)		
Size of land owned by man	landsizman			-0.291		
				(-1.37)		
Value of land owned by woman	landvalwom				0.000278*	
					(1.92)	
Value of land owned by man	landvalman				-0.000198**	
					(-1.98)	
Constant	_cons	0.192	0.249	0.341	-0.0769	
		(0.09)	(0.15)	(0.20)	(-0.03)	
	<i>N</i>	225	225	225	225	

t statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

7.3.4 Tobit vs. logit regression on inheritance

		(2)	(18)
Trend	gr_fhigherd	1.060***	0.710**
		(3.09)	(2.36)
District1	disapuhuan	0.574	0.685
		(0.99)	(1.30)
District2	discusanda	0.632	0.635
		(1.07)	(1.15)
Literacy woman	edulitwom	-0.116	-0.234
		(-0.30)	(-0.63)
Spanish secondary woman	lanspasecwom	0.274	0.243
		(0.56)	(0.52)
Marriage years	maryea	0.00637	0.0202
		(0.24)	(0.80)
Age difference of couple	agecoudif	-0.0612	-0.0457
		(-1.75)	(-1.40)
Age of woman	agewom	0.0133	-0.00489
		(0.50)	(-0.19)
Daughter above 15 years	hhmemfem3	0.165	0.189
		(0.38)	(0.45)
Son above 15 years	hhmemmal3	-0.758*	-0.411
		(-1.97)	(-1.18)
Distance to district capital on food	distfoot	0.00161	0.000983
		(0.90)	(0.60)
Number of social programs	socpronumb	-0.282	-0.332
		(-1.01)	(-1.27)
Recognized peasant community	ccr	-0.595	-0.549
		(-1.30)	(-1.30)
Inheritance of other assets, man	inh_asset_f	-0.914*	-0.330
		(-1.81)	(-0.69)
Inheritance of other assets, woman	inh_asset_m	-0.417	-0.373
		(-0.79)	(-0.75)
Land ownership by woman	landinhwom	1.091***	0.900**
		(2.63)	(2.34)
Land ownership by man	landinhman	0.726**	0.589*
		(1.99)	(1.73)
Constant	_cons	-0.610	0.178
		(-0.36)	(0.11)

<i>N</i>	225	225
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t statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

7.4 Inheritance

Variable	Stata	Woman		Man	
		Soles	%	Soles	%
Land inheritance value	landvalinh_	2489	100	5070	100
Part owned by man	landvalinh_man	27	1	840	17
Part owned by woman	landvalinh_wom	463	19	84	2
Part owned by couple	landvalinh_cou	1903	76	4111	81
Part owned by others	landvalinh_oth	96	4	35	1

Table 7.4a: First line is the mean value of individual land inheritance in soles by woman and man in the principal couple of the household, while the following lines are the type of reported current ownership of this inherited, value in soles and in percent of the total inherited land value (1280 households in whole Household survey sample)

Variable	Stata	Woman		Man	
		Soles	%	Soles	%
Land inheritance value	landvalinh_	3838	100	4564	100
Part owned by man	landvalinh_man	32	1	1230	27
Part owned by woman	landvalinh_wom	1119	29	9	0
Part owned by couple	landvalinh_cou	2512	65	3241	71
Part owned by others	landvalinh_oth	176	5	84	2

Table 7.4b: First line is the mean value of individual land inheritance in soles by woman and man in the principal couple of the household, while the following lines are the type of reported current ownership of this inherited, value in soles and in percent of the total inherited land value (225 households in public goods game experiment analysis)

7.5 Public goods game instructions

7.5.1 Introduction

This exercise is the second part of the research study which you already participated in some days ago. The study is done by Peruvian and Norwegian researchers, who will use the results only for getting more general knowledge about how people make decisions in their daily life. The information you share with us today will be anonymous, and only the investigators in this project will get to know your answers..

In these exercises, we will ask you to make decisions. There are no right or wrong decisions here. You can make money in all the exercises. The amount you earn depends on the decisions you make.

In some of these exercises, your earnings will depend not only on your own decision, but also on the decision of the other participants who take part in this study. Because of that, we will not know the outcome until all participants have made their decision. Therefore, the money that you will earn

during the experiment will be given to you on between ... and ... o'clock. Note that all the decisions you make here today are private and confidential, so nobody except the researchers in this project else will get to know what you decided or how much money you earned. Therefore, we will tell you the results and give you the money in private, with only you and one or two of the enumerators present.

Some of the exercises are a bit complicated to understand, so we will spend some time to talk about them before you make your decision. The money you earn will depend upon what you do in the different exercises, therefore it is important that you understand the exercise before you make your decisions, otherwise you might regret it afterwards. Therefore, you should ask questions whenever I am not clear.

Do you have any questions before we begin? Now, one of you should draw a chip from this bag. The color of the chip determines which role you play later in one of the exercises. *(Make one of the two participants draw from the bag, and note the color on the individual sheet. This color determines whether the couple will be sellers or buyers in the trade game, but you don't tell them this now)*

Now, I ask one of you to leave the room while the other one does the exercises, as these are individual and anonymous decisions. Then I will ask you to participate afterwards, while the other one leaves the room. Ok?

7.5.2 Instructions: the group exercise (public good game)

All the 40 participants in this study will take part in this exercise, both men and women. You have been divided into groups of 4 participants. However, you don't know who the other people in your group are. Husband and wife are never in the same group. Each group member will be given 7 soles. *(Illustrate with giving participant 7 coins of 1 sol)* You can choose how much of these 7 soles you would like to give to the group and how much you would like to keep for yourself. For each sol you give to the group, the group earns 2 soles. *(Illustrate with taking 1 sol of the participant's money and putting it in another pile, the "group earnings", and add 1 sol to this pile. Then show the collective earnings if the participant gives 3, 5 or 7 soles in the same manner)* We call the money earned by the group "group earnings".

Now, your decision is to decide how much of the 7 soles you would like to keep for yourself and how much to give to the group. All other group members will make the same decision. All of you will make the decision anonymously and we will not reveal to anyone your decision. After all group members have decided how much they want to give to the group, we will divide the collective

earnings equally out to all group members. Everybody gets the same amount of the collective earnings, no matter how much they gave to the group.

Do you have any questions? Here are your 7 soles. You should now tell me how much you want to give to the group.

7.5.3 Experimental setup and instructions for the joint part

1 enumerator enters a home.

Important:

1. Don't mention for any of them that they will do the decisions jointly until both have finished the individual part. They are not supposed to know this while they make their individual decisions.
2. The answers in the individual parts must be kept secret from the spouse. Hence, the other spouse must not be present in the room or listen at the door, or any other people. The decisions are private and anonymous.
3. In joint part: don't push them to discuss. Just say what is written under in point 4, nothing more, and write down the answers you get.

Sequence:

1. Both present:
 - a. Read introduction
 - b. Make one of them draw a chip from the bag (determining types in trade exercise, though don't tell them yet what this means)
 - c. Ask one of them to leave, and come back when called
2. Individual part:
 - a. Run the 3 exercises, in the order given in the questionnaire
 - b. Answer individual questionnaire, and note time used
3. Ask the interviewed to leave the room, and call the other
 - a. Run the 3 exercises, same order as with spouse
 - b. Answer individual questionnaire, and note time used
4. Call the other one, such that both are in the room
 - a. "You have now both done the same 3 exercises individually. You will get paid for your decisions in all these exercises. However, now we ask you to do the 3 exercises jointly. Both of you will get paid for these joint exercises as well, in the same manner as in the individual part. Therefore, in total, each of you will get paid for 6 exercises. The only difference is that now you have to agree upon the same answer."

- i. Group exercise: “Again, each of you take part in a group with 3 others in this community. The two of you are not in the same group. You don’t know who the other people in your group are. It is a different group than the one you took part in the last time. The two of you have to decide upon the same contribution. Here are 7 soles to each of you (*illustrate with 7 soles to each of them*). How much would you like to contribute to the group?”
 - ii. Trade exercise: “In the trade exercise, you both have the same role as previously, implying that you are sellers/buyers. Again, your trading partner is another person in this community, but you don’t know who. Your trading partner is not the same as the last time. Each of you have a different trading partner. But, you have to decide upon the same offer. How many goods do you want to sell/buy? ”
 - iii. Risk exercise: “Again, you have to decide whether to take the safe money or draw from the bag, but now you should make a joint decision in each of the choices. Afterwards, you will both be paid for one of these situations, and it will be the same situation for both of you. Let’s start with the A situations. Do you want 0,5 sol or to draw from the brown bag?” *Write down their answer, and continue in same way as in individual part. First do all A situations, then all B situations.*
 - b. Go through all 3 exercises in sequence given in the questionnaire. Write down their answers as they are. Don’t push them to discuss. If only one is speaking, then write down his/her answers, as long as the other doesn’t object. Only if the other one objects you should wait until they agree. If so, just ask “what is your decision?”. Write down their answer and fill out the questions required (who talked etc).
 - c. After all exercises: “You should now draw one of these cards, to determine which choice situation you will be paid for in the risk exercise. If you draw a red card, you will be paid for one of the A situations, if you draw a black card you will be paid for one of the B situations. The number on the card determines which situation you will be paid for.” *Show the cards, mix them, and make one of them draw one card without seeing the front page of the cards. Announce which situation they will be paid for in the joint risk exercise. If they chose to draw from the bag in this situation, make them choose a “winning colour” and then draw a chip from the right bag.*
5. Ask one of them to leave the room again, for determining the outcomes in the individual risk exercises. Run the same procedure as above on the one remaining in the room. Let him/her draw a card to determine which situation will be paid. If he/she chose to draw from the bag in this situation, let him/her choose a “winning colour” and then draw a chip from the bag.

Announce how much he/she earns in the individual risk exercise. The spouse must not be present, because the individual decisions shall not be revealed to the spouse.

6. Then say: “Thank you very much. You will receive all your payments ... (at a certain date), by showing up at At the time..... We also ask you not to talk about the content of these exercises with other people in the community before that time, as we want all participants to make their individual decisions.”
7. Ask the person to leave the room, and the other to enter, and repeat the procedure.