

# Joint Titling in Rural Peru: Impact on Women's Participation in Household Decision-Making

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**Summary.** — Peru has implemented joint property rights between spouses and cohabitants on 57% of 1.5 million formalized agricultural plots. Bargaining theory indicates such redistribution of assets should empower women. This project measures influence on decision-making in 1,280 rural households, interviewing man and woman separately. A historical coincidence during the land reform of the 1960–70s made only some communities eligible for plot titling. The process was exogenous and independent of both household and community characteristics. The significantly positive impact on female empowerment in simple mean comparison and econometric models including pre-titling historic variables is hence unbiased.

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## 1. INTRODUCTION

The Special Land Titling and Cadaster Project (PETT)<sup>1</sup> in Peru progressed rapidly when the Inter-American Development Bank (IDB) funded this rural land titling effort in 1996. More than 1.5 million plots of land were titled in less than a decade. The political motivation for the formalization of property rights given in the loan proposal followed the standard economic efficiency arguments<sup>2</sup> (IDB, 1995). The basic idea is simply to register existing informal property rights as perceived by the actors and the local society in which they live—not to change ownership of a given asset, between or within households.

*Partial community property right* is the default marriage regime in the Peruvian civil code. Assets acquired during marriage or cohabitation are the joint property of the man and the woman, with one important exception: inherited and inter-vivo transferred assets from parents remain the individual property of the heir.<sup>3</sup> However, regulations arising from the new land titling laws require land to be jointly titled between a man and a woman who share their life in a nuclear family. Only plots of land already registered as individual property are exempted—a bit paradoxical, since the formalization program was implemented precisely due to the general lack of formal ownership in the first place. The joint titling requirement serves as an implicit gender-equalizing reform, as sons tend to inherit more than daughters. PETT respected informal property rights between households—land was not redistributed from rich farmers to poor ones, as in the Ethiopian formalization process (Holden, Deininger, & Ghebru, 2011)—but individual property rights within the household were not respected, as both members of the couple became equal owners independent of the origin of the land. If “simply formalizing the informal” is accepted as the guiding principle for the formalization program, the joint titling requirement in the land law directly contradicts the individual's right to inherit according to Peru's civil code. However, joint titling can be more in line with customary law and practices (Glavin, Stokke, & Wiig, 2012).<sup>4</sup>

The policy was actively supported by titling program donor IDB, implementing Fujimori government in Peru, gender NGOs, and other societal actors. However, most people

did not notice how formalization changed the gender landscape due to the conspicuous lack of open public debate on the matter. Calculations on the land cadaster, with some assumptions on the relationship between given title holders as registered, show that 57% of the 1.5 million agricultural titled plots of land are joint property between man and woman (Wiig, 2012). This contrasts with the World Bank Living Standard Measurement Survey (LSMS) from 2000, according to which only 13% of the plots were jointly owned, with the man having sole ownership in 75% of the cases, while the corresponding figure for the woman was only 12% (Deere & Leon, 2003).

An independent impact evaluation by GRADE of the PETT program verifies the high number of joint titles (GRADE, 2007). Based on their household survey, Fuentes and Wiig (2009) calculate that 43% of the PETT titled plots of land are joint property, compared to 39% joint ownership for untitled plots. The figures increase to 57% and 49% respectively when single-headed households are excluded. Responses regarding subjective ownership in our PeruLandGender household survey from 2010 (PLG10) indicate that joint property is the social norm for married couples in traditional highland communities, but individual rights may re-emerge in case of separation or divorce.

Agricultural land is similar to other types of assets. Gender inequality resembles other injustices based on historic

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discrimination by geography, culture, race or class. If the sacred principle of individual property rights in the capitalistic system is set aside in the land titling process, similar redistribution might be imposed with any other asset and legitimacy. Whether this is considered good or bad depends on one's political preferences and ideology. Normative discussions aside, it is still essential to assess whether Peru's "radical" land redistribution policy reflected through joint titling brought the intended outcome of female empowerment. The Peruvian top-down enforcement of joint titling represents a unique source of information for similar processes in other countries.

No *ex ante* PETT survey with relevant empowerment indicators was available in Peru. Nor was it feasible to construct a baseline, as most districts had already titled at least parts of their territory. The PeruLandGender research project also had limited funds and time for such a time-consuming approach. However, a historical coincidence led the PETT titling to resemble a quasi-experiment. During the land reform of the 1960–70s, large estates were forcibly expropriated and the land given to peasants who in the end formed *communities*. Some of these became legally recognized, others not, depending on the often idiosyncratic decisions of the local land reform director rather than explicit community criteria (Mayer, 2009). Over the years, neither community authorities nor members themselves have distinguished much between the two types. Both are led by assemblies that enforce collective decision-making through majority rule and sanctions, while plots of land are controlled by the individual farmer without assembly interference (Wiig, 2005).<sup>5</sup>

However, when the formalization process started, the dormant legal status of the "community" took on a life of its own. PETT could title plots of land only in the unrecognized communities, since the lands of recognized communities are defined as communal property. Today one finds both types of communities co-existing within the same district, often side by side as close neighbors. For all practical analytical purposes, due to the exogenous nature of the process of becoming eligible for individual titling and non-interference by the community in intra-household allocations, I infer that differences in female empowerment are due to the imposition of joint titling in the former.

In late 2010, we interviewed the principal couples in 1,280 households in 69 communities in four Peruvian highland departments, both jointly and separately, to cover the multifaceted nature of household decision-making and land ownership. The deliberate sampling split between formally Recognized Peasant Communities (CCRs) with formal community ownership to land and unrecognized units with similar organization in "Private Communities" (CPs) without communal ownership to ensure comparability between the two systems. Districts were sampled where both systems were represented more or less equally. Further, we chose districts with high levels of joint titling, since we wanted to measure the effects of a successful gender-equalizing policy rather than to differentiate impact by degree of policy implementation.

The empowerment effect is found to be considerable. Exogenous PETT titling implies that a simple test of proportion between CPs and CCRs with regard to empowerment indicators is sufficient to verify the impact of land titling on women empowerment. The empowerment effect emerges as significantly positive for 7 out of 26 different household decisions (according to the responses given by women themselves; and 6 when men responded). For the aggregated empowerment indicator where each positive decision carries the same weight by household, we find that the share is 5.3 percentage points higher in CPs than in CCRs for female respondents and 5.1

percentage points higher according to male respondents, both significant at the 5% level.

Next, the assumed exogeneity of being CCR or CP was relaxed by introducing household and community control variables. The latter also includes historic pre-PETT figures from the Agricultural Census of 1994 (C94) for a subset of 885 households. The estimated impact of titling in the OLS models is highly significant, with a 15.5 percentage point effect on the overall empowerment index. The effect was strongest for large investment and agriculture, with less impact on daily expenditures, as market operations are traditionally seen as a female responsibility anyway.

These findings are unique in the rather restricted literature on joint titles and female empowerment even though many countries are today enforcing joint titling (Ali, Deininger, & Goldstein, 2011; Widman, 2012). Most studies either fail to find any impact at all, or use indicators not directly related to female empowerment. I found that, despite traditional norms of family unity and gender equality, legal documents serve to secure such rights and increase female participation in household decision-making in the Peruvian highlands.

## 2. THEORY AND LITERATURE

As noted by Becker (1991), the unitary model of the household was dominant in the economic literature until Manser and Brown (1980) introduced differences in individual preferences within a collective bargaining model and opting out of marriage as the threat-point. Lundberg and Pollak (1993) assumed that household members controlled their own work effort and payoff from individually-owned assets. In their non-cooperative equilibrium, reduced effort and refusal to share output while still married will constitute the threat-point. Agarwal (1997) notes that norms and culture of the society in general, as well as individual knowledge and ability, give negotiation power in the bargaining model independent of the threat points of divorce and non-collaboration.

According to these three theories, increasing the relative share of assets of women compared to men, in our case the transfer of land ownership from men who traditionally inherit more land than women, to the couple through joint titling will increase the woman's share of surplus in a Nash bargaining model. By law, she will now keep half the land in case of separation and divorce. The risk of demanding greater influence in household decision-making, which ultimately might lead to marriage breakdown, is therefore reduced. In the approach of Lundberg and Pollak (1993), it would mean reducing the utility of the partner by refusing to use the land or share the products thereof. Finally, female landownership implies she contributes more to the common good of the household, which, through general norms of "influence according to contribution" as emphasized by Sen (1990), gives women a stronger voice. However, the family (and household) is a complex relationship where feelings toward one's partner and preferences may differ over issues, time, and place. Altruism still plays an important role, so household decision-making is probably a mix of unitary and separate interests (Doss & Meinzen-Dick, 2009)

As with other assets, increasing land ownership by women (individually and through joint ownership) is seen as a policy that can increase female empowerment. Proving this relationship empirically is difficult, because of the problem of reverse causation: women that are more empowered will tend to own more land. Researchers have sought to deal with the potential endogeneity effect by using land brought into the marriage

that is supposed to be exogenous to the current empowerment level (Allendorf, 2007; Quisumbing & Maluccio, 2003; Wiig, Bråten, & Fuentes, 2011). However, positive results will be biased if women who are more empowered also inherit more from their parents. On the other side, attractive (intelligent) daughters who attract wealthy spouses have less marginal utility from transfers from parents. This makes it impossible to assess *ex ante* the direction of the aggregated total effect (Fafchamps & Quisumbing, 2004). Furthermore, because of their pre-marriage wealth, they can negotiate greater intra-marriage influence with potential future husbands when they enter the marriage market (Becker, 1991).

Empowerment can be defined as the capacity to make choices and transform these choices into desired actions and outcomes (WB, 2008). Kabeer (1999) has described empowerment as consisting of the three inter-related dimensions *resources*, *agency* and *achievements*: the resources to do a certain action, the ability to do it, and whether the desired outcome is really in one's own interest.<sup>6</sup> My analysis applies a narrow and limited concept of empowerment, since we measure only whether women have participated in "positive" decision-making: we include instances where the household decided to do a certain action and exclude instances when the household decided not to.

The literature emphasizes that formalization leads to greater security of tenure.<sup>7</sup> There would be less risk of losing existing rights in general, for the woman to the husband in case of separation. However, such analysis often results in analyzing households that consist of widows or single mothers rather than married or cohabiting couples. Holden *et al.* (2011) find widows with formal certification in Ethiopia can choose to rent the land to more productive farmers, while Peterman (2010) shows that new laws in Tanzania strengthening the rights of widows increase the woman's influence while still married.

Redistribution can also be an explicit and integral part of the land titling process.<sup>8</sup> To my knowledge, no formalization process explicitly imposes individual ownership of land to a woman if that land is informally seen as the property of the man. However, joint titling for couples is an implicit redistribution. In title-on-demand programs (only people who request titles themselves are approached by the titling agency), the couple decides which names to include on the title deed. This voluntary approach is often negative for women. Widman (2012) finds that in Madagascar only 3–4% of land then becomes jointly titled.

Other countries have imposed joint titling by law without any effect on women's property rights. Deere and Leon (2003) argue that the titling agency in Brazil simply disregarded the law and chose to issue individual titles for men instead. Agurto and Guido (2002) find that the Nicaraguan titling agency allowed "joint" to be interpreted to be the combination of father and son, or any other combinations of relatives.

By contrast, Rwanda, Bolivia, and Peru have been rather successful in imposing joint property in top-down comprehensive land formalization programs. In the rather limited Bolivian program which involved 140,000 titled plots from 2007 to 2010, Ramirez Carpio (2010) find that 37% were jointly titled, 23% titled solely to the woman, and 36% solely to the man. On the other hand, from Rwanda, Ali *et al.* (2011) report an extraordinarily speedy and comprehensive process, where 4.8 million out of an estimated 11 million plots of land were registered, although not yet titled, in the first year. In a pilot study they find that the woman alone or jointly with spouse had formal user rights to 43% of the instances. Still, the Peruvian case

remains the most successful in achieving high rates of joint ownership, with 57% (Wiig, 2012).

A plot of land can be used simultaneously for various purposes (e.g., both as input in agriculture and as a construction site for housing). Functions are in practice difficult to separate. In most traditional cultures in Latin America, the man is responsible for agriculture and the woman for taking care of the family as the general rule. Qualitative interviews indicate that the woman normally keeps the children, house, and land if the couple separates. In the PLG10 questionnaire module on perceptions 96% of the women and 94% of the men say the custodian of the children should keep the land (Wiig, 2012). It is hard to say whether this reflects pre-separation property rights, constitutes compensation, and/or a one-off child support contribution, or she merely administers the assets on behalf of the children.

Even though joint titling is enthusiastically promoted as a gender-equalizing policy in many countries today, there is to my knowledge no quantitative research evidence of an empowerment effect. The few quantitative case studies that exist have failed to find any major effects (Alvarado Merino, 2005; Lasterria-Corniel, Agurto, Brown, & Rosales, 2003). Ali *et al.* (2011) found that in Rwanda the joint land titling program has entailed significantly more soil conservation and gender-equal land inheritance, but their study did not include any explicit decision-making indicators.

From Ecuador, Deere and Twyman (2012) find that women with a larger share of household assets (including land) have a higher probability of taking part in household decision-making. This is due to a relative stock of individually owned assets, rather than better tenure security in general. In the present study, we follow their approach by not explicitly distinguishing between the formalization and redistributive effects.

### 3. HISTORY OF LAND AND GENDER IN PERU

#### (a) Property rights

Despite nearly double-digit annual growth in the national economy over the past decade, Peruvian highland farmers have remained poor. Subsistence agriculture and periodic migration are the main economic activities. Traditional gender roles give men responsibility for farming while women take care of the children and animals. However, there are few cultural taboos against switching tasks, especially as regards the woman assuming male responsibilities, if the couple finds the solution convenient—for instance, if one of the spouses periodically migrates to work elsewhere; see Wiig (2012). Despite (or due to) the segregation of responsibilities, couples see complementarity and equality between the sexes as an overarching principle, which in turn gives rise to a norm of joint decision-making. Customary law normally regards land as joint property as long as the couple lives together, but not necessarily in the case of separation or divorce.

The formal "participation in profits" marital property regime constitutes a partial community property system, in that property acquired during marriage (like that acquired during cohabitation) is jointly owned by the couple (Deere & León, 2001). Property brought into marriage or inherited afterward is, however, individual property (although profits like sales or the products or rents from this property are defined as joint income). This means that the new land formalization laws contradict civil law, since they consider non-registered possessions as joint property regardless of the previous history of those possessions. This practice is, however, more in line with the

perception that land possession under customary law is jointly owned by the couple (Wiig, 2011).

(b) *Land reform and community eligibility for individual titles*

Ever since the Spaniards colonized Peru and established large landholdings, the *haciendas*, the slogan “land to the tiller” has been an integral element in the class and ethnicity struggle in the country. Initially, the colonial system protected the original indigenous populations against severe exploitation, but the ensuing *encomienda* process ended up handing them over to the white, or *mestizo*, elite. Local peasants were in practice enslaved labor until the land reform of the 1960s and 70s, when the state expropriated the large landholdings and redistributed them to those who had worked the land. The intention was to promote collective farming, but after a while the land was fragmented into the individually-held micro-plots of the highlands today.

It so happened that the peculiarities of this land reform limited PETT titling, several decades later, to some communities independent of their household and community characteristics. Let me explain the particular aspects that make our estimated cross-section coefficients unbiased. This account builds on the excellent summary by Mayer (2009) and my own qualitative interviews with older COFOPRI staff and participants in the historic land reform process.

Highland society was *de facto* feudal. The *hacienda* owners controlled the lives of their tenants and workers, who had to work on the *hacienda* in exchange for usufruct rights to plots of land; some workers also had their homes on the *hacienda*. Communities that achieved recognition status as early as the 1930s, long before the land reform, popularly referred to as *original communities*, are assumed to have been more independent, despite being dependent on the *hacienda* owner in many ways. He would typically control trade, transport, police, irrigation channels, roads, and other infrastructure in the area. The few examples of purely original communities in our area were excluded from the analysis.

Slowly, the development of a modern state based on democratic elections began to erode the power of the *hacienda* owners. The archaic *hacienda* system could not keep pace with the need for productivity growth to feed the increasing rural population. In addition, improved Leftist organizational capabilities led to confrontations in the countryside. Poor peasants who left their rural lives and moved to the urban slums constituted an increasing threat to the structure of society. Some members of the Peruvian elite saw comprehensive land reform as a means of preventing a socialist revolution. The government conducted some land redistribution experiments as early as the mid-1950s. At the same time, *hacienda* owners who perceived a change in politics and experienced the dwindling profitability of large-scale farming started to sell land to their former tenants and workers. In 1968, General Juan Velasco A. seized power through a leftist military coup d'état. Within a year the government began expropriating the *haciendas*, leaving hardly any intact when civilian rule returned 10 years later.

The purpose of the land reform was not to transform the peasants into independent smallholders, but to maintain large entities for collective farming that would allow investments in machinery and modern production techniques. According to my COFOPRI informants, the land reform split the land into three main categories: community, private, and cooperative lands.

Typically, those communities that were already recognized legally (Original communities) would be given back a part of the land they had lost to the *hacienda*, if they accepted former

*hacienda* workers as community members. The land reform agency misguidedly believed such communities practiced collective farming, in joint production and shared output, in line with their intended policy, a structure intended to facilitate mechanization in the longer run. The land reform agency feared fierce resistance to collectivization from the peasants who had already acquired some plots of land individually. These were often designated as Peasant Groups (GCs). The land reform agency still believed even GCs would want to become CCRs or cooperatives<sup>9</sup> once “they acknowledged the technical superiority of collective farming.” However, any culture of collective farming was traditionally weak in Peru, as reflected in the fact that both CCRs and GCs were merely groups of individual smallholders. The cooperatives in the highlands were dysfunctional and soon closed; some were even prone to malpractice.

Today's community structure rose out of the ashes of the land reform. As Mayer (2009, pp. 28–29) puts it: “. . . haciendas dissolved fairly rapidly into *de facto* and sometimes officially recognized indigenous communities (*comunidades campesinas*) without much fanfare or official notice.” The same applied to malfunctioning cooperatives. Two important aspects of the reform influence this analysis. First, differences in *ex ante* land reform activism or other community characteristics did not affect the timing of becoming independent units. Whole districts were handed over at a time, independent of the legal status of each of the communities. Second, the *ex post* land reform legal status was rather random, as CCR status was not seen as a necessity if the community had achieved their independence from the government agencies anyway. Some communities applied for recognition and others did not; some eventually were granted recognition, while others were not. This process was probably driven more by incidental factors like the views of community leaders at that time, connections in the political system, or the perceptions and preferences of land reform officials—rather than any inherent characteristics of the community culture that also might affect women's empowerment more than four decades later. When Velasco lost power to more market-friendly generals in 1975 and the failure of cooperatives became apparent to all, the state apparatus lost interest in the rural question, slowing down any related process like issuing recognition. The peasants were left to organize themselves as they saw fit. Without external interference or benefits, peasant interest in community recognition also dwindled.<sup>10</sup>

After a while, people did not distinguish between communities of different legal status. All peasants were responsible for their own land-plots, but they continued to rely on collective action through work exchange to achieve economy of scale in production. They all had community assemblies which limited individual rights and mandated collective action on irrigation channels, roads, schools, etc.—a form of enforced taxation at the community level. Independent of the legal status of the community, the individual had similar rights, restrictions, and obligations.

The history of these communities ranges along a continuum in several dimensions, like locals *vs.* immigrants, original communities *vs.* haciendas, private land *vs.* cooperative lands. The CCRs and CPs included in our survey display different combinations of these inherent characteristics. Even the Original communities are not necessarily more cooperative-minded than the rest. The population can actually be less homogeneous than other types since the land reform agency forced *hacienda* employees upon Original communities in exchange for more land.

During fieldwork in the district of Tambo in Ayacucho in 2002, I observed PETT handing out title deeds to individual

plots of land. The local people used the term “community” to refer to any geographical or social unit of households, regardless of legal status. Returning 5 years later, I found that a linguistic change had taken place as a response to individual titling by PETT. The communities eligible for PETT titles were now termed *Private Communities* (CPs) in contrast to the Recognized Communities, i.e., the CCRs that were not eligible for individual titling. I have chosen to use the term “private community” throughout this analysis, although other districts use terms like annex (*anexo*), village (*poblado*), or sector.

There appears to be no research explicitly designed to explain why some communities gained recognition and others did not, although some studies indicate a random process. Mayer (2009) has mapped the evolution of community formation in the Paucartambo Valley of Cusco. In 1961 this area had 169 *haciendas*, 16 recognized communities, and eight communities without legal status. After the land reform in 1986 there were no *haciendas*, but 47 Recognized Communities and 31 Peasant Groups. The latter “...functioned as communities but lacked the official recognition papers” (Mayer, 2009). In addition, communities without any formal legal status are probably not included in his analysis. Nationally, the number of CCRs doubled from 2,228 in 1968 to 4,792 by 1990, covering about one third of the land in the highlands (Trivelli, 1992). In other words, about two thirds of the land belongs to Private Communities, since large properties no longer exist.

For this study, districts were selected where the number of CCRs and of CPs was more or less balanced. Further, they had to be part of former *haciendas*, and not the so-called *original communities*. By excluding districts completely dominated by either CCRs or CPs, we ensured that both types would be representative of the district population in general.<sup>11</sup> Within the sampled districts, we exempted communities at high elevations, as these probably depended more on collective action to manage pastures and rotation agriculture. We then randomly selected four CCRs and four CPs, and then at random selected 20 households within each of them. The total survey sample was 1,280 household in 69 communities.<sup>12</sup>

#### (c) PETT Carpet titling approach

The titling agency PETT, and later COFOPRI, respected the legal status of the community even though seasoned officers admitted that some plots of land in CCRs had initially been titled due to confusion about inter-community borders. With better-quality maps, the problem of incorrect titling was reduced considerably.

The PETT titling process is described in detail in other papers from the PeruLandGender research project (Glavin *et al.*, 2012; Wiig, 2011). We conclude that PETT indeed followed the intended carpet titling approach within CPs, registering and titling all plots of land within a community in one operation. Community leaders would ensure that all members of the community were present when PETT agents came to register land claims. Together, they walked from plot to plot, asking for the owner and then for the spouse/co-habitant when such was not mentioned automatically as being the co-owner. When passed from the cadaster to the public property registry, the information on each title would be posted on the district municipality wall. If, within a month, nobody contested the information given, the registered owners became the official owners.

If for example the heir to a plot of land demanded individual rights and the exclusion of spouse, the burden of proof for such rights would lie with him or her. In Peru, such “egoistic”

demands would be seen as a serious lack of confidence in one’s spouse.<sup>13</sup> Protests did arise, but mostly from distant family members. Such plots of land were taken out of the process for settlement in court, and therefore appear in the cadaster as plots without title.<sup>14</sup> Plots of land at high elevations were exempted as the government did not want to title pastures or rotation land with diffuse property rights. Furthermore, the low value of such land would not justify the titling expenses. The mean share of plots with titles in CPs is 48% in our survey, which includes all types of land. The lack of titles is mostly due to altitude rather than intra-familial disagreements. Only 3% were erroneously titled in CCRs due to misinterpreted community borders. The overall conclusion is that PETT took institutional constraints seriously.<sup>15</sup> The main forms of land acquisition were inheritance (54%), purchase (20%), and allocation by assembly (20%).<sup>16</sup>

## 4. METHODOLOGY

### (a) *Quasi-experiment*

The empowerment impact of joint titling is the difference in the woman’s involvement in household decision-making between CPs and CCRs. PETT titling is a true quasi-experiment at household level if the six conditions discussed below are satisfied. However, only three of them are necessary for applying titling at community level as the treatment variable.

(1) PETT chose districts for titling at random, a point emphasized by current and previous PETT agents. They started in one district and proceeded in neighboring districts later. However, GRADE (2007) finds some indications that districts with road access and agricultural production of high value were chosen first. Madalengoitia (2010) finds mining regions to have significantly more PETT titles—in his view, an intentional selection to facilitate negotiations with the local population. However, such criteria would not affect titled and untitled communities within the district differently, so they were not relevant for this analysis. Finally, all districts in our survey lay within the same agro-ecological zone, with a similar Quechua-speaking culture, which ensures comparability.<sup>17</sup>

(2) Being a CCR with communal property or a CP eligible for individual titles is random and independent of community or household characteristics that might affect women’s empowerment. Ability to cooperate and lobby the land reform agency might have influenced CCR status. Initially, CCR status gave higher tenure security and facilitated economic support from the state, but these benefits gradually disappeared, as did the communities’ interest in becoming recognized as CCRs<sup>18</sup> (Mayer, 2009). More important, such community characteristics are probably orthogonal to our empowerment variable, as anthropologists stress that community and household level are separate spheres (Bolton, 2010; Mayer, 2004). “I have never come across any case where the community assembly intervenes in the internal distribution of land between household members,” according to Mayer, in a personal communication. However, he stresses that gender practices might differ between different agro-ecological zones, so I control for this indirectly in the following regression and matching models. The regional PETT office chose which districts were to be titled, without consulting the local population. I have found no indications that communities were allowed to self-select into the CCR or CP category.<sup>19</sup> The local population has still little influence on their own institutional

status, since the García government (2006–11) withdrew a law proposal which would permit dissolution of CCR status by simple majority rather than two-thirds absolute majority. In addition, the bureaucracy put off existing applications, fearing social unrest.

(3) PETT selected communities within the districts independent of their characteristics. We sampled districts where all eligible communities had been titled, thereby avoiding potential selection bias due to road access, and closeness to district center or mining activity, as noted above. Furthermore, we excluded communities in highland pastures, as well as communities close to the district capital, in order to sample only comparable communities with agriculture as main activity. Self-selection out of titling, for example due to expected taxation, was not common at community or individual level, as that would imply a lessening of tenure security compared to the neighbors.

(4) Random household inclusion is satisfied due to PETT's "carpet approach" of registering all plots of land within the community in one go. The households preferred not to opt out, for two reasons. The service was free initially, but was expected to cost money later. Further, reciprocal defense of property rights could disappear once the titled majority could rely on the state for protection. Independent lawyers interviewed said they advised clients to trust the spouses by accepting joint titling, rather than taking the risk of remaining without any title during the year the court would need to settle their cases.

(5) Plots selected for titling were independent of plot characteristics, due to the practice of "carpet" titling.

(6) Whether PETT issued joint or individual titles was meant to be independent of household characteristics. The government issued ID cards as the basis for any government intervention, treating CPs and CCRs as well as all residents within them equally. Furthermore, PETT knew that some men sought to avoid joint titling by claiming to be bachelors; agents checked their family background with local authorities, and neighbors independent of the status recorded in the ID papers. From 2003, gender NGOs ran local campaigns to make women aware of the need for ID papers and their rights to joint titles (Glavin *et al.*, 2012).

All these six conditions were reasonably satisfied, so PETT formalization of property rights could be termed a quasi-experiment. However, endogeneity remained a potential source of bias, since less empowered women could more easily be pushed aside by strong husbands despite PETT efforts. Moreover, bypassed women may still benefit from a change in the overall gender culture at the community level, as the more empowered women become role models. We assume this externality is stronger within than between communities.

Thus I chose whether PETT had issued titles in the community or not as the treatment variable, to counter possible household-level endogeneity by making conditions 4 to 6 redundant and including externality effects within communities. These community-level variables hence reflect reduced form effects.

We deliberately sampled districts with high levels of joint titling. Cadastral information combined with some rough assumptions as described in Wiig (2012) indicated an average of 85% for the eight districts. The method was confirmed by the joint titling figures in the PLG10 household survey, as 76% of PETT titled plots were registered in the names of both spouses. Still, 7% were owned by the man only and 4% by the woman only. The remaining 13% were titled to the "other category," mainly parents and other family members who had not transferred formal property rights even though the principal couple was the *de facto* owner (Wiig, 2012).

The high levels indicate that PETT enforced joint titling top-down. Or, it might be that these areas were more receptive to joint titling, perhaps due to a more gender-equal culture. In any case, our estimation results are still unbiased and valid for districts with similar gender-equal cultures. We did not intend to carry out a representative study for the whole of Peru, but rather to search for an empowerment effect where it would be most likely and the cross-section data analysis methodologically most convincing. The results could also be interpreted as minimum impact of joint titles, as it is in less gender-equal districts that women stand to gain more. However, that must remain a matter for future research, since a lower degree of joint titling makes the analysis vulnerable to stronger endogeneity effects.

My assumption is that there is no difference in the gender culture between CPs and CCRs before PETT titling left the pilot stage in 1996. The National Agricultural Census from 1994 (C94) interviewed all rural households. We could identify 52 of the 69 communities in PLG10, but not the same households or individuals, so we aggregated household information in C94 into community-level variables to be included as controls reflecting pre-PETT characteristics of the given community.<sup>20</sup> The C94 variables applied as controls in the econometric model are reported by CPs and CCRs in the lower part of Table 4 in the Appendix. In 1994, more people had inherited land in CPs than in CCRs, more households had sons above 15 years of age as members, fewer households applied fertilizers, educational level was higher, households owned more plots, fewer plots were irrigated, and more households owned plots outside their own community. The expected overall effect on women's empowerment is indecisive, because the variable effects go in different directions. Regional PETT offices and field agents themselves differed considerably in their efforts to impose joint titles (Glavin *et al.*, 2012). Furthermore, a high degree of joint titling can also be expected to change social norms within the community—thereby affecting women without joint ownership of land as well.

The COFOPRI registry of CCRs was used for selecting districts. We needed a reasonable balance of CPs and CCRs to expect them to have a similar gender culture, with no unobserved characteristics (e.g., religious charismatic movement) to explain why only some communities ended up with a different legal status than the overall majority. This also indicated that "carpet titling" had been successful: most eligible plots in the districts had in fact been titled. We then restricted our universe of communities to valleys and hillsides, excluding communities located at high elevations. From the remaining list, we randomly selected four CCRs and four CPs from each district for inclusion in the survey, reducing the risk of breaking conditions 2 and 3 above.

Nearly five decades have passed since the land reform. Profound social changes have taken place: civil war, rising education levels, trade, state activity, and improved geographical and class integration. Differences in community characteristics that might have influenced choice of legal status at the time of the land reform are not necessarily present today, such as political connections, or leaders' organizing capacity. Mayer (personal communication) believes that political networks were quite coincidental and not directly linked to community characteristics like tenure security, and were thus random in nature. But the choice of legal status determined later intervention by PETT to issue individual titles, so it seems reasonable to assume that later differences in empowerment are due to titling and not inherent community characteristics. Tenure security in the aftermath of the land reform does not appear to differ between the two types of communities, so there is

no reason to expect that the difference in formal institutions has any impact on women's empowerment.

(b) *Empowerment indicator*

I measured women's influence on 26 specific household decisions by applying a two-step procedure. Respondents first indicated whether a certain action involving a decision had taken place during the last 12 months (5 years for investments). If no, no more information was collected. If yes, the respondent was asked exactly who had made the decision. If the woman in the principal couple took part in the actual decision-making, the empowerment indicator was given the value 1. If she was not among the individuals directly involved, the value was 0. For households that did not effectuate any positive decisions, the household observation is missing. For each decision made by the household I then aggregated the empowerment indicator for only the positive decisions into the overall *Empowerment ALL* indicator. If the woman influenced 5 out of 10 (or 8 out of 16) positive decisions made, the *Empowerment ALL* value is 0.5, while 2 out of 20 gives the value 0.1. A continuum of variable values between 0 and 1 is possible, as the number of decisions realized and the number influenced by the woman varies by household. I then constructed indicators in the same way for the categories *Expenditure*, *Investment*, *Agriculture*, and *Market Empowerment*, to assess where women have had the most and the least influence.

In principle it is possible to probe on unrealized actions as well, but that would be too time-consuming for survey interviews and the responses would probably have been less informative. Some categories, like investment decisions, can probably be afforded only by a relatively more wealthy subsection of the population, but that does not affect the overall empowerment variable which includes all households. I apply the same weight for each realized decision by the household in the calculation of the empowerment indexes. Moreover, there is no prior reason to believe joint titling will have more impact for wealthier groups, as long as all households in the survey own at least one plot of land.

A general interest in effects of titling was presented as the purpose of the study, not specifying the gender dimension of the study. Our request for names of individual(s) who had taken part in the explicit decision was less of a leading question than having the respondent affirm/deny female participation. Our interviewees might still have responded according to sensed expectations and perceived political correctness. However, as such pressure would be similar throughout the district, it does not represent a source of bias in our analysis.

We also inquired into the decision-making process itself: whether anyone opposed the decision, whether non-involvement was voluntary, etc. Responses to such conditional questions proved unreliable and not useful for our analysis. However, asking who had the idea for a given investment revealed an interesting gender dimension. It turned out that men were expected to take the initiative, whereas women should be consulted in order to reach joint agreement. Considerable decision-making power is hence based on the right to propose. These questions are not aggregated into the *Empowerment* variables. I have constructed the alternative category variable *Investment idea* using the same methodology, i.e., share of all realized investment decisions with female (alone or jointly) participation in the idea, as an additional (and alternative) indicator of female influence in household decision-making.

In the first part of the analysis I used a *t*-test to estimate whether the difference between the dummy variable for each of the 26 decision categories was similar between CPs and

CCRs. A test of proportions was applied on the continuous valued aggregated *Empowerment* indicators. The difference reflects the effect of joint titling if the exogeneity assumptions discussed above hold.

(c) *Econometric analysis*

In the second part of the analysis I controlled for possible omitted variable and simultaneity effects through introducing household- and community-level variables in OLS regression models.<sup>21</sup> The independent effect of these on *Empowerment* might have been erroneously credited to *Private community* (and hence joint titling) if the two explanatory variables correlated. However, I included only control variables unlikely to be affected by *Empowerment* or correlated with other omitted variables in the residual.

The household-level variables from PLG10 included age of the woman, mathematical competence, demographic composition, etc. Income effects were captured through female and male inheritance of land, which are less sensitive to household gender relations than current income structure, as discussed in Wiig *et al.* (2011). Community variables like geographical position, history, organization capacity etc. were taken from the PLG10 survey, and we applied historical outcome variables from C94 dataset, like the share of the population with inherited land, education level, number of plots and irrigation systems, which might have influenced women's position within the community before PETT started issuing titles to individual plots. Descriptive information on variables applied in the analysis is given in table 4 in the appendix. We were able to identify C94 information for 49 of the 69 communities in the PLG10 dataset. The "cost" of reducing the number of observations to be included in the regression models, for example from 1259 to 878 household with the overall women empowerment indicator as dependent variable, was more than counteracted by the "benefit" of controlling for variables that might have given rise to differences in gender cultures that correlate with type of community.

By clustering the residuals at community level I could control for possible correlation between households within the community.

## 5. RESULTS

(a) *Comparing means, assuming exogenous titling*

Table 1 below shows the mean level of influence on each of the 26 household decisions in *Private communities* (CPs) and *Recognized Peasant Communities* (CCRs). The difference in mean value, and corresponding statistical significance, is given in the first column. Women in CPs reported significantly more participation in seven categories (27%) than their counterparts in CCRs. The men reported significantly higher female participation in six categories (23%).<sup>22</sup> Take, for example, whether to use *Fertilizers* in agricultural production. 514 women living in CPs reported positively (implying that the remaining 118 women in CPs reported negatively) that their household had purchased fertilizers during the last 12 months. Of the former, 58.8% said they had influenced the final decision to do so. Fertilizer application is less common in CCRs, with 446 households, and involved less female influence, as only 47.1% of the women took part in the final decision. The resulting 11.7 percentage point difference between CPs and CCRs is significant at the 1% level in a *t*-test. The corresponding responses by men are shown in the right-hand side of Table 1.

Table 1. *Women's participation in household decisions, by CCR and CP*

	Female report					Male report				
	Diff	CP		CCR		Diff	CP		CCR	
		Share	#	Share	#		Share	Share	#	Share
School utensils	0.016	457	0.897	470	0.881	0.013	458	0.847	471	0.834
School uniforms	0.008	426	0.894	457	0.886	0.017	434	0.839	448	0.821
Beer	0.067	195	0.513	186	0.446	0.119***	259	0.363	283	0.244
Other alcohol	0.085**	255	0.678	256	0.594	0.089**	316	0.503	314	0.414
Boys, matriculation	-0.024	364	0.863	363	0.887	0.032	365	0.833	361	0.801
Girls, matriculation	0.005	328	0.863	337	0.858	0.023	329	0.839	336	0.815
EXPENDITURES	0.016	543	0.815	541	0.799	0.064**	554	0.720	562	0.656
Housing plot	0.128	46	0.891	38	0.763	0.102	45	0.911	42	0.810
Buy/construct house	0.036	114	0.737	154	0.701	0.002	118	0.746	160	0.744
Math. for improvement	0.033	139	0.712	184	0.679	-0.049	147	0.673	195	0.723
Furniture	0.013	121	0.785	158	0.772	-0.019	124	0.750	156	0.769
Buying land	0.207***	60	0.917	31	0.710	0.033	62	0.855	28	0.821
Selling land	0.75	4	0.750	1	0.000	-0.400	5	0.600	2	1.000
Buying machinery	0.5	2	1.000	6	0.500	-0.129	7	0.571	10	0.700
Buying car/beast of burden	-0.019	18	0.611	27	0.630	-0.173	23	0.522	36	0.694
INVESTMENTS	0.047	269	0.798	313	0.750	-0.011	278	0.756	330	0.767
Fertilizers	0.117***	514	0.588	446	0.471	0.110***	515	0.536	446	0.426
Pesticides	0.087**	419	0.570	372	0.484	0.087**	429	0.527	380	0.439
Manual labor peon	0.135***	360	0.611	290	0.476	0.130***	360	0.556	301	0.425
Collaborative work	0.058	365	0.595	401	0.536	0.008	401	0.486	437	0.478
Hire tractor/animal	0.093**	336	0.563	298	0.470	0.048	347	0.493	306	0.444
Tools	0.125**	187	0.428	198	0.303	0.069	203	0.369	226	0.301
AGRICULTURE	0.087***	600	0.592	591	0.505	0.050*	605	0.519	604	0.469
Peon self in community	-0.087	95	0.768	90	0.856	0.056*	313	0.284	350	0.229
Peon self, outside com.	-0.189*	29	0.586	40	0.775	0.035	182	0.297	237	0.262
Self, any paid work	0.006	21	0.714	24	0.708	0.078	112	0.232	117	0.154
Partner, any self work	0.009	151	0.265	176	0.256	-0.137	33	0.606	35	0.743
Self business	0.016	58	0.845	70	0.829	-0.205*	39	0.385	39	0.590
Partner business	-0.079	38	0.500	38	0.579	0.005	60	0.867	65	0.862
LABOR	-0.014	285	0.508	302	0.522	0.045	448	0.324	468	0.279
ALL	0.053**	632	0.702	627	0.649	0.051*	634	0.607	633	0.556
ALL reduced	0.058**	626	0.720	624	0.659	0.046**	626	0.641	624	0.641

Note: Difference in mean participation rate by women in decision-making by realized expenditure/employment within the household in last 12 months (5 years for investments). % is mean share by CP. # is number of households effectuating this category, Diff is difference share between CP and CCR. Source: PeruLandGender 2010 household survey

\*Significance at 10% level.

\*\*Significance at 5% level.

\*\*\*Significance at 1% level.

The Empowerment ALL variable aggregates women's influence in 26 different household decisions into one indicator. Women reported 5.3 percentage points higher levels in CPs than in CCRs (men 5.1 percentage points), indicating that the empowerment effect of joint titling in the Peruvian highlands was positive and significant at the 5% level for both.

The influence of titling proved strongest for *Agriculture* among the four category-aggregated *Empowerment* indicators. The mean for CPs is 8.7 percentage points higher than for CCRs and significant at the 1% level in a test of proportion according to our female respondents. The effect is lower for male respondents. The 5.0 percentage point difference is still significant at the 1% level. The indicator for current household *Expenditure* is not significantly different, probably because women are generally responsible for such purchases in most households. Deere and Twyman (2012) point out that the empowerment concept makes sense only for decisions in which women have not participated previously.

We asked about investments over the past 5 years. Women in CPs reported taking part in land purchases considerably

more than did women in CCRs: 91.7% compared to 71.1%, respectively for female respondents. There is no significant difference for male respondents, which might reflect differences in perception. However, only 60 sales took place in CPs and 31 in CCRs. For other investment categories no significant differences were found in empowerment between CPs and CCRs.

Whether or not to participate in the labor market is the last category. Fewer women work as paid day laborers in agriculture (peon) than men, within and outside the community. The woman may decide whether to work in agreement with the husband, but it seems that she cannot influence her partner's choice. We note some differences between the two types of communities, but no uniform reporting patterns for men and for women.

Some positive decisions are taken by only a minority of households. The *ALL reduced* indicator in the final line of Table 1 includes only questions with at least 250 observations for female respondents, which eliminated 10 out of 26 questions. This meant including fewer questions in the calculated Empowerment indicators for some of the households, and



omitting only six households. The difference for female respondents rises slightly to 5.8 percentage points, and is reduced to 4.6 percentage point for male respondents—both remain significant at the 5% level.

(b) *Regression models*

The true effect can be higher if the estimate is contaminated by negative selection and simultaneity effects. I hence introduce possibly omitted variables as controls in a stepwise manner in the OLS regression models reported in Table 2 below.<sup>23</sup> In the first column I introduce the contemporaneous PLG10 household and community variables on the PLG10 sample of households in the first column. The estimated *Private community* dummy<sup>24</sup> coefficient effects are 0.0676 for female respondents (and 0.0492 for male respondents in the fourth column). They are close to the previous uncontrolled estimated effect of 5 percentage points, but are now insignificant.<sup>25</sup>

Historic pre-titling data probably better reflect local culture and practices that might have affected both gender roles (then and today) and whether the community sought and got recognition. However, we are able to construct community-level variables from the Agricultural Census of 1994 (C94) only for a subsample of 878 households. The sample reduction effect appears in the second column, which shows PLG10 control variables on the C94 subsample. The CP coefficient is then reduced to 0.0224 for female respondents (but increases to 0.0636 for male respondents).

We then introduce the C94 community-level variable on the C94 subsample in the model to subtract the potential selection effect in the third column. The higher estimated *Private community* dummy coefficient reflects an increase in the joint titling effect to 15.5 percentage points (and 17.2 percentage points for male respondents), highly significant at the 1% level. This “Main” model specification probably reveals the effect of joint titling best and will hence be the focus in the ensuing analysis (with descriptive variable statistics given in Table 4 in the Appendix).

The signs of the PLG10 household-level variables are as expected, although most are not significant. The exception is *Age of woman*, representing cohort effects, negative at the 5% significance level. With more “young adult” offspring still living in the household, there are more people who might take the place of the woman of the principal couple in household decision-making. The coefficients for the existence of *Daughter above 15 years* and *Son above 15 years* in the household dummies are hence expected to be negative. *Female* and *Male mathematical competence*, intended to reflect intelligence, and *Woman* and *Man inherit land*, whether each have inherited land as an exogenous proxy for individual wealth, proves to be not significant.

The PLG10 community questionnaire variables have been reported by the president of the community or a knowledgeable, trusted representative. As expected, *Altitude* in meters above sea level has a very significant negative effect, since remote communities tend to be more traditional. *Community population* is also significantly negative, indicating that women are more influential in smaller (and probably more transparent) societies. We also introduce controls for their report on pre-land reform organizational forms, thereby controlling for differences in culture that might have influenced whether the community gained official recognition or not. Different ownership systems might have existed within the territory of a given community today, so our dummy variable states whether or not one type of ownership existed (in at least parts of the territory of the current community). The land-scale

holdings of former *hacienda* land show significantly lower empowerment today, at the 10% and 5% levels for female and male respondents respectively, whereas the smaller *Fundo* properties show a considerable positive effect significant at the 1% level. One possible explanation is that former workers on such land were historically freer to migrate, which gave the women more responsibilities both at home and while traveling. Having *Original community* land (being recognized before the land reform of the 1960–70s), shows no significant impact.

Traditional culture, assumed to permit less influence by women, is probably stronger in more isolated communities. The control variable *Distance on foot* refers to the time necessary to walk from the community to the local district capital. Our dataset does not confirm the assumed empowerment effect of *Education* (measured as level rather than dummy) in Table 1.<sup>26</sup> We also tested whether better-educated women would be more able to take advantage of the institutional change of introducing joint titling, for instance because they could more readily see the potential positive future benefits. However, no such significant interaction effects were found in the models reported in Table 5 in the Appendix.

Road accessibility, as indicated by *GRADE* (2007), had no significant effect, neither did the community assembly organizations. The only exception was internal laws enacting *Land transfer restrictions*: they proved to yield a significant positive empowerment effect for the model based on male respondents.

In the anthropological literature, a common finding is that land inheritance and land management differ between agro-ecological zones (Mayer, 2002). *Altitude* in 1000 meters above sea level is probably the best indicator, reflected by the highly significant negative estimated effect.<sup>27</sup>

Other agro-technical variables at community level have been calculated from the historical data in the Agricultural Census from 1994 (C94). These factors represent the pre-PETT gender culture, from which the effect of individual plot titling should be measured (descriptions in Table 4 in the Appendix). The inclusion of all C94 variables doubles the explanatory power of the model with  $R^2$  value of 0.240 and tripled the estimated empowerment effect of joint titling, as the CP coefficient rises to 0.155. The correlation of the C94 variables with *Private community* varies; I will not assess the partial effects on the estimated treatment effect. The exact causal mechanisms are complex and will be investigated in future research.

Many of the C94 variables proved highly significant in themselves. The C94 variable *Land inherited* refers to the share of the households in the community who have inherited any land. The effect is negative, as expected, since men tend to inherit more than women. The more the inheritance, the more will the man bring to the marriage compared to the woman. Acquisition through the market is normally less gender-biased. *Adult sons farming* is the mean number of sons per household above 15 years that contribute to household farming. It reflects both family size and importance of the agricultural sector, and was found to have a significant negative effect. The mean share of households that applied *Fertilizer* was significantly positive, probably reflecting modernizations due to market integration. Both the share of households in the community with *Irrigation* on their plots and the mean number of *Plots owned* per household reflect income and cash-crop potential. These yield significant negative effects for women’s empowerment. The mean *Education* level of the agriculturalist (independent of gender) in the community has no significant impact. The share of households owning *Plot outside* the community reflects the outward orientation of the community population, but has no significant effect upon women’s empowerment.

Table 2. *Women's participation in household decision, OLS regression models*

Variables Sample	Female respondents			Male respondents		
	PLG10 PLG10	PLG10 C94	Main C94 C94	PLG10 PLG10	PLG10 C94	Main C94 C94
Private community	0.0676 (0.0448)	0.0224 (0.0589)	0.155*** (0.0451)	0.0492 (0.0499)	0.0636 (0.0539)	0.172*** (0.0523)
Education woman	-0.000679 (0.0112)	0.00983 (0.0131)	-0.000534 (0.0135)	0.00884 (0.0103)	0.0197 (0.0138)	0.00638 (0.0154)
Education man	0.00878 (0.00959)	0.0123 (0.00941)	0.0114 (0.00874)	0.000526 (0.00834)	-0.00487 (0.0110)	-0.00572 (0.00982)
Spanish sec. woman	-0.00191 (0.0377)	-0.0432 (0.0367)	-0.0446 (0.0337)	-0.00555 (0.0327)	-0.0237 (0.0309)	-0.0100 (0.0348)
Time of co-habitation	0.00312** (0.00151)	0.00143 (0.00161)	0.00120 (0.00147)	0.00383*** (0.00139)	0.00308* (0.00157)	0.00256* (0.00141)
Age difference	-0.000449 (0.00205)	-0.00188 (0.00253)	0.00108 (0.00229)	-0.00319* (0.00177)	-0.00373* (0.00219)	-0.000903 (0.00200)
Age of woman	-0.00458*** (0.00160)	-0.00260 (0.00173)	-0.00368** (0.00165)	-0.00281* (0.00146)	-0.00198 (0.00160)	-0.00307** (0.00149)
Daughter above 15	-0.0403 (0.0242)	-0.0456 (0.0308)	-0.0178 (0.0306)	-0.0368 (0.0241)	-0.0184 (0.0294)	0.00832 (0.0284)
Son above 15	0.0232 (0.0209)	0.0278 (0.0248)	0.0287 (0.0235)	0.0227 (0.0197)	0.00578 (0.0218)	0.000404 (0.0226)
Male math	0.00314 (0.0256)	-0.00465 (0.0295)	-0.0131 (0.0282)	0.0309 (0.0232)	0.00572 (0.0282)	-0.0134 (0.0271)
Female math	0.0194 (0.0204)	0.00120 (0.0258)	-0.00647 (0.0240)	-0.00143 (0.0228)	-0.0127 (0.0283)	-0.0241 (0.0270)
Man inherits land	-0.0310 (0.0223)	-0.0422* (0.0244)	-0.0270 (0.0212)	-0.0266 (0.0243)	-0.0427 (0.0266)	-0.0200 (0.0231)
Woman inherits land	-0.0465** (0.0213)	-0.0420 (0.0256)	-0.0212 (0.0268)	-0.0112 (0.0151)	0.00427 (0.0177)	0.0269 (0.0176)
Altitude	-0.206*** (0.0489)	-0.250*** (0.0817)	-0.349*** (0.0963)	-0.175*** (0.0421)	-0.247*** (0.0741)	-0.311*** (0.0794)
Population	-0.104 (0.186)	-0.988 (0.605)	-0.841** (0.411)	-0.0483 (0.179)	-0.562 (0.673)	-0.562 (0.449)
Distance distr. capital	0.000180 (0.000244)	0.000151 (0.000357)	0.000170 (0.000225)	0.000125 (0.000253)	0.000220 (0.000346)	0.0000682 (0.000224)
Hacienda land	0.00463 (0.0451)	-0.0444 (0.0609)	-0.0945* (0.0544)	-0.0119 (0.0425)	-0.0573 (0.0642)	-0.125** (0.0509)
Fundo land	0.127** (0.0525)	0.166*** (0.0613)	0.179*** (0.0463)	0.126** (0.0533)	0.116 (0.0700)	0.138** (0.0617)
Original com. Land	0.0446 (0.0605)	0.0153 (0.0730)	0.0704 (0.0701)	0.0217 (0.0537)	0.00722 (0.0656)	0.0315 (0.0648)
Money contributions	0.00458 (0.0499)	0.0272 (0.0538)	0.0741 (0.0521)	0.0156 (0.0504)	0.0548 (0.0500)	0.0691 (0.0465)
Agri/forest land	0.0231 (0.0579)	0.0461 (0.0613)	-0.0353 (0.0484)	0.0337 (0.0618)	0.0396 (0.0636)	-0.0582 (0.0542)
Land conflict mediation	0.00863 (0.0486)	0.0152 (0.0601)	-0.0460 (0.0378)	-0.00600 (0.0440)	0.0156 (0.0524)	-0.0518 (0.0369)
Land transf. restrictions	-0.0275 (0.0241)	0.00279 (0.0303)	0.0326 (0.0257)	-0.0243 (0.0237)	0.00168 (0.0268)	0.0472** (0.0228)
Land inheritance			-0.247*** (0.0808)			-0.286*** (0.0717)
Adult sons			-1.086*** (0.289)			-1.016*** (0.292)
Fertilizer			0.247*** (0.0546)			0.184*** (0.0501)
Education			0.0480 (0.0422)			0.0328 (0.0460)
Plots owned			-0.0218 (0.0153)			-0.0401*** (0.0148)
Irrigation			-0.236*** (0.0725)			-0.228*** (0.0756)
Plots outside			-0.473 (0.381)			-0.490 (0.550)
Constant	1.386*** (0.205)	1.543*** (0.281)	2.086*** (0.370)	1.082*** (0.202)	1.306*** (0.310)	1.989*** (0.328)

#Obs	1259	878	878	1267	885	885
$R_2$	0.143	0.143	0.240	0.113	0.117	0.209
Adjusted $R_2$	0.127	0.120	0.213	0.0966	0.0934	0.181

Note: OLS regression models for Empowerment ALL indicator as dependent variable, clustered by community. Explanatory variables at household level from PLG10 in upper part, community level from PLG10 I medium part, and community level from C94 in lower part. First model only PLG10 variables and PLG10 sample, second PLG10 variables with C94 sample and third both PLG10 and C94 variables using C94 sample; female respondents. Model four–six is similar for male respondents. Altitude in 1000 m.a.s.l.; Population in 1000 households.

\*Significance at 10% level.

\*\*Significance at 5% level.

\*\*\*Significance at 1% level.

### (c) Decision categories and regional differences

Women's influence varies within the 26 decisions categories. In some, the level is high, and one may well ask whether joint titling would give even more influence to women. The norm of influence according to attribution would also be strongest where the link to the asset in question is the most apparent, as with land-related decisions like land sales/purchase and agricultural practices. A positive secondary “threshold” effect is also possible. Without ownership rights, women had previously few incentives for getting involved in agricultural decisions. With the formalization of joint ownership, a woman now has the right to take part in agricultural decisions. If she does, she will also strengthen her property rights, as people will notice her involvement. By acting as an owner, the woman becomes one, protecting her current and future rights to land as a valuable asset.

In Table 3 below we apply *Empowerment* indicators aggregated by the decision categories *Expenditure*, *Investment*, *Agriculture*, and *Labor* as dependent variables. The fifth column is the overall *Empowerment ALL* indicator for all 26 decisions as applied in Table 2. The last column is the additional dependent variable *Investment idea*, which, as explained, reflects whether the woman had the original idea, alone or jointly with husband, for the given positively realized investment. The right and tendency to initiate is an important way of influencing the choice of household projects. Women are relatively disempowered in this dimension, as the mean indicator value is 0.543 in CPs and 0.492 in CCRs for female respondents.<sup>28</sup>

As for the treatment variable *Private Community* (CP), I report on it only to show how the effect is fairly consistent over model formulation and methodology.<sup>29</sup> The estimated coefficient is given in bold; asterisks indicate level of significance, the standard deviation is given in brackets below, and the number of observations (left) and explanatory power  $R^2$  (right) are reported in the third line. The models applying empowerment indicators based on female respondents are in the upper part of the table, and male respondents in the lower part. All OLS models are estimated with residuals clustered at community level—sufficient to assume normally distributed residuals within community and not for the entire dataset.

Table 3 reports the coefficient for the treatment variable *Private community* (CP) in OLS estimation for the preferred dataset including community-level variables from the agricultural census of 1994 (C94), leaving out the other explanatory variables that are presented in Table 1. The effect is strongest for (*Empowerment*) *Investment* and *Agriculture*. The coefficient values reflect that women in CPs score 24.6 and 20.6 percentage points higher on the given empowerment indicator, which varies between 0 and 1. The coefficient value of 0.0819 for *Expenditure* probably reflects the traditionally high female influence on this matter: the score on the empowerment indicator is 0.815 in CPs and 0.799 in CCRs. Supplementary information indicates that women's traditional role as caretakers of

the home also includes responsibility for sales and purchases in the market. The physical “purse-string” control obviously empowers. In 69% of the PLG10 households, the woman controls the household budget, although only 19% decide how to spend the money alone. Most normal and incidental income is channeled into the household budget, which is in her control. Only a minor share (15–20%) of both men and women keep more than 25% of the income in their own pockets. The rest goes into the common budget controlled by the woman (Wiig, 2012). Qualitative interviews indicate women have a better overview of current and future household needs. Through market activities, women become better informed about costs. The men produce and earn the income, which implies less of a need for overview of needs, alternatives, and market prices. “Purse-string control” gives knowledge, and knowledge is power, in the household as well as in the society.

The coefficient for participation in decisions about taking part in the *Labor* market is 0.175, significant at the 5% level. The lower degree of joint decision-making compared to other categories seems reasonable, as whether to take paid work is left to the initiative of the individual. The effect on the alternative indicator *Investment idea* is strong, with an estimated coefficient of 0.211, significant at the 5% level. Thus we see that joint titling induces women to take more initiatives, and thereby gain influence over their own lives.

In the second type of model marked “District dummies” we also included dummies for each of the districts in the PLG2010 sample as we assumed that different gender cultures might arise within geographical and administrative areas. This reduced the estimated impact of titling, but the coefficient in the *Empowerment ALL* model of 0.0875 is still significant at the 5% level. As in the “Main” model specification, the effects are strongest for *Investment* and *Agriculture*. The sample was split into the four regions Apurimac, Ayacucho, Cusco, and La Libertad for separate analysis on OLS models using the “Main” specification. The titling effect differed by region on both category and overall empowerment indicators. The effects on different indicators could also go in opposing directions within a given region. Take for example Apurimac, where the effect on *Expenditure* was significantly negative and on *Labor* significantly positive. The aggregated effect on *ALL* for this region was hence positive, but not significant. In Cusco, the large positive *Investment* and *Agriculture* coefficients were neutralized by the negative *Labor* market effect. Neutralization was also found between regions on a given topic. The significantly negative effect for *Labor* in Cusco served to reduce the overall effect in the “Main” version with the full dataset. These regional results should be interpreted with caution, as the drastic reduction in number of observations means that outliers might influence the estimated coefficient values considerably.

The estimation on the empowerment indicators constructed on female questionnaire responses is given in the upper part of Table 3, and on male responses in the lower part. The estimated effect is actually stronger in the latter. The CP coeffi-

Table 3. *Women's participation in household decisions, by type, alternative datasets, PLS regression models*

		Expenditure	Investment	Agriculture	Labor	All	Invest idea
Female respondents	<b>Main</b>	<b>0.0819*</b>	<b>0.246***</b>	<b>0.206***</b>	<b>0.175**</b>	<b>0.155***</b>	<b>0.211**</b>
	St.dev.	(0.0439)	(0.0540)	(0.0600)	(0.0760)	(0.0451)	(0.0898)
	#Obs, $R^2$	766, 0.136	413, 0.197	883, 0.267	417, 0.189	878, 0.240	413, 0.185
	<b>Dist. Dum.</b>	<b>0.0149</b>	<b>0.183***</b>	<b>0.126**</b>	<b>0.161*</b>	<b>0.0875**</b>	<b>0.145**</b>
	St.dev.	(0.0400)	(0.0564)	(0.0512)	(0.0839)	(0.0351)	(0.0680)
	#Obs, $R^2$	766, 0.178	413, 0.236	833, 0.316	417, 0.199	878, 0.301	413, 0.237
	<b>Apurimac</b>	<b>-0.0893**</b>	<b>0.0819</b>	<b>0.132</b>	<b>0.474**</b>	<b>0.0948</b>	<b>-0.0114</b>
	St.dev.	(0.0309)	(0.0664)	(0.0914)	(0.186)	(0.0626)	(0.0950)
	#Obs, $R^2$	224, 0.126	95, 0.286	244, 0.166	87, 0.279	253, 0.151	95, 0.342
	<b>Ayacucho</b>	<b>0.166</b>	<b>1.203</b>	<b>0.583</b>	<b>0.157</b>	<b>0.713</b>	<b>-1.109</b>
	St.dev.	(0.796)	(1.019)	(0.951)	(1.603)	(0.463)	(1.246)
	#Obs, $R^2$	207, 0.138	131, 0.336	220, 0.146	111, 0.301	232, 0.165	131, 0.217
	<b>Cusco</b>	<b>0.0205</b>	<b>0.255**</b>	<b>0.266***</b>	<b>-0.380***</b>	<b>0.0459</b>	<b>0.394***</b>
	St.dev.	(0.0595)	(0.111)	(0.0684)	(0.0461)	(0.0436)	(0.111)
	#Obs, $R^2$	217, 0.214	159, 0.208	223, 0.153	162, 0.241	225, 0.234	159, 0.221
<b>Libertad</b>		<b>0.453</b>	<b>0.390*</b>			<b>-0.0747</b>	
St.dev.		(0.274)	(0.192)			(0.566)	
#Obs, $R^2$	118, 0.333	28, 0.394	146, 0.347	57, 0.549	168, 0.358	28, 0.681	
Male respondents	<b>Main</b>	<b>0.217***</b>	<b>0.171***</b>	<b>0.179**</b>	<b>0.0721</b>	<b>0.172***</b>	<b>0.128</b>
	St.dev.	(0.0609)	(0.0551)	(0.0755)	(0.0507)	(0.0523)	(0.0863)
	#Obs, $R^2$	788, 0.127	423, 0.178	850, 0.214	640, 0.126	885, 0.209	423, 0.248
	<b>Dist. Dum.</b>	<b>0.167***</b>	<b>0.116*</b>	<b>0.0765</b>	<b>0.0280</b>	<b>0.104**</b>	<b>0.0324</b>
	St.dev.	(0.0448)	(0.0597)	(0.0632)	(0.0653)	(0.0428)	(0.0641)
	#Obs, $R^2$	788, 0.174	423, 0.200	850, 0.269	640, 0.140	885, 0.272	423, 0.316
	<b>Apurimac</b>	<b>0.244**</b>	<b>0.119</b>	<b>0.128</b>	<b>0.123</b>	<b>0.144*</b>	<b>0.289**</b>
	St.dev.	(0.0897)	(0.0943)	(0.0866)	(0.0929)	(0.0765)	(0.115)
	#Obs, $R^2$	235, 0.124	96, 0.210	253, 0.122	173, 0.176	254, 0.124	96, 0.357
	Ayacucho	0.927	0.195	-0.772	-1.020	0.248	-0.0382
	St.dev.	(0.775)	(0.870)	(0.469)	(0.992)	(0.414)	(0.529)
	#Obs, $R^2$	213, 0.161	143, 0.235	228, 0.168	156, 0.236	233, 0.190	143, 0.249
	<b>Cusco</b>	<b>0.164**</b>	<b>0.803***</b>	<b>0.330***</b>	<b>0.0435</b>	<b>0.303***</b>	<b>0.0276</b>
	St.dev.	(0.0693)	(0.114)	(0.0725)	(0.0559)	(0.0435)	(0.147)
	#Obs, $R^2$	218, 0.216	156, 0.120	224, 0.129	193, 0.117	225, 0.171	156, 0.139
<b>Libertad</b>	<b>0.114</b>	<b>0.290</b>		<b>-0.0399</b>	<b>0.377</b>	<b>-0.350</b>	
St.dev.	(0.586)	(0.269)		(0.408)	(0.224)	(0.394)	
#Obs, $R^2$	122, 0.333	28, 0.373	145, 0.274	118, 0.341	173, 0.315	28, 0.745	

Note: Different empowerment sub-categories, all and alternative indicator *Invest decision* as dependent variables applying both PLG10 and C94 data. Report only *Private community* coefficient (in bold), standard deviation, number of observations, and explanatory power for different OLS model specification, first line as given in Table 2, second line includes dummies for districts and third-six lines are regional models for each region. Missing value when identification is not possible due to low number of observations. Robust standard errors clustered at community level.

\*Significance at 10% level.

\*\*Significance at 5% level.

\*\*\*Significance at 1% level.

cient for *ALL* in the “Main” version is 0.172 and significant at the 1% level. Whether the analysis is based on female or male responses seems to matter for some topics: for instance, the coefficient for *Expenditure* is three times as high when the indicator is based on male respondents.

## 6. CONCLUSIONS

The IDB and other actors in the multilateral system endorse joint ownership of assets as a gender-equalizing policy. However, there is scant empirical proof of the expected empowerment effect, due to the short implementation periods and methodological difficulties like the lack of pre-reform baseline statistics on empowerment. The analysis presented in this article deals with both these problems. Peru has enforced joint male/female ownership of household agricultural land through nearly two decades now. The average in our survey sample is 10.2 years, ample time for this unique redistributive policy intervention to have empowered the benefited women

as well as to spur changes in gender norms within the communities in question. Due to historic quirks dating back to the 1960s, otherwise similar communities with and without titled plots exist side by side within the same district, thereby enabling our research to avoid the endogeneity problem which otherwise haunts cross-section data analysis.

The analysis in our 1,280 PLG10 survey households shows a significant empowerment effect. Women living in communities with titled plots participated in 70.2% of the household decisions that were effectuated, compared to 64.9% in the communities without titled plots. This 5.3 percentage point difference is significant at the 5% level. The strength of the effect rises to 15.5 percentage points when we introduce both household-level and community-level variables in OLS models, some constructed from historic data to control for possible pre-titling differences. This quantitative analysis has identified gradual cultural changes which are not necessarily deliberate on the part of those involved, and also indicates some causal mechanisms. First of all, the effect is strongest for agricultural decision-making and land-related investment, which indicates that

the social norm of “influence according to contributions” as argued by Agarwal (1994) and Sen (1990) is a more important explanation than the hypothesis of the threat-point effect of changing post-divorce outcomes in favor of women, as indicated by Manser and Brown (1980).

This interpretation is further substantiated by norms-related survey questions and qualitative interviews on the distribution of land in the case of separation or divorce. Regardless of how land was acquired, women often keep land as compensation and child support if the man leaves the relationship to start another family. Ironically, joint titling of inherited land might actually be closer to traditional practice than today’s formal marriage law. Herein lies an important caveat: land might revert to all male property via inter-vivo transfers and inheritance. Our survey indicates that parents still prefer to

transfer land to sons rather than daughters, and that the partner’s name will not necessarily be included in the title deed. The empowerment gain through formalization in this generation might prove to be a loss of customary rights in the next. Thus, cultural practices may explain the lack of resistance toward the joint titling law (Glavin *et al.*, 2012). Our analysis probably has limited external validity for less gender-equal cultures. For example, Article §91 in Colombia’s new Victims Law sets joint titling as the overarching principle for processes of land restitution and formalization. Implementation is likely to encounter fierce resistance within Colombia’s rather male-dominated society (Colombia, 2011).<sup>30</sup> In addition, the top-down enforcement of joint titling in the near-dictatorship of Peru in the 1990s is hence not necessarily replicable in other countries and other times.

## NOTES

1. PETT has been re-organized and merged into its urban counterpart, Organism for the Formalization of Informal Property (COFOPRI), as described in Wiig (2012).

2. Formalized private property rights through titling facilitate sales and rental of land to the most efficient farmer; farmers will invest more in the land if they can be more certain of reaping the future benefits, and farmers can use the title deed as collateral to obtain loans for investments.

3. The alternative full *Community property* implies all assets are jointly owned by the couple, while *Separation of property* implies that the purchasing spouse is the sole owner (Deere & Doss, 2006). Peruvian couples are free to register either form, as a general rule or only for specific objects. In rural areas, few actually do so: it is expensive to apply to a public registrar and most people are not aware of this option. Neither our qualitative or quantitative survey teams encountered any such examples of full *community property* or *separation of property* during fieldwork in 2010.

4. Inter-vivo transfers of land are often seen as being a transfer to the couple. However, the origin reappears as a valid argument for the heir in case of separation and divorce (Glavin *et al.*, 2012; Wiig, 2012).

5. The main insight from Nobel Prize Laureate Elinor Ostrom’s research is that informal groups of people are able to make and maintain rules of behavior based on shared norms and the ability to impose sanctions on defectors (e.g. Ostrom (2001)).

6. Women might do harm to themselves voluntarily, for example by genital circumcision due to social and cultural payoffs in some developing countries; cosmetic surgery is a less violent, but still parallel, example in Western culture.

7. Land rights are normally considered a bundle of rights. However, it is not normal to split the rights in case of divorce, e.g., one individual keeps the right to farm while the other to housing.

8. Titling is considered the fulfillment of Peru’s original land reform in the 1960s and 70s, but at household level joint titling represents redistribution since most land now belongs to the offspring of the original beneficiaries.

9. Several classifications existed, depending on size and geographic location. Agrarian Society of Social Interest (SAIS) was the most common.

10. Most post-Velasco community recognitions came in special campaigns by departments covering the majority within a given district, e.g., in Puno by President García 1986–90.

11. If only a single community has a different organization than the rest within a district, this tends to reflect very peculiar social processes that might have affected the gender culture too.

12. Mean elevation differs only slightly between CCRs and CPs in our 2010 dataset. Including this factor in the empirical analysis does not alter the results significantly.

13. The state can have a role in imposing a certain household equilibrium to avoid conflict between the spouses. Where joint ownership is the default, claim to individual ownership is perceived as a lack of confidence in the partner. But if the couple can choose without any “guidance,” claiming joint ownership is then normally seen as an act of mistrust in the partner (Widman, 2012). In Peru, however, refusing to include one’s partner could be risky, as it would delay the formalization process.

14. Initially, migrants often found their land had been erroneously titled to caretakers. Now, the converse is more common. People who had migrated decades ago return for the land cadastral registration process and often receive titles, at the expense of the peasants who actually farm the land today.

15. However, this cross-contamination seems to blur the results, since exclusion of these most extreme cases of unexpected titling coverage increases the effect and significance of the estimated impact in the following analysis.

16. Inheritance is less important in CPs, with 51% of all plots compared to 57% in CCRs, while land purchase constituted 37% in CPs compared to 11% in CCRs. However, the latter figure shows that considerable land transactions also take place in CCRs. We also expect underreporting due to formal prohibition of such sales, so that, for example, a purchase from uncle is reported as “inheritance.”

17. The exception is La Libertad in Central Peru, which provides an interesting case for comparison. However, we do not find major differences in gender equality or in land tenure.

18. President Fujimori (1991–2000) did not distinguish between CPs and CCRs when he visited districts, handing out public funds to ensure his reelection. Cooperatives got most economic support during the land reform period. These were later dissolved and turned into CPs and CCRs.

19. There were rumors of corrupt PETT practices, but we were not able to find any substantial evidence. Such rumors might simply be attempts by some communities and households to rationalize what they experience as unfair treatment.

20. Some communities were temporarily abandoned in 1994 due to the civil war, and hence do not appear in the agricultural census. The people started to return some years later, after the final defeat of the Shining Path guerrilla.
21. The OLS specification is chosen as it is simple to interpret estimated coefficient values. The alternative Tobit specification, due to censoring of the dependent variable at 0 and 1, gives comparable results.
22. The effect is significantly negative for only one decision by female respondents and one by male respondents.
23. Some communities in the PLG10 survey could not be identified in the C94 survey. Any resulting potential selection bias in the reported OLS models is probably minimal since variables' values reported in Table 4 hardly differ between two samples. Furthermore, the coefficient for our variable of interest, Private Community, is marginally stronger in non-reported Heckman regression models.
24. There is no third category of untitled CPs in the sample, as we deliberately selected districts where all eligible communities had been registered by PETT agents.
25. The Empowerment indicator varies between 0 and 1; hence the coefficient in OLS is equal to percentage points effects.
26. NGOs and state programs often try to change gender culture as integral parts of their activity in rural areas. I tried different combinations in the current model specification without significant effect and these models are hence not reported.
27. I chose not to include explanatory variables with potentially reverse causality. Empowered women might more readily argue that the family should have more livestock: that would be to their advantage, as livestock and income derived are traditionally women's responsibility.
28. Investment idea is not included in the Empowerment ALL variable reported in Table 1. Male respondents give considerably lower figures for Investment idea: 0.434 for CP and 0.383 and CCR. However, the test of proportion between the two community types for *Investment idea* is not significant.
29. Full models available on project home pages <http://perulandgender.nibrinternational.no/>
30. Political representation indicates different national gender cultures. In Peru 29.2% of the congress members are women, compared to only 10.1% in Colombia (Schwindt-Bayer, 2012).

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## APPENDIX A.

Table 4. Variable description

		PLT10 and C94 household						PLT10 households					
		All		CP		CCR		All		CP		CCR	
		#Obs	Mean	#Obs	Mean	#Obs	Mean	#Obs	Mean	#Obs	Mean	#Obs	Mean
Community type		892	0.512	457	1.000	435	0.000	1280	0.504	645	1.000	635	0.000
PLG2010	Expenditure empowerment, female	766	0.805	382	0.800	384	0.811	1084	0.807	543	0.815	541	0.799
Household	Investment empowerment, female	413	0.790	183	0.859	230	0.735	582	0.772	269	0.798	313	0.750
	Agriculture empowerment, female	833	0.550	421	0.585	412	0.514	1191	0.549	600	0.592	591	0.505
	Labor empowerment, female	417	0.524	193	0.541	224	0.510	587	0.516	285	0.508	302	0.522
	Empowerment, female	878	0.679	447	0.695	431	0.662	1259	0.676	632	0.702	627	0.649
	Investment idea empowerment, female	413	0.529	183	0.572	230	0.494	582	0.516	269	0.543	313	0.493
	Expenditure empowerment, male	788	0.671	391	0.708	397	0.635	1116	0.688	554	0.720	562	0.656
	Investment decision empowerment, male	423	0.773	186	0.820	237	0.736	608	0.762	278	0.756	330	0.767
	Agriculture empowerment, male	850	0.492	425	0.525	425	0.459	1209	0.494	605	0.519	604	0.469
	Labor empowerment, male	640	0.312	310	0.348	330	0.279	916	0.301	448	0.324	468	0.279
	Empowerment, male	885	0.578	451	0.609	434	0.545	1267	0.581	634	0.607	633	0.556
	Investment idea empowerment, male	423	0.397	186	0.429	237	0.373	608	0.406	278	0.435	330	0.381
	Education level of woman in PP, level	892	2.132	457	2.225	435	2.034	1280	2.196	645	2.284	635	2.107
	Education level of man in PP, level	892	2.822	457	2.919	435	2.720	1280	2.889	645	3.002	635	2.775
	Native, Spanish secondary, dummy	892	0.561	457	0.495	435	0.630	1280	0.540	645	0.560	635	0.520
	Time of co-habitation, # years	892	24.1	457	25.2	435	22.9	1280	23.6	645	24.5	635	22.6
	Difference age woman and man, # years	892	-3.3	457	-3.4	435	-3.3	1280	-3.3	645	-3.3	635	-3.2
	Age of woman in PP, # years	892	44.8	457	46.2	435	43.3	1280	44.3	645	45.2	635	43.3
	Daughter above 15 years, dummy	892	0.247	457	0.282	435	0.209	1280	0.243	645	0.260	635	0.225
	Son PP above 15 years, dummy	892	0.303	457	0.306	435	0.299	1280	0.300	645	0.299	635	0.301
	Male math. competence, dummy	892	0.640	457	0.672	435	0.607	1280	0.663	645	0.682	635	0.644
	Female math. competence, dummy	892	0.393	457	0.442	435	0.343	1280	0.403	645	0.433	635	0.373
	Man inherited land-plots, dummy	892	0.504	457	0.429	435	0.584	1281	0.484	645	0.437	635	0.532
	Woman inherited land-plots, dummy	892	0.323	457	0.284	435	0.363	1281	0.315	645	0.304	635	0.328
PLG2010	Altitude (meters above sea level), #	892	3254.4	457	3218.5	435	3292.2	1280	3263.1	645	3237.1	635	3289.4
community	Number of households in community, #	892	77.0	457	84.3	435	69.4	1280	98.1	645	127.4	635	68.4
	Walking to district capital, # minutes	892	96.3	457	69.3	435	124.7	1280	109.7	645	92.3	635	127.3
	Hacienda land pre-land reform, dummy	892	0.610	457	0.600	435	0.621	1280	0.650	645	0.654	635	0.646
	Fundo land pre-land reform, dummy	892	0.078	457	0.066	435	0.092	1280	0.120	645	0.090	635	0.150
	Original com. pre-land reform, dummy	892	0.275	457	0.175	435	0.379	1280	0.215	645	0.124	635	0.307
	Community monetary contrib., dummy	892	0.645	457	0.468	435	0.830	1280	0.684	645	0.580	635	0.789
	Communal agri or forest land, dummy	892	1.361	457	1.617	435	1.092	1280	1.267	645	1.468	635	1.063
	Internal law restrict sales of land, dummy	892	0.667	457	0.670	435	0.664	1280	0.773	645	0.893	635	0.652
C1994	Inherited land, %	893	0.378	457	0.417	435	0.337						
community	Adults in HH farming, #	893	0.127	457	0.150	435	0.101						
	Fertilizer application, %	893	0.897	457	0.818	435	0.980						
	Education level, #	893	2.236	457	2.368	435	2.096						
	Land-plots owned, #	893	2.972	457	2.760	435	3.199						
	Irrigation on plots, %	893	0.540	457	0.506	435	0.577						
	Has land in other districts, %	893	0.036	457	0.051	435	0.021						

Note: Descriptive statistics for variables included in regression models, left side including both 2010 and 1994 data, right side only 2010 data. Upper part is individual household variables and middle part community-level variables (PLG2010), while the lower part shows pre-land reform community variables (C94). #Obs are the number of observations; Mean is the calculated mean value for the observed values in the given dataset.

Table 5. *Interacting community type with female education, OLS regression models*

	PLG10 and C94				PLG10			
	Female respond		Male respond		Female respond		Male respond	
	Agri	All	Agri	All	Agri	All	Agri	All
<b>CP coeff</b>	<b>0.180**</b>	<b>0.102</b>	<b>0.0976</b>	<b>0.117*</b>	<b>0.0366</b>	<b>0.00187</b>	<b>-0.0482</b>	<b>-0.0071</b>
	(0.0812)	(0.0633)	(0.0912)	(0.0654)	(0.0728)	(0.0572)	(0.0806)	(0.0598)
<b>Woman's education</b>	<b>-0.0069</b>	<b>-0.0162</b>	<b>-0.0161</b>	<b>-0.0098</b>	<b>-0.0156</b>	<b>-0.0189</b>	<b>-0.0131</b>	<b>-0.0067</b>
	(0.0230)	(0.0157)	(0.0211)	(0.0146)	(0.0208)	(0.0139)	(0.0166)	(0.0118)
<b>Woman's education and CP interaction</b>	<b>0.0120</b>	<b>0.0252</b>	<b>0.0383</b>	<b>0.0262</b>	<b>0.0271</b>	<b>0.0302*</b>	<b>0.0405*</b>	<b>0.0258</b>
	(0.0238)	(0.0179)	(0.0249)	(0.0181)	(0.0214)	(0.0156)	(0.0215)	(0.0162)
<b>Man's education</b>	<b>0.0077</b>	<b>0.0113</b>	<b>-0.0156</b>	<b>-0.0059</b>	<b>0.00688</b>	<b>0.00860</b>	<b>-0.0031</b>	<b>0.0003</b>
	(0.0124)	(0.00878)	(0.0116)	(0.00986)	(0.0127)	(0.00963)	(0.0108)	(0.00841)
Observations	833	878	850	885	1191	1259	1209	1267
R <sup>2</sup>	0.267	0.242	0.216	0.211	0.159	0.146	0.132	0.115

*Note:* Right side "All data" include controls for characteristics like education, age, language and land inheritance, and community-level controls like elevation, number of residents, history, and distance (PeruLandGender2010). The left side also includes community-level controls like agricultural practices, irrigation, amount of land, etc. before individual land titling started from the agricultural census of 1994 (Cenagro94). Each side has separate models for female and male survey responses for Agriculture and All decision empowerment indicator; only CCP, education, and the interaction effects are reported. Robust standard errors clustered at community level. Right side of the table "Only PeruLandGender" excludes the Cenagro94 community controls. The symbols

\* Significance at 10% level.

\*\* Significance at 5% level.

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