Land rights in transition:

Preliminary experimental evidence on how changes in formal tenure affect agricultural outcomes, perceptions, and decision-making in the Philippines

Impact Evaluation Endline Report

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Acknowledgments

We would like to thank a number of people whose efforts, either directly or indirectly, culminated in the completion of this evaluation.

We deeply appreciate all of the support we have received from the Philippine Department of Agrarian Reform's (DAR) senior management team and support staff, including Secretary John Castriciones, former Secretary Rafael Mariano, former Secretary Virgilio de los Reyes, former OIC-Undersecretary Homer Tobias, Undersecretary Emily Padilla, Undersecretary Bernie Cruz, former Undersecretary Jose Grageda, former Undersecretary Karlo Bello, former Undersecretary Rosalina Bistoyong, Bureau of Land Tenure Improvement (BLTI) Director Joey Sumatra, former BLTI Director Leandro Caymo, Policy and Planning Service Director Letecia Damole-Canales, Management Information Systems Service Director Nestor Bayoneto, Supervising Agrarian Reform Program Officer Sonia Ancheta, the Regional Directors, Provincial Agrarian Reform Officers, and all DAR field staff that supported the evaluation. Their enthusiasm for the study and assistance throughout has been critical to its continued success.

We very much appreciate all of the hard work and outstanding field management of the Field Managers Maria Sylvia Tuason and Rhea Macapanas and the field staff, Lovely Densing, Micha Fernandez, Philip Salas, Bryan Adlaon, Stella Lumaad, Stephanie Miguel, Joanne Roa, and Sanny Mangayao. Their dedication and persistence were critical to the project's success.

We also thank Tristan von Zahn, Rowell Dikitanan, Michelle Rafols, Naixin Zhu, and Jessica Gao for their excellent research support and project management. We appreciate the guidance of Sudhir Shetty, Andrew Mason, and Aaditya Mattoo, as well as the support and comments from Achim Fock, Gabriel Demombynes, Madhu Raghunath, Maria Theresa Quinones, Kathrine Kelm, Sarah Antos, Klaus Deininger, Talip Kilic, Agnes Quisumbing, Michael O'Sullivan, Aletheia Donald, Sundas Liaqat, and Aneesh Mannava.

We would also like to thank the International Initiative for Impact Evaluation. Their continued support and input at all stages of the project have been invaluable.

Research discussed in this publication has been funded by the International Initiative for Impact Evaluation, Inc. (3ie) through the Global Development Network (GDN) and by the World Bank's East Asia and Pacific Gender Innovation Lab (EAPGIL). EAPGIL is supported through the World Bank Group's Umbrella Facility for Gender Equality (UFGE) in partnership with the Australian Department of Foreign Affairs and Trade. The Umbrella Facility for Gender Equality (UFGE) is a multi-donor trust fund administered by the World Bank to advance gender equality and women's empowerment through experimentation and knowledge creation to help governments and the private sector focus policy and programs on scalable solutions with sustainable outcomes. The UFGE has received generous contributions from Australia, Bill & Melinda Gates Foundation, Canada, Denmark, Finland, Germany, Iceland, Latvia, Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom, and the United States.

The views expressed in this article are not necessarily those of 3ie or its members, of GDN, or of the World Bank Group, its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

Executive Summary

Private property rights are widely considered to be one of the most important tools in fighting inequality and promoting economic growth. In the Philippines in particular, a lack of formal, individual property rights is a key obstacle facing many farmers as they work to maximize productivity on their lands and escape poverty.

Of the 4.9 million hectares of land that have been distributed to over 2.8 million Filipino farmers under the Comprehensive Agrarian Reform Program (CARP), almost half (2.37 million hectares) were awarded in the form of collective titles that failed to provide beneficiaries with full individual property rights. To address this issue, the Department of Agrarian Reform (DAR) is in the process of subdividing these collective titles and distributing individual land titles to the respective Agrarian Reform Beneficiaries (ARBs). This ongoing intervention provides a unique opportunity to study the impacts of providing formal, individual property rights as the subdivision process is underway.

Although the DAR monitors the Collective CLOA Parcelization Program in terms of total outputs, there has been no impact evaluation of the parcelization process. In order to gather valuable information on the impacts of formal property rights, the International Initiative for Impact Evaluation (3ie) and the World Bank's East Asia and Pacific Gender Innovation Lab (EAPGIL) partnered with Innovations for Poverty Action (IPA) to conduct a randomized experiment on the subdivision of collective titles in the pre-existing DAR Parcelization Program (DARPP). The impact evaluation is designed to measure the impacts of DARPP on agricultural investment and output and the channels – namely tenure security and gains from trade – through which these impacts may materialize. The study additionally investigates impacts on ARB welfare, migration, agricultural aspirations, and intra-household bargaining and decision-making.

Although the impact evaluation is designed to measure the impacts of the DARPP, this report only presents the impacts of an intermediate stage in the parcelization process and, as such, cannot be used to draw conclusions about the effects of the program as a whole. Nevertheless, these intermediate impacts provide useful lessons on how the parcelization process can be improved and fill a global knowledge gap on how programs changing property rights, which can span several years, affect beneficiaries while they are going through the transition. Economic theory predicts that formalized property rights can influence investment decisions and productivity by reducing the threat of expropriation, increasing access to credit, and/or gains from trade (Besley 1995). The parcelization of collective titles is expected to have positive impacts on these outcomes. However, the direction and magnitude of the impacts of an intermediate stage of parcelization are theoretically ambiguous. On the one hand, the subdivision survey may settle boundary disputes, provide clarity on borders, and reassure ARBs that they will eventually receive individual land titles, all of which could increase perceptions of tenure security or make it easier to lease out the land. On the other hand, any process of change can breed uncertainty during the transition, and the long duration of the process coupled with the temporary relinquishment of title documents during processing may cause a decline in perceived tenure security. Existing empirical evidence is thin, and the only other randomized experiment providing evidence on an intermediate stage of formalizing individual property rights takes place in a very different context, with an existing customary land tenure system and beneficiaries who formerly had no formal title (Goldstein et al. 2018). This report fills that knowledge gap by providing empirical evidence on the direction and magnitude of impacts of the first stage of a change in property rights, shedding light on how ARBs experience the transition phase and what improvements to the process can be made. We additionally provide the first experimental evidence on land property rights in the Philippine context.

Measuring the impacts of the process of parcelization requires that researchers observe ARBs whose collective titles are undergoing the parcelization process and have a hypothesis about what would have happened in absence of the initiation of this process. Thus, a cluster randomized control trial (RCT) design was chosen in order to measure how and to what extent the DARPP process impacts agricultural and welfare outcomes. The study's sample consists of 475 collective titles across 10 provinces in Regions V, X, XI, XII, and XIII in the islands of Luzon and Mindanao where the DAR reports a backlog of collective titles considered priority for subdivision and would not be able to parcelize all titles within the study period. The random assignment of collective titles to either treatment or control creates two groups that are characteristically the same on average, informing us of what would have happened to collectively titled parcels and their ARBs absent the program. Treatment titles were prioritized for subdivision during the study period, whereas control titles will be subdivided after the completion of the study. Apart from the timing of the intervention's roll-out, no changes were made to the administration of the intervention as a result of the study.

The impact evaluation began with a baseline survey conducted between July 2015 and May 2018 with 855 ARBs and their spouses across 475 collective titles. IPA then conducted a lottery to randomly and evenly allocate sample titles to treatment and control groups. The DAR then prioritized parcelizing the treatment group while control titles could be treated only after the study. An endline survey was then conducted between November 2019 and February 2020. The intervention in the provinces of Bukidnon and Davao Occidental saw little progress during the study period, and since the randomization was stratified by province, we excluded these two provinces from the analysis while maintaining the study's internal validity. The endline sample includes 324 titles, including 159 in the treatment group and 165 in the control group.

Although the study's initial plan was to evaluate the impacts of the provision of individual land titles, this report only examines the impacts of an intermediate stage of the parcelization process. The parcelization process broadly consists of two main milestones: 1) the subdivision and demarcation of individual agricultural parcels within the collectively titled landholding, and 2) the registration and distribution of individual title documents. At the time of the endline survey, the majority of treatment titles had completed the survey subdivision process (the first milestone), but only 4 percent had received the individual title documents (the second milestone) due to long delays in processing the individual titles. The average duration between completion of the subdivision survey and the endline survey was 20 months. It is plausible to expect impacts before completion of the process, given the survey subdivision already provides clarity on the precise area owned by each ARB and resolves disputes among collective CLOA members. However, the impacts of an intermediate stage of the process cannot be used to draw conclusions about the potential benefits of parcelization or of individual property rights more broadly. For example, the receipt of an individual title document could strengthen perceived property rights and enable the ARBs to use the land for additional purposes, such as access to credit.

We find that survey subdivision more than doubled the likelihood that ARBs leased out their awarded parcel compared to the control group and decreased the likelihood that they till the land themselves by a similar magnitude. An increase in leasing may be consistent with improved clarity in property rights. However, the subdivision survey decreased ARBs' perceptions of tenure security and perceptions of local government's ability to effectively enforce their property rights. Aligned with these concerns, the subdivision survey also increased ARBs' anxiety levels by 9 percent and decreased their life satisfaction by 26 percent compared to the control group. We also find suggestive evidence of a decline in certain investments in the land, including leaving it fallow for productivity reasons and plans to make large investments like barns or granaries. Although subdivision changed the way ARBs use their land and perceive of their property rights,

there were no statistically significant impacts on the agricultural output of subdivided parcels. There were also no average impacts on intermediate outcomes of interest, such as food consumption, productivity aspirations, or migration.

We find that intra-household bargaining and decision-making changed as a result of the subdivision process, in particular in households of male ARBs. Wives of male ARBs reported lower levels of decision-making on the land. Notably, the subdivision survey led to a 51 percentage point decline in the likelihood that wives of male ARBs reported their opinion could prevail in the case of a disagreement with their spouse on a land-related decision. Although their decision-making authority decreased, we do not see a decrease in other measures of their agency. This decline in land-related decision-making authority may be linked to decreased perceptions of spousal ownership. Compared to the control group, wives of male ARBs whose titles were subdivided were less likely to report their names on the title. In the Philippines, women in agricultural households tend to have higher educational attainment and are more likely to work in off-farm labor, so this may represent a specialization of decision-making. However, the shift in decision-making is also aligned with a shift in gender norms among male ARBs, who are 34 percentage points less likely to believe that women should be decision-makers on land that they own. We do not observe a similar trend in the households of female ARBs, and if anything, survey subdivision incites a shift toward more gender-equal decision-making on land that the DAR awarded to female ARBs.

Perhaps linked with lower levels of assets and differences in access to and experiences with institutions, the subdivision survey affected male and female ARBs differently. Compared to female ARBs in the control group, female ARBs whose land was subdivided were 24 percentage points more likely to lease out the land, 6 percentage points more likely to sell the land, and 22 percentage points less likely to till it themselves. They also decreased their planned investment in the land. Although female ARBs had fewer recent experiences of land conflict after the subdivision survey, other facets of their tenure security declined. The subdivision survey decreased perceptions of tenure security for both men and women, but the declines in the perceived effectiveness of local officials to enforce property rights were larger for female ARB.

Agrarian Reform Communities (ARC) consist of clusters of agrarian reform barangays which receive additional support services from the DAR, including but not limited to the construction of farm-to-market roads and irrigation infrastructure, provision of credit lines, capacity-building trainings, and support for small enterprises. The subdivision survey affected ARBs in ARCs differently than those outside of them, likely due to the greater access to information and to complementary support services within these communities. Increases in leasing and decreases in perceived tenure security and perceived effectiveness of local officials to enforce land rights were concentrated in areas outside of ARCs that have more limited access to support services. Within ARCs, there were no statistically significant impacts on tenure security, and ARBs increased their attempts to invest in sheds and irrigation. However, declines in psychological wellbeing and in women's decision-making authority were concentrated within ARCs, suggesting that the average impacts of survey subdivision are spread across different parts of the population.

ARBs initially received land through a market-based program that compensated former landowners. Unless their land is non-compensable, such as most land formerly owned by the government, ARBs must make amortization payments over a 30-year period to reimburse the value of the land; however, these payments are not typically made while the land is collectively titled. Once the area of each ARBs' parcel has been determined through parcelization, the amortization schedule can be calculated and enforced. Likely related to the need to make amortization payments or not, we see differential impacts on compensable and non-compensable

lands. ARBs on compensable lands whose land was subdivided are 25 percentage points more likely to lease their land and 21 percentage points less likely to till it themselves than ARBs on compensable lands in the control group. Their perceptions of tenure security and of the effectiveness of local officials to enforce property rights decline, as do their plans to invest in large infrastructure. Aligned with the decline in tenure security, ARBs on compensable land experience an increase in anxiety but no statistically significant change in their life satisfaction. In comparison, ARBs on non-compensable lands do not experience changes in their tenure security or in leasing, and they increase their attempts to invest in irrigation and sheds and their plans to invest in new trees. Nevertheless, ARBs on non-compensable lands experience a decline in their life satisfaction. The subdivision survey influences actual and planned migration for ARBs on both compensable and non-compensable lands; however, these impacts go in opposite directions for the two groups.

Although any process of change can generate uncertainty and anxiety, several aspects of the way the program is implemented may explain the average declines in tenure security, investment, and psychological well-being after the subdivision survey. Although the design of the program incorporates procedures and plans for informing and involving the ARBs in the parcelization process, ARBs whose land was subdivided reported much lower levels of information and involvement than expected. The long duration of the process and the lack of clarity on the current status and timeline combined with this lack of information and involvement could raise concerns among ARBs about their current tenure situation and raise doubts that they will ever receive their individual titles. Compounding these concerns, ARBs relinquish their collective title documents after the survey subdivision, as these documents would be cancelled in order for the individual CLOAs to be issued. This leaves ARBs with temporary absence of proof of ownership, which can raise concerns about tenure security. Without proof of ownership, ARBs may worry that it would be more difficult for local officials to enforce property rights. Alternatively, delays in receiving the individual titles may erode trust in these authorities. Another potentially influential aspect of program design is that after receiving their individual titles, ARBs on compensable lands will also receive an amortization schedule. Because defaulting on amortization payments can lead to foreclosure, ARBs may be worried about their ability to pay off the land and the possibility of losing the land to foreclosure.

Changes in intra-household decision-making in the households of male ARBs may be linked with a reinforcement of the original ARB's identity or with a reassertion of gender roles that can occur in times of increased anxiety. The parcelization process may serve as a reminder of which spouse was the original ARB, and some ways in which the subdivision process is implemented may further reinforce this notion. Invitations to attend assemblies of ARBs during which important information is circulated and decisions are made are only addressed to the ARB and not to the spouse, even though the land is conjugal property for married ARBs. Involving both spouses in this process may facilitate more equal bargaining power on land-related decisions.

Our results do not provide any evidence for or against the potential benefits of the parcelization of collective land titles; however, they do point to several ways that the implementation of the parcelization process in the Philippines could be improved. Ensuring that ARBs have greater access to information, participate more in the process, and have more transparency throughout the process could reduce uncertainties that arise between the first and second stages of parcelization. Accelerating the process, so that ARBs receive their individual titles sooner, could also help alleviate concerns that may arise due to the delays. Including tracking of the provision of individual titles in the monitoring and evaluation system may help quickly identify bottlenecks in the process to ensure timely provision of titles. In addition, facilitating access to support services during the process may ease the transitional stage and/or enable ARBs to take advantage of

clarity in their property boundaries, but these services must be delivered in a gender-sensitive way. Additional actions could address other sources of anxiety, such as the temporary absence of a paper title and amortization. Finally, including both spouses in the parcelization process and ensuring the de facto provision of joint titles may enable both spouses to more fully participate in intra-household decision-making on the land.

The Government of the Philippines, with technical and financial assistance from a World Bank project under preparation, is already addressing many of the recommendations coming out of this study. A thorough communication campaign that targets both spouses is detailed in the Stakeholder Engagement Plan. Moreover, the parcelization process will be digitized, which is expected to reduce the delays in receiving individual titles and improve the transparency of the process. The monitoring and evaluation system is designed to identify and address challenges: a Steering Committee and Inter-Agency Agreement will facilitate agreement on performance standards and enable identified bottlenecks to be addressed quickly. Finally, the provision of titles in the names of both spouses will be enforced, and access to support services will be facilitated.

Beyond the Philippines, our results demonstrate the importance of evaluating not just the final outcomes of a program but the impacts of intermediate stages of an intervention that can span several years. Doing so can help identify implementation challenges and can provide course correction to improve the experiences of the beneficiaries. In addition, we find suggestive evidence that accompanying the implementation of land reform programs with the provision of support services may ease some of the challenges beneficiaries face during the transition in their property rights and/or enable them to more fully benefit from the program. Including both spouses in land reform programs, not only through ensuring joint titling, but also through involvement in the implementation of the program may affect intra-household bargaining and decision-making on the land. Finally, our results also provide evidence that can inform the design, implementation, and monitoring and evaluation of other parcelization programs, in particular where administrative constraints could result in implementation delays and uncertainty among beneficiaries.

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Abbreviations and acronyms

ARB	Agrarian Reform Beneficiary
BARC	Barangay Agrarian Reform Council
CARP	Comprehensive Agrarian Reform Program
CLOA	Certificate of Land Ownership Award
DAR	Department of Agrarian Reform
DARAB	Department of Agrarian Reform Adjudication Board
DARCO	Department of Agrarian Reform Central Office
DARPO	Department of Agrarian Reform Provincial Office
DARRO	Department of Agrarian Reform Regional Office
DARPP	Department of Agrarian Reform Parcelization Program
DENR	Department of Natural Resources and Environment
EAPGIL	East Asia and Pacific Gender Innovation Lab
FOF3	Field operation files
FOO	Field Operations Office
IP	Indigenous Peoples
IPA	Innovations for Poverty Action
LBP	Land Bank of the Philippines
LMS	Land Management Service
LRA	Land Registration Authority
MARO	Municipal Agrarian Reform Office
MARPO	Municipal Agrarian Reform Program Officer
PARO	Provincial Agrarian Reform Office
PARPO	Provincial Agrarian Reform Program Officer
RSS	Request for Survey Services

1. Introduction

Private property rights are generally considered one of the key pillars of economic growth and development. By the same token, a lack of clear and formal property rights, a pervasive feature in many developing countries, impedes such development (Demsetz 1967; North and Thomas 1973; De Soto 2000; Besley and Ghatak 2010). The Government of the Philippines faces this development challenge as many Filipino farmers do not have individual, formalized property rights over their agricultural land but instead hold collective rights with neighboring co-owners. Such collective titling is a legacy of the Philippine Comprehensive Agrarian Reform Program (CARP). Under political pressure to show good progress in the 1990s, the Government redistributed land in bundles by awarding groups of farmers collective land titles similar to the *ejidos* in several Latin American land reform programs (World Bank 2002). While collective titling hastened the land distribution process, the assignation of property rights was incomplete. A previous observational World Bank evaluation of the CARP mentions that collective titles for land that is managed individually are "handicapped in terms of their development and sustainability," lacking the investment effects of individual titling and therefore failing to fully achieve the impact of the reforms (World Bank 2009, p. 12).

The Government, recognizing that these collective titles may constrain investment and financial market development, has implemented a program to subdivide collectively titled lands and distribute individual titles to the respective co-owners, formalizing their individual property rights. This process of formalizing property rights of collectively titled lands is known as parcelization (hereafter referred as the DAR Parcelization Program, or DARPP), which the DAR has been conducting for the past three decades. By parcelizing collective titles, the Government hopes that formal, individual property rights will provide incentives for greater investment and growth in the agricultural sector, fostering a more sustainable, inclusive growth.

At the time of the study's inception in 2013, the Government was allocating US$8 - 10 million per year to parcelize an average of 59,000 hectares of collectively titled land annually. With over a million hectares left to subdivide, the DAR wanted an impact evaluation to better understand the DARPP's impact on agricultural investment, output, and the welfare of its ARBs and inform a roadmap with regard to the direction of the DARPP.[1] Although this study has seen changes in the DAR's top leadership twice, its stated thrust and policy direction has maintained the need to better understand the impact of agrarian reform on ARBs' lives and agricultural production with specific references to those undergoing parcelization. As such, our impact evaluation studies the effect of DARPP in its pre-existing nature, with the only change to program implementation being the randomization of the timing of parcelization. Neither IPA, nor the World Bank, nor the academic researchers involved in the impact evaluation were involved in designing, promoting, or implementing the program that was evaluated.

[1] By the end of 2019, the DAR had 816,784 collective titles remaining, 544,562 of which were considered as priority for subdivision. As their average annual accomplishments between 2016 and 2019 declined to about 30,000 hectares, it would take another 18 years to fully parcelize priority titles at the current rate.

Land titling is an administratively costly, time-intensive process, and implementing participatory and transparent land tenure regularization programs with certificates rather than titling may help achieve the same objectives in a more cost-effective manner (Deininger et al. 2011). However, any inefficiencies in the process or lack of transparency can preclude any potential benefits and even have negative consequences over time (Besteman 1990; Deininger 2011). The DARPP is broadly implemented in two stages: 1) the subdivision and demarcation of individual agricultural parcels within the collectively titled landholding, and 2) the registration and distribution of individual titles. While this study was originally designed to evaluate the impact of the program as a whole, long delays between these two stages presented an unique opportunity to investigate impacts in the interim. Thus, this study exploits the intervention's timing to identify the impact of the DARPP's first stage and the causal mechanisms by which it can improve agricultural and welfare outcomes in one of the first randomized experiments of its kind.

Goldstein and colleagues (2018) conduct the only other randomized experiment of an agricultural land formalization program in Benin, investigating the impact of the program's first stage analogous to the DARPP's. [2] They find that this stage strengthens tenure security, resulting in substantial increases of investments in perennial crops and trees and closing the gender gap in fallowing before any land certificates are issued. While the DARPP may follow a similar participatory process of land demarcation and dispute resolution, the context is different: land formalization in Benin coexists with a customary land tenure system while land titling is the primary means of securing land rights in the Philippines. Moreover, farmers in the Benin study had no land title to their name, while farmers in our study already had a collective title, which was relinquished during the demarcation process. Thus, the ownership, or lack thereof, of a physical title may have more meaningful impact in the Philippines. Moreover, the speed at which the program is implemented can be critical, and long delays can breed an atmosphere of uncertainty which can dampen agricultural investment (Balisacan 2007). It can take years before a farmer receives an individual title after the DARPP's first stage, and understanding these first-level impacts can help inform policy design, implementation, and cost-effectiveness.[3]

This evaluation focuses on how the survey subdivision and demarcation process -- the first step toward formal, individual property rights -- influences agricultural output and investment, the channels through which changes may occur, and shifts in intra-household decision-making on the land. The primary research questions are the following:

> **Research Question 1:** What is the causal impact of the DARPP's first stage on agricultural investment and output?

[2] While Goldstein et al. (2018) was the first RCT directly measuring land formalization, Ali et al. (2014) conducted a randomized encouragement experiment in Tanzania by randomizing price incentives to claim land titles in an urban context.

[3] This is primarily supported by anecdotal evidence since DAR does not collect data to support this. However, the study's treatment farmers had been waiting an average of 20 months from the time their landholding was subdivided until they were interviewed for the study's endline survey, and the vast majority had not yet received their individual titles.

Research Question 2: What is the causal impact of the DARPP's first stage on ARBs' perceptions of tenure security, and to what extent might this explain changes in agricultural investment and output?

Research Question 3: What is the causal impact of the DARPP's first stage on gains from trade, and to what extent might this explain changes in agricultural investment and output?

Although the intervention is intended to improve agricultural outcomes and improve the efficiency of land markets, it may also affect the welfare of ARBs, migration, their attitudes toward agricultural production, and intra-household decision-making. Thus, we ask the following additional questions:

Research Question 4: What is the causal impact of the DARPP's first stage on the welfare of ARBs?

Research Question 5: What is the causal impact of the DARPP's first stage on migration via reducing bondage to the land?

Research Question 6: What is the causal impact of the DARPP's first stage on aspirations to improve agricultural productivity and planned investment in titled land?

Research Question 7: What is the causal impact of the DARPP's first stage on intra-household bargaining and decision-making?

While the impact evaluation was initially designed to measure impacts on access to credit as a mechanism for increased investment, indicators for this hypothesis were not collected during the follow-up survey. Due to delays in project implementation (see Section 6.2), beneficiaries had not yet received their individual titles to use as collateral, the primary mechanism through which they may access formal credit.

Moreover, this study only looks at impacts of having undergone a subdivision survey, as the majority of ARBs in the treatment group had not yet received their individual titles. Thus, one could expect further changes in impacts after the individual title is received.

2. Intervention, theory of change and research hypotheses

2.1 Intervention

The DAR is the department tasked to carry out the parcelization of collective Certificate of Land Ownership Awards (CLOAs), or collective land titles, in coordination with the Department of Environment and Natural Resources' (DENR) Land Management Service (LMS) and the Land Registration Authority (LRA). Broadly speaking, the two main stages of the parcelization process include:

1) **Validation and subdivision survey:** ARBs are verified to be tilling their respective agricultural parcels within the collective CLOA and must agree to have the landholding subdivided in order for the DAR to proceed. This is usually conducted during a *pulong-pulong*, or assembly of ARBs under the collective title, where the DAR explains the subdivision process and their rights and obligations once they receive their individual CLOAs. This is also a participatory process where all ARBs must reach a consensus on their respective land borders, and the DAR facilitates dispute resolution.

   If all ARBs agree to have the landholding subdivided, the DAR or a private contractor then conducts a land survey provided there is a consensus among the ARBs on their respective borders. The survey plan is then submitted to the LMS for their technical review and approval.

2) **Title registration and distribution.** Once the survey plans are approved, the DAR draws up a Deed of Parcelization for the ARBs to sign, which is then registered with the LRA and local Register of Deeds (ROD). Once registered, the ARBs receive their individual CLOAs.

There is an important distinction between collective ownership and collective management when discussing the population subject to parcelization. Although agricultural landholdings may be collectively titled, this does not necessarily mean they are farmed or managed collectively. The DAR, knowing many agricultural plots were farmed individually, primarily used collective titling as a transition mechanism for distribution and not as a means to change the agrarian structure and organization of agricultural production. In this study, sample ARBs largely farmed their collectively titled parcels individually. Collectively managed farms tend to opt out of parcelization, or the DAR simply does not prioritize them for subdivision if it is not economically feasible or sound to do so. As of 2019, less than 1 percent of total collectively-titled hectares distributed saw ARBs opt out of parcelization in favor of collective titling, and 3.5 percent covered farmer associations and cooperatives that the DAR does not target for parcelization.[4] Due to the lengthy legal process involved in inheriting lands awarded through CARP, 95 percent of ARBs in our sample are the original recipients of their titles, while the remaining 5 percent inherited them.

Differences between collective and individual titles

Understanding how the formalization of individual property rights may influence agricultural and welfare outcomes in the context of the CARP necessitates an understanding of the differences between collective and individual titles. Table 1 shows the key operational differences between them, most of which can be attributed to the legal determination of the exact area and ownership of individual parcels during parcelization. Once they receive their individual titles, ARBs can legally sell or lease their individually-titled parcels if they are beyond the CARP's 10-year land sale restriction (see Section 5.3.2).[5] However, land transfers still occur under collective CLOAs, often due to adverse shocks and capital constraints (APPC 2007). Moreover, ARBs with collective titles are limited in using their land as collateral to access the formal credit market because lending institutions cannot resort to a legal means of disposal in case of foreclosure. Parcelization also

[4] This is based on data from the "Summary report of subdivision of collective CLOAs Issued as of December 31, 2019" report from the Bureau of Land Tenure and Improvement.

[5] "If the land has not yet been fully paid by the beneficiary, the rights to the land may be transferred or conveyed, with prior approval of the DAR, to any heir of the beneficiary or to any other beneficiary who, as a condition for such transfer or conveyance, shall cultivate the land himself." Section 27 of RA 6657

enables Local Government Units to more easily determine and collect land taxes since it clarifies the exact area and ownership of the parcel. Further discussion of the differences between collective and individual titles vis-à-vis parcelization requires an understanding of the distinction between compensable and non-compensable lands.

Table 1: Differences between collective and individual titles

	Collective	**Individual**
Who is on the title?	ARB co-owners (and spouses if applicable) awarded parcels within the landholding	One ARB (and their spouse if married)
Can sell land?	No	Yes, if beyond 10-year land-sale restriction*
Can lease land?	No**	Yes***
Can use as collateral?	No	Yes
Can pass land onto heirs?	Yes	Yes
Land reimbursement	No amortization schedule	30-year amortization schedule
Paying property taxes in practice	Complications with enforcement	Easier to enforce

*The team is currently confirming with the DAR that no other conditions apply.
**While an individual parcel cannot be leased, co-owners can agree to lease out the entire landholding under an agri-venture agreement.
***The team is currently confirming the specifics related to the ARBs ability to lease the land with the DAR.

Compensable versus non-compensable landholdings

The CARP is a market-based program whereby landowners are compensated for privately owned land that is acquired by the government and redistributed to ARBs. These lands are defined as compensable because ARBs must pay the government-owned Land Bank of the Philippines (LBP) at the price they have been valued. Under a collective CLOA, the exact area of each ARB's parcel within the collective landholding is unknown, so the valuation is only conducted once it has been parcelized.[6] Once individually titled, the ARB receives a payment schedule, and a 30-year amortization period commences with a six percent interest rate per annum.[7] If the ARB fails to fulfill an aggregate of three annual payments, they risk foreclosure by the government. Because the majority of ARBs in our sample have not yet received their amortization schedules, the

[6] These CLOAs are usually parcelized several years after the initial acquisition and distribution; the study's sample collective CLOAs were distributed to ARBs over 10 years ago (see Section 5.3).
[7] Land Bank accepted advance amortization deposits from ARBs under collective CLOAs, though it is unclear whether this is still allowed.

average repayment amounts are not yet known for our sample. However, section 26 of the Republic Act No. 6657 includes an affordability clause to try to ensure that beneficiaries will be able to make the amortization payments. The first five annual payments may not be more than five percent of the value of the annual gross production, as established by the DAR. If the scheduled annual payments after the fifth year exceed 10 percent of the annual gross production and low productivity is not due to the beneficiary's fault, LBP may reduce the interest rate or the principal obligations in order to ensure the payments are affordable for the beneficiaries. Since ARBs in this study had not yet received their individual CLOAs, they did not have to begin making these payments at the time of the endline survey. However, they likely begin anticipating these amortization payments.

Non-compensable landholdings were typically government-owned lands whereby ARBs do not have to make amortization payments to LBP. Thus, ARBs on these lands can legally sell or use the land as collateral once they receive the individual CLOA if it is beyond the 10-year land sale restriction. However, as with compensable lands, the land is still valued to determine the land tax that must be paid. See Section 6.6 for a subgroup analysis on whether the landholding is compensable.

2.2 Theory of change

Figure 1 indicates simplified causal pathways through which parcelization, or the formalization of individual property rights, can influence agricultural investment, output, profits, and welfare. Although the theory of change was developed considering the impacts of parcelization as a whole, many of the same channels could be relevant after the first stage of parcelization, which is studied in this report. Economic theory suggests three key mechanisms through which formalized property rights can influence investment decisions (Besley 1995):

1) **Freedom from expropriation**. Having more secure rights may induce greater investment simply because the threat of expropriation of the fruits of that investment are lowered. Unlike a collective CLOA, an individual CLOA assures the ARB of their legal right to a defined parcel of agricultural land, giving the landowner the needed certainty to make agricultural investments in the long-term. Once subdivided, the parcel's borders and area are determined and included in the newly registered title.

   This mechanism assumes the provision of titles as a dominant means for securing land rights. In countries where customary land rights coexist with freehold titling – common to many sub-Saharan African contexts – the complexity of these arrangements and its interaction with titling must be considered. Lawry and colleagues (2014) suggest this coexistence with customary law might explain why the existing evidence generally shows greater productivity gains outside sub-Saharan Africa, hypothesizing that those under customary arrangements may enjoy a relatively higher level of tenure security ex-ante.[8] However, the state's administrative capacity and ability to enforce property rights are also key assumptions that must hold in order to improve tenure security (Deininger 2004;

[8] They also consider a "wealth effect" as an explanatory factor given African farmers tend to be poorer than those in Latin America and Asia.

Goldstein et al. 2018). While some communities of Indigenous Peoples (IPs) follow customary land laws, formal titling is the primary means for securing land ownership in the Philippines.[9]

In their systematic review of twenty quantitative studies across Asia, Latin America, and sub-Saharan Africa investigating impacts of freehold titling on investment, productivity, and welfare, Lawry and colleagues (2014) observe improved tenure security often explains the positive impacts of freehold titling programs.[10] Qualitative interviews with non-sample DARPP beneficiaries indicated that tenure security may also be one of the most active channels in this study (see Appendix A). Commonly reported sources of insecurity under collective titles were the Government and farmers on neighboring parcels. Regarding the former, they were not sure whether the DAR would eventually parcelize the landholding, which they claimed would assure them of their land ownership. Consequently, these ARBs were hesitant to substantially invest in their parcel and at times did not invest at all until the DAR informed them their landholding would be parcelized. Regarding the latter, some ARBs report neighbors encroaching on their parcels by shifting monuments placed during the initial land survey when the DAR issued the collective title.

While much of the literature focuses on the impact of receiving land titles or certificates on tenure security, the pulong-pulong and land demarcation through the subdivision survey may already begin to address these concerns and change perceptions of tenure security even before individual titles are issued. Participation in these activities may increase certainty that the Government will issue ARBs individual titles for the parcel of land they are tilling. Moreover, the pulong-pulong facilitates conflict resolution, and ARBs may feel more secure from encroachment or eviction after they reach a consensus on each parcel's borders. During qualitative interviews, some ARBs reported more tenure security after this initial stage and consequently significantly increased crop coverage on their parcel. Thus, the actual distribution of individual titles may not be the only means by which the DARPP changes perceptions of tenure security.[11]

However, specific features of the subdivision process may also breed some temporary tenure insecurity. For example, ARBs must relinquish their collective CLOA documents while the individual CLOA documents are being processed because the old title documents will need to be canceled (see Section 6.1). Given ARBs sometimes express tenure security in terms of having a physical title on hand, the absence of any proof of ownership may reduce tenure security (see Appendix A). Any implementation delays may exacerbate these feelings and concerns about when or whether the new title documents will be received. In his assessment of the CARP, Balisacan (2007) argues that speed and

[9] No IP communities were part of the study's sample.

[10] Lawry and colleagues (2014) and Goldstein (2018) express concerns over the methodological quality of some of this evidence base where impacts might be overstated.

[11] When ARBs were interviewed for the spousal baseline survey after their initial interviews (see Section *4*), many in the treatment group who had already had subdivision surveys already perceived their land to be individually titled, even before the title was registered and distributed to the ARB.

credibility are essential; otherwise the process will breed an atmosphere of uncertainty and inhibit agricultural investment. Implementation delays aside, any process of change may also generally induce feelings of anxiety and insecurity.

DARPP impacts on tenure insecurity may also be less transitory. ARBs under compensable lands must begin a 30-year amortization schedule after parcelization, and feelings of tenure insecurity may increase if these ARBs lack confidence in their ability to maintain payments. If they perceive foreclosure by the government to be a likely possibility even before they receive their amortization schedule during the DARPP's second stage, ARBs may be less willing to make long-term investments in the land. In fact, the ability to maintain amortization payments was the most common way ARBs related their tenure security during qualitative interviews, with 69 percent stating their security depended on avoiding delinquency.

2) **Access to credit**. Formal property rights (i.e. having an individual title) may allow the owner to secure the necessary credit to make optimal investments in the land by using the land as collateral. Moreover, greater access to credit can enable ARB households to better smooth consumption in the face of adverse income shocks and improve welfare. There is little evidence supporting this channel, though the evidence base is thin (Lawry 2014).

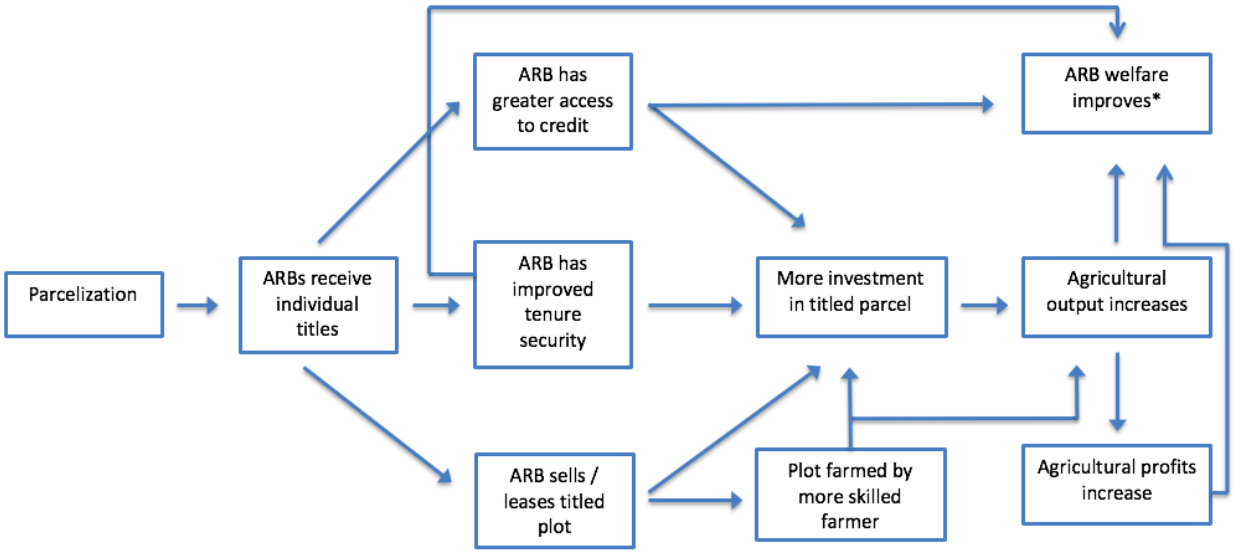
   As mentioned, we do not expect to see the access to credit channel at play given the majority of ARBs in the treatment group had not received their individual titles by the endline survey and thus could not yet legally use their individually titled land as collateral in formal credit markets.

3) **Gains from trade**. If land sale markets are not free, land may not be in the hands of the person most able to productively use the land. This lack of allocative efficiency can be because they lack the necessary skills or abilities, or they lack the capital or access to credit. Finally, land may be held at an economically inefficient scale. Freeing land markets may therefore result in gains both through better resource allocation in skills and capital and in gains through scale economies. In the context of this study, ARBs can only legally sell their land once they have an individual title. Although ARBs can still lease or sell land informally with collective titles, formalization may also improve access to reliable information and reduce the cost of selling or leasing land. Deininger and colleagues (2011) find that households with land use certificates administered through Ethiopia's land registration program are more likely to lease out land, and Deininger and colleagues (2019) also find increases in land rental activity to more productive farmers due to China's land registration reforms in Chengdu prefecture. Holden and colleagues (2011) find the impact on leasing is higher for women who tend to be more tenure insecure under customary land arrangements in Ethiopia. This finding indicates that the gains from trade channel may coincide with greater tenure security because farmers may be more willing to lease land if they are more confident they can reclaim it once the lease ends.

Although the majority of treatment ARBs had not received an individual title by the endline survey, anticipation of parcelization may induce ARBs to sell their land. For example, an ARB reported during a semi-structured interview that one of the title co-owners, after being notified during the pulong-pulong that a 30-year amortization would commence after parcelization, decided to sell his agricultural parcel in the informal market. Lacking confidence in his ability to maintain the amortization schedule, he decided to sell the land before any possible foreclosure by the government. In addition, land demarcation may provide clarity needed to sell or lease a parcel, especially if the ARB had overlapping claims or border disputes that were resolved during the pulong-pulong.

While investment and productivity may increase through this channel, there is little evidence of how it may impact farmer's welfare. The influx of cash can be used for an investment (e.g. a more lucrative household enterprise) or to migrate for better job opportunities that may improve long-term welfare (see *mobility constraints* below). On the other hand, it may be sold due to an external shock (e.g. to pay for medical treatment), which may have positive welfare impacts in the short-term but leaves the ARB without a key asset and direct food source in the long-term.[12] It is worth noting that the DAR does not encourage ARBs to sell their land, fearing a re-concentration of land in the hands of the wealthy. In fact, the DAR restricts ARBs from selling their awarded lands for ten years from the initial distribution. Our study sample is beyond the 10-year land sale restriction so that we may investigate the gains from trade channel (see Section 5.3).

Figure 1: Theory of Change



*The impact on improved welfare is less clear if the plot is sold or leased. Farmers may not benefit from increases in agricultural output or profits; however, they may benefit from cash from the sale or rental.

[12] Fearing a re-concentration of land in the hands of the wealthy and continued poverty, the DAR has restricted ARBs from selling their awarded lands for ten years from the initial distribution. Our study sample is beyond the 10-year land sale restriction (see Section 5.3).

As seen in Figure 1, parcelization, or simply the land demarcation process, may impact at least one of these intermediary outcomes, leading to an increase in agricultural investment if access to input markets exists.[13] A change in durable and/or variable agricultural investment may then increase agricultural output. Output may also increase more directly through the gains from trade channel if the parcel is sold or leased to a farmer who is simply more skilled. Assuming access to output markets, improved output may lead to increased profits, and consequently, welfare. Increased output may also directly impact welfare if the harvest is used for household consumption and therefore increases food security. A change in tenure security may also directly improve ARB psychological welfare as they can more easily defend the integrity of the titled land. Greater access to credit may also directly improve welfare as it can improve the ability to weather income shocks or make other non-agricultural investments.

Aside from limiting agricultural investment, the lack of clear property rights for land can be a constraint in other dimensions that have direct consequences for welfare. This includes:

1) **Mobility constraints**: A lack of property rights can be a constraint on mobility (e.g., moving to cities to look for work or simply engaging in non-farm work), causing both efficiency losses in the labor market and subsequent welfare losses. For example, a lack of tenure security under collective title involves monitoring costs, demanding the presence of the ARB or their household to prevent any possible encroachment or confiscation of the land. Parcelization may increase the ability and willingness of the ARB to migrate if it relaxes the tenure security constraint. Moreover, mobility constraints may be relaxed through land sales, giving the ARB and/or household members the capital needed to migrate for work. In a land certification program in Mexico, de Janvry and colleagues (2015) show that those with certificates were more likely to have a migrant household member. In Ethiopia, Ayele and Siba (2017) find land certification is a significant determinant of off-farm labor participation, and Do and Iyer (2008) find the issuance of land certificates in Vietnam led to a small increase in non-agricultural activities. In China, Deininger and Jin (2008) find that leasing land contributed to occupational diversification.

2) **Psychological costs**: Lack of property rights can take a direct toll on welfare through the psychological costs that come with anxiety and worry. The wellbeing of ARBs can be improved through strengthened tenure security, an increase in consumption or income, or through greater access to credit to weather external shocks.

3) **Constraints on decision-making**: Uncertain property rights can lead to landowners making decisions on their land that are not aligned with their own goals and values. The spouses of ARBs may also lack clarity on their rights to the land, and thus take a less active role in the decision-making process. In the Philippines, spouses of ARBs are technically co-owners of the awarded parcel, and they are listed on the title with the words

[13] Note that this is a simplified Theory of Change primarily modeled on Besley's (1995) theoretical mechanisms. Additional channels are discussed in-text.

"married to" preceding their name as stipulated by the Family Code of the Philippines[14]. Parcelization may serve as a reminder that the spouse's name is also on the title and influence how they make decisions on the land, yet existing evidence on the impacts on intra-household decision-making is lacking. In Rwanda, Ali and colleagues (2011) find a tenure regularization program increases recognition of land ownership among female spouses with a marriage certificate. In Ethiopia, a land registration program placed the photos of both spouses on the land certificate to emphasize joint ownership. Notably, while in previous studies women saw their names on titles for the first time, collective titles in our sample were already legally considered conjugal property, although most respondents were unaware that both names were meant to appear on the title. While Deininger and colleagues (2011) find anecdotal evidence that spouses were more willing to invest in the land as co-owners, female empowerment outcomes were not included in the analysis. During this study's baseline survey, we asked married respondents whose opinion would prevail if the spouses did not agree on a decision related to the DAR-awarded parcel and why this person's opinion would prevail. When women were identified as the final decision maker in the case of disagreement, the most common response given by both male and female respondents was that the wife made the final decision because her name was on the title or the land belonged to her. In comparison, when men were identified as the final decision maker in the case of disagreement, the most common response given by both male and female respondents was that the husband knew more about farming or was the person tilling the land. This suggests that for women, having recognized land rights can be an important factor in bargaining and decision-making power over the land.

2.3 Research hypotheses and outcomes

Hypotheses

We organize the hypotheses into families on the effect of the first stage of the DAR parcelization program (DARPP). After each hypothesis we provide a ranking: * for primary; ** for secondary.

Family 1: Agricultural Investment and Output

Group A: Investment and Output

H1: The first stage of the DARPP increases agricultural investment*
H2: The first stage of the DARPP increases agricultural output*

Group B: Mechanisms of Increased Investment

H3: The effect of the DARPP's first stage on increased investment/output can be (partially) explained by improved perceptions of tenure security*
H4: The effect of the DARPP's first stage on increased investment/output can be (partially) explained by gains from trade*

[14] Anecdotal evidence from ARBs and DAR staff suggests that this format may not always be followed, with some titles including only one name even if the ARB is married.

Family 2: Tenure Security

H5: The first stage of the DARPP increases perceptions of tenure security*

Family 3: Gains from Trade

H6: The first stage of the DARPP leads to gains from trade*

Family 4: Household Welfare and Financial Position

H7: The first stage of the DARPP increases household food consumption**
H8: The first stage of the DARPP improves psychological wellbeing**

Family 5: Migration

H9: The first stage of the DARPP reduces bondage to land (increases ability to migrate to opportunity)**

Family 6: Aspirations

H10: The first stage of the DARPP increases aspirations to improve agricultural productivity**

H11: The first stage of the DARPP increases planned investment in the land**

Family 8: Intrahousehold bargaining and decision making

H12: The first stage of the DARPP changes the perceptions of ownership of spouses of agrarian reform beneficiaries**

H13: The first stage of the DARPP increases ARBs' participation in decision-making on their parcels**

H14: The first stage of the DARPP increases the participation in decision-making of the ARB's spouse**

H15: The first stage of the DARPP increases ARBs' agency in decision-making on their parcels*

H16: The first stage of the DARPP increases the agency in decision-making of the ARB's spouse**

H17: The first stage of the DARPP leads to more egalitarian agricultural decision-making between ARBs and their spouses*

Outcomes

Investment: Measured by considering both durable investments and the way the farmers use the land. Durable investment includes number of trees planted per hectare, presence of physical infrastructure, and any attempts to build, maintain, or improve physical infrastructure. Farming

practices will be measured by the proportion of the parcel's area cultivated with ground groups, the total number of hectares cultivated, and whether the parcel is fallowed.

Output: The total value of all crops harvested during the past cropping year (including own-consumed production), before any value-added activities, divided by the number of hectares.

Tenure security: Measured through outcomes that can be classified into three main areas: 1) history of land disputes, 2) farmers' perceptions of tenure security, and 3) farmers' perceptions of government institutions in securing property rights.

Gains from trade: The percentage of land sold at endline, percentage of land rented at baseline and endline, and percentage of owner-operated farms.

Welfare: Measured through 1) household food consumption in the past seven days and 2) self-reported measured of psychological health (the ARBs' and spouse's anxiety and life satisfaction).

Migration: Whether the ARB has migrated or intends to migrate for economic reasons and the number of household members who have left the household.

Aspirations: Ratio of the aspired output per hectare to the perceived maximum output in the community and the value of aspired output per hectare. In addition, we measure the respondents' aspirations to make further investments in their parcels (building physical infrastructure or new crops or leaving the land fallow in the next five years, planting trees for income in the next 12 months).

Perceptions of spousal ownership: The proportion of spouses who state that they have a name on the title of the parcel, whether the spouse reports that they are a decision maker on the parcel of interest because they are the owner of the parcel or because their name is on the title for the parcel; and whether the ARB reports that their spouse is a decision maker on the parcel of interest because they are the owner of the parcel or because their name is on the title for the parcel.

Participation in decision-making: Measured by whether the respondent considers themselves a decision-maker either alone or jointly with their spouse; a participation score drawn from a reported model of household decision-making; whether the respondent's opinion prevails in the case of a disagreement; and the respondent's self-reported level of input on decisions on the titled plot of interest. Moreover, we look at spousal equality in decision-making, measuring whether the husband considers both spouses to be decision-makers on the parcel of interest; whether the wife considers both spouses to be decision-makers on the parcel of interest; an equality score drawn from the husband's reported model of decision-making ranging from one (least equal) to five (most equal); an equality score measured using the wife's reported model of decision-making**;** the lowest score in a series of decision-making vignettes and whether it is reported by the husband or by the wife; whether the husband reports that either spouse can make the final decision about the parcel of interest after a disagreement; and whether the wife reports that either spouse can make the final decision about the parcel of interest after a disagreement.

Agency: The extent to which ARBs and their spouses feel empowered to make decisions on their land based on their goals and values using a relative autonomy index of the respondent when it comes to agricultural decisions, and ordinal self-efficacy score of reported self-efficacy with regard to agricultural decisions, and an ordinal score of the respondent's level of autonomy over decisions on the parcel of interest.

3. Timeline

Figure 2: Timeline of the evaluation

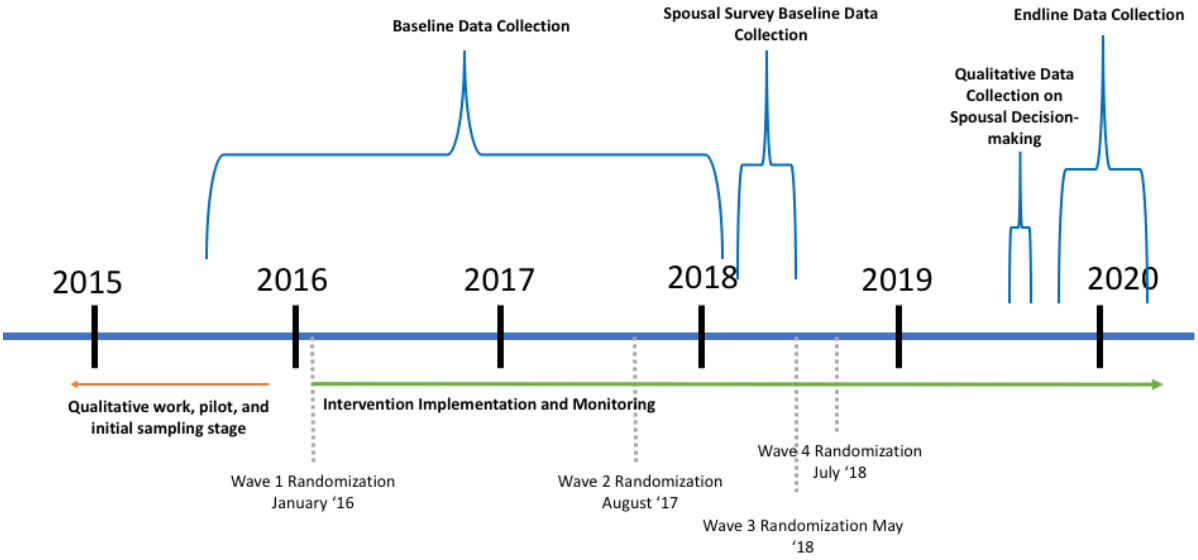


Figure 2 above depicts the study's data collection timeline. The evaluation began in July 2013 when we began working closely with the DAR to refine the study's design, select the study's field sites, and select and validate the study's sample titles (see Section 5.3). As this was an evaluation of a pre-existing program, the study design primarily involved the design of randomization strategy, defining a Theory of Change, developing survey instruments, and defining the empirical specification. While the DAR was determining its list of target titles and validating those titles, we conducted semi-structured interviews with 50 former DARPP beneficiaries in Camarines Sur in December 2013 to better understand the Theory of Change and inform the baseline instrument. In January 2014, we ran a small pilot with Camarines Sur Department of Agrarian Reform Provincial Office (DARPO) which informed the study's implementation plan with the DAR.

The survey plan involved a rolling baseline survey covering outcomes related to hypotheses 1-11 above and randomization; after finishing the baseline survey in one geographic region, we conducted the randomization of those surveyed titles / ARBs and then moved on to the next region. After each randomization, we began coordinating with the respective DARPOs and Department of Agrarian Reform Municipal Offices (DARMOs) to monitor compliance through the endline survey in 2020.

The first survey round was conducted in the Bicol Region from July to October of 2015 while the research team simultaneously worked with the DAR offices in Region XI to validate the sample titles there. After a lengthy title validation process, surveys were conducted in Region XI in March and April of 2016 when a subset of 50 titles were validated as qualified by the DAR. There was then a further pause of four months as the validation of project titles was finished. The next survey round took place between July of 2016 and mid-January of 2017.

While the number of titles initially validated by the DAR indicated we would reach our initial target sample size of 600 titles, it was discovered during the survey itself that many titles were not qualified, and we would need to expand to new areas to reach our target. Thus, a fourth round of surveying began in February of 2017 in Region XII as well as a new set of additional titles in

Region XI. Following the same pattern as the previous round, many titles were found to be disqualified during the survey, and the target was not reached. Thus, CLOAs in Regions X and Region XIII were subsequently added to our sample. Surveying in these regions began in August of 2017 at the same time that surveys in Region XII were finishing and continued until early January of 2018.

In February 2018, IPA received funding from the World Bank's East Asia and Pacific Gender Innovation Lab (EAPGIL) in part to investigate hypotheses 12 – 17 to better understand the DARPP's impact on intra-household bargaining and decision-making[15]. A spousal baseline survey was implemented with ARBs and their spouses between February and May of 2018. In August of 2019, we conducted structured, qualitative interviews with ARBs and their spouses to better understand the baseline findings and inform the endline instrument.

The endline survey ran between November 2019 and February 2020 and covered all outcomes of interest detailed above.

4. Evaluation: design, methods and implementation

The evaluation consists of 475 collective titles and 855 ARBs that are owners of the respective landholdings. All ARBs eligible for the study within the collective titles are included in the sample.[16] Each collective CLOA has two qualified ARBs on average with 49 percent having just one qualified ARB.[17]

The above research questions are tested using a cluster randomized control trial (RCT) where collective titles are randomly and evenly allocated to a treatment and control group. The treatment group were selected for parcelization to receive individual titles while the control group maintained their collective titles during the study's duration. The Institutional Review Board of the University of Maryland, College Park provided oversight for this project, Land Property Rights – Philippines under reference number 488988-18.

4.1 Sample size and power calculations

The statistical power of an RCT is the probability of detecting a given effect at a given significance level, in the event the intervention has an impact. An underpowered study runs the risk of concluding that the intervention had no impact when in fact it did, simply because the sample was not large enough to give statistically significant results.

In our initial proposal, we estimated a sample size of 600 collective titles yet were only able to identify 475 collective titles across the study's eleven provinces. Moreover, Bukidnon and Davao Occidental made little progress during the evaluation period and subdivided less than 25 percent of their treatment titles and were thus excluded from the follow-up survey, leaving us with 324 sample titles. Since the randomization was stratified by province among other characteristics (see

[15] EAPGIL was not involved in the study design pre-2018, and the primary alteration to study rollout was the addition of a gender-specific component and add-on spousal survey.

[16] There is one CLOA with more than eight ARBs where eight ARBs within the collectively titled landholding were randomly sampled.

[17] These CLOAs have other co-owners, but they were disqualified from the study for various reasons (e.g. the ARB was deceased, sold the plot, etc.).

Section 5.2), we could exclude these two provinces from the analysis while maintaining the study's internal validity.

A power calculation determined that a sample size of 320 clusters with approximately two individuals each is sufficient to detect effect sizes of 0.31 standard deviations with 90 percent power for a two-sided test. This calculation assumes Beta = 0.5, Rho = 0.2, and about 60 percent compliance. We are powered to detect similar changes in decision-making allocation and autonomy based on the spousal survey. Although it would require additional funding, a second follow-up survey would result in substantial gains in power, as compliance with the intervention would likely increase with more time.

4.2 Sample selection

Selecting field sites and respondents was a comprehensive, multi-step process, beginning with scrutinizing provincial-level administrative data on collective titles and crop coverage and ending with on-the-ground validation of ARBs (a detailed account can be found in Appendix B). The sample selection process included the following steps:

1) Review of national-level data to determine provinces with a large backlog of collective titles and appropriate crops.

2) Initial validation of title lists by regional and provincial DAR offices to clarify the subdivision status and the peace and order situation of proposed sample sites.

3) Projection of prospective sample titles by provincial and/or regional DAR offices and the regional DENR offices to determine whether or not they lie on land considered Alienable and Disposable (A&D) – land that is able to be used for agricultural, residential or commercial uses under the land classification system of the Philippines. The landholding must be within A&D land in order to be parcelized.

4) Ground-level validation of titles and ARBs to determine whether they qualify for the sample.

During the first step, we decided with the DAR to include Regions X, XI, XII, and XIII[18] across Mindanao and the Bicol Region[19] in Southeast Luzon. These five regions included in the study make up 34 percent (126,654 hectares) of workable collectively titled land that was remaining to be subdivided in 2019.[20] Given the rate of subdivision in these regions during the past four years, it will take about nine more years to subdivide their workable titles. (i.e. just conduct and approve subdivision surveys). These figures do not consider lands which have not yet had their individual CLOAs registered and distributed, which may take even longer.

[18] Also referred to as the Northern Mindanao Region, Davao Region, SOCCSKARGEN Region, and Caraga Region, respectively.
[19] Also referred to as Region V
[20] While Region VIII holds the highest balance of collective CLOAs, the DAR recommended to exclude the region from the study because the destruction wrought by Typhoon Haiyan in 2013 had significantly reduced operational capacities. Region VI has the second highest balance, but it was excluded due to the reportedly large number of hectares covered by large sugarcane plantations what would require significant time to parcelize.[1]

After selecting the study's field sites, we worked with the DAR's regional, provincial, and municipal offices to validate the CLOA data and conducted ground validation of ARBs. The eligibility criteria we used for titles and ARBs largely mirror the DAR's criteria for parcelization, except we also excluded those with more than 30 ARBs and where ARBs were deceased, permanently migrated, sold parcels, or could not be found. Including these titles and ARBs would significantly prolong the parcelization process beyond the study's timeline. A CLOA was deemed qualified as long as it had one eligible ARB. In addition, as mentioned in Section 2.2, we only included titles that were beyond the 10-year land sale restriction.

Table 2: Disqualified sample titles during sampling stage

Reason for disqualification	Number of titles	Percent of total disqualified
Below 10-year land sale restriction	410	3.5%
Voluntary Land Transfer[21]	170	1.4%
Problematic/peace & order	2,385	20.1%
More than 30 ARBs	119	1.0%
Already undergoing subdivision	7,540	63.5%
Not alienable & disposable	102	0.9%
ARBs deceased	88	0.7%
ARBs sold parcels	100	0.8%
ARBs migrated	53	0.4%
No ARBs found/unavailable	168	1.4%
No eligible ARBs for various reasons	278	2.3%
Other	463	3.9%
Total	11,876	-

Of the 12,432 collective titles assessed for eligibility, 4 percent were qualified for the study. As seen in Table 2, two criteria account for over 80 percent of disqualified titles: having already begun the parcelization process and titles in areas with peace and order issues or labeled "problematic". The later are titles affected by ongoing conflict or have encountered problems that may significantly hinder the parcelization process, which the DAR may not consider "workable". The eligibility criteria imposed by the study account for about 10 percent of disqualifications. Given these criteria did not pose a major constraint during the sampling process, we may expect the sample to broadly resemble the remaining "workable" titles in these areas. Thus, we expect the findings from this study to be largely applicable to any remaining titles that have not yet been subdivided

As seen in Table 3, our final sample consists of 475 collective CLOAs with about 90 percent in Mindanao and the remaining 10 percent in the Bicol Region of Southeast Luzon. While Bukidnon and Davao Occidental were not included in the endline sample, Mindanao still holds 85 percent of the study's sample titles. As mentioned earlier, Regions 6 and 8 are the only other regions with large backlogs of collective CLOAs. Recognizing why these regions were not included in the study

[21] These are lands that were typically distributed to family members and relatives of the landowner, and the DAR does not prioritize them for parcelization.

can provide insights into the external validity of our findings in these areas. For Region 6, one should keep in mind sugarcane reportedly features as a prominent crop, which benefits from larger economies of scale and can have higher land valuations, meaning larger amortization payments for ARBs.[22] Region 8 was excluded due to a lack of administrative capacity. One would need to consider its capacity to deliver the intervention in a similar fashion to the study's sample sites when extrapolating results to this area.

4.4 Randomization

The IPA Principal Investigators privately randomized the 475 titles that were validated as eligible for the study using a matched-pair randomization on statistical computer software. Collective titles were matched on the following characteristics: 1) whether the titled landholding is on compensable or non-compensable land, 2) provincial location, 3) whether the title is within an Agrarian Reform Community (ARC) through which the DAR channels support services, and 4) the number of ARBs on the collective title qualified for the study. Table 3 shows the allocation of treatment and control across regions and provinces, demonstrating an even allocation ratio with 237 treatment titles and 238 control.

Table 3: Treatment and control distributions of final sample

Province	Number of titles	Treatment titles	Control titles	Percent of total sample
Region V	**47**	**23**	**24**	**9.9**
Camarines Sur	20	11	9	4.2
Albay	27	12	15	5.7
Region X	**93**	**47**	**46**	**19.6**
Bukidnon	51	26	25	10.7
Misamis Oriental	42	21	21	8.8
Region XI	**232**	**115**	**117**	**48.8**
Davao Oriental	118	58	60	24.8
Davao Occidental	100	52	48	21.1
Davao del Sur	14	5	9	2.9
Region XII	**101**	**51**	**50**	**21.3**
Sarangani	30	17	13	6.3
North Cotabato	14	7	7	2.9

[22] Sugar has long benefitted from import tariffs to keep prices artificially high. At the time of writing, the government was planning to liberalize trade in sugar.

Sultan Kudarat	57	27	30	12
Region XIII	**2**	**1**	**1**	**0.4**
Surigao del Sur	2	1	1	0.4
Total	475	237	238	100

Once randomized, the DAR Undersecretary for Field Operations issued a memo to the respective DARPOs and MARPOs to prioritize subdivision of the study's treatment titles while withholding subdivision from control titles for the duration of the study. In order for the DARPOs to continue to meet their annual targets, they replaced the control titles listed in their annual target lists with other titles not yet targeted for subdivision. The study's ARBs were not aware of the randomized experiment and thus the control group ARBs did not know they were randomly selected to be subdivided only after the study ended.

Given the intervention's slow progress in Bukidnon and Davao Occidental, ARBs among the collective titles in these provinces were not included in the endline survey (see Section 6.2). Thus, as seen in Table 4, this analysis focuses on 324 sample titles, 159 in treatment and 165 in control.

Table 4: Treatment and control distributions of endline sample

Province	Number of Titles	Treatment Titles	Control Titles	Percent of Total Sample
Region V	47	23	24	14.5
Region X	42	21	21	13.0
Region XI	132	63	69	40.7
Region XII	101	51	50	31.2
Region XIII	2	1	1	0.6
Total	324	159	165	100.0

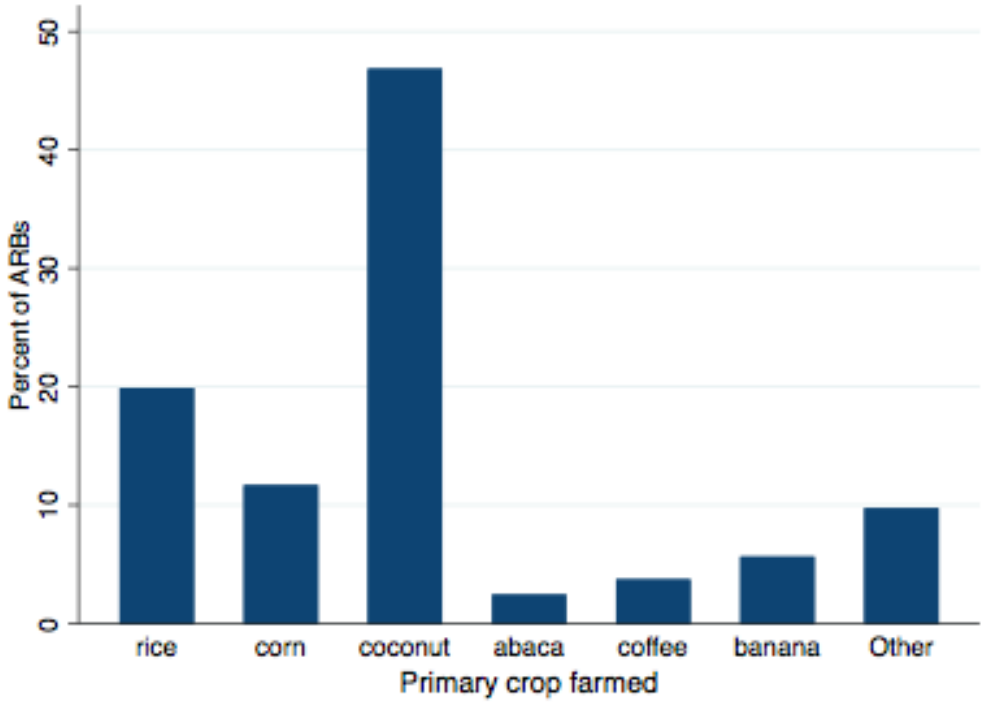
4.5 Respondent characteristics

Among those ARBs included in our experimental sample, the majority of ARBs are male, with about one-third of the sample being female. ARBs are an ageing population, and the mean age in our sample is approximately 54 years old. They have relatively low levels of education with 69 percent having completed elementary school while 34 percent graduated from high school. The target population of the CARP are poor, marginalized farmers, and the study's sample reflects this: the mean daily food expenditure is US$1.06 per capita, a median per capita monthly income of US$38, and little savings. See tables 7 and 8 in Appendix B for balance tables summarizing these statistics.

The study's ARBs are smallholder farmers who have been farming for most of their lives. Over half own just one parcel, which was awarded by the DAR. They have around 40 years of overall

farming experience and about 26 years of experience as a primary land tiller, financing inputs and making the primary production decisions. They have been farming their collectively titled parcel for over 18 years on average. These farms are largely rainfed with only 37 percent using irrigation. Figure 3 shows the crop farmed that generated the most income as reported by the ARB at baseline. The most common crop farmed is coconut at 47 percent followed by rice and corn.

Figure 3: Primary crop farmed on collectively titled parcel



At baseline, the overwhelming majority appear to prefer individual titles; when asked if they would prefer 1 hectare of land with an individual title or own 3 hectares jointly with another farmer in the community, 94 percent chose the former even though they could own 50 percent more land in the latter scenario. While disputes with neighbors appear as one source of tenure insecurity, more ARBs report the government as a potential threat to their land tenure; about 13 percent report it is very likely or likely their parcel may be confiscated by a neighbor while 32 percent report it is very likely or likely their parcel may be confiscated by the government.

In terms of decision-making, as expected, ARBs as a whole report a high involvement in agricultural decision-making, with 88 percent of ARBs in the control group reporting that they make decisions on their agricultural parcels and 89 percent reporting that they can make the final decision on a parcel in case of a disagreement with their spouse. There are notable gender differences, however; while 94 percent of male ARBs in the control group report being decision makers (either alone or jointly with their spouse), 74 percent of female ARBs do so. Similarly, 68 percent of female ARBs in the control group report that their opinion can prevail after a disagreement, compared to 97 percent of male ARBs. Spouses of ARBs reported somewhat lower levels of decision-making involvement, although again gender differences were apparent; 73 percent of husbands of female ARBs reported being agricultural decision makers compared to only 38 percent of wives of male ARBs.

4.5 Data collection

4.5.1 Baseline

The baseline survey ran from July 2015 to May 2018 (see *Challenges during baseline data collection* for an explanation of the prolonged baseline period). The survey was designed to capture all primary and intermediate outcome measures as well as other useful demographic information for data analysis. The questionnaire was programmed using Blaise software and administered using 4G-enabled tablets. The questionnaire and programming structure were tested during extensive piloting with non-sample farmers in Camarines Sur and the Davao Region. Interviews were carried out with both the qualified ARBs of sample titles and the tillers of the respective collectively titled parcel if the ARB was not actively involved in the production process. Where relevant, the spouses or live-in partners of ARBs were interviewed as well. We obtained data from four sources:[23]

1) **ARB questionnaire**: This instrument collected data on household and plot-level outcomes, including basic demographic information of the household; land tenure and tenure security; agricultural investment and output; income; access to credit; asset ownership; consumption; social capital; and psychological measures such as levels of anxiety.

2) **Tiller questionnaire**: If the ARB was not knowledgeable about the agricultural production on the collectively titled parcel (e.g. they leased out the plot), this instrument collected agricultural investment and output data from the actual tiller of that parcel.

3) **Spousal questionnaire:** This instrument was administered to the ARB and their spouse or partner separately and simultaneously in order to ensure privacy. It collected outcome data on agricultural and household decision-making, perceptions of land ownership, asset ownership, time allocation, and participation in agricultural activities, as well as psychological scales such as locus of control and motivational autonomy. Where possible, female surveyors interviewed female respondents, though this was not always possible due to logistical constraints. 66 percent of female respondents were interviewed by female surveyors.

4) **DAR Field Operations Files (FOF3):** These administrative files compiled by the DAR provided data on whether a collectively titled plot is on compensable or non-compensable land and within an ARC, two criteria by which the pairwise randomization was conducted.

A total of 1,495 ARBs were interviewed using the baseline ARB questionnaire, 855 of which were later deemed eligible for the study.[24] The tiller interview was administered with 76 farmers tilling the collectively titled plot, 83 percent of whom were a family member or relative of the eligible ARB. As discussed in Section 4, the spousal survey was implemented after the ARB survey finished, and 551 ARBs and 491 spouses of ARBs were interviewed.

[23] The ARB, tiller, and spousal questionnaires can be found in Appendix C.

[24] As shown in Table 4, the DAR parcelized 139 sample CLOAs while the baseline survey was ongoing. Moreover, 191 titles that the DAR had validated as not subdivided were in fact subdivided upon re-validation. These titles and respective ARBs included in the baseline were dropped from the sample before the randomization.

The ARB questionnaire generally lasted between 1.5 to 3 hours depending on the number of parcels owned by the respondent and the type and number of crops planted. The priority respondent for the interview was the ARB listed on the DAR records. However, at times another household member was interviewed instead if they were more knowledgeable about agricultural practices and outputs on the parcel of interest.

4.5.2 Endline

The endline survey ran from November 2019 to February 2020 and combined the ARB and spousal questionnaires, so the household was only visited once. The surveys were programmed using SurveyCTO, an ODK-based software, and administered on tablets. As with the baseline, the questionnaire was piloted in Camarines Sur in Region V and the Davao Region (Region XI). The questionnaires collected data on the same outcomes as during the baseline, except questions on access to credit were dropped because we do not expect to see impacts on this outcome in the short-run and most treatment ARBs did not yet have individual titles (see Section 6.2). Anticipating a high refusal rate due to the length of the questionnaire, we also did not ask about asset ownership, social capital (apart from conflict-related questions), and variable investment in the endline questionnaire, especially as we did not expect to see much movement on these outcomes in the short-run. We also included a module on the intervention to collect self-reported compliance data and better understand ARBs' experience with the intervention.

Since the ARB and spousal questionnaires were conducted during a single household visit, one surveyor administered the ARB questionnaire first, and then the spouses were separated and interviewed simultaneously at their residence. If an ARB could not be interviewed, someone else in the household who was familiar with agricultural production and household finances was interviewed. About 93 percent of those interviewed were the original ARBs interviewed at baseline. If another household representative was interviewed, the most common reason was because the ARB was deceased. 56 percent of female respondents were interviewed by female surveyors.

4.5.3 Qualitative data

We conducted semi-structured interviews with 50 non-sample DARPP beneficiaries in Camarines Sur before the baseline survey to better understand the evaluation's Theory of Change and to inform the baseline instrument (see Appendix A). Before the endline survey, we also conducted a short qualitative study among ARBs and their spouses across 40 households in Region XI to better understand the baseline findings on intra-household decision-making and to inform the endline spousal questionnaire. Lastly, we conducted semi-structured interviews with municipal offices in areas where we have concentrations of sample titles to better understand how the intervention is implemented on the ground.

4.6 Attrition

Subjects were tracked through two primary mechanisms. First, during both the baseline and endline survey, we asked numerous questions to collect data to assist with tracking, such as phone numbers and social media information. Second, we gathered location and contact information from barangay officials, neighbors, and co-owners on the collective title if an ARB had relocated and could not be contacted otherwise. As discussed in Section 6.2, we did not include

CLOAs in Bukidnon and Davao Occidental in the follow-up survey due to the low compliance rate, so only 324 titles and 631 ARBs were included in the endline survey.

Attrition in our study occurs when an ARB or a plot enrolled at baseline is missing in the endline sample[25]. ARB mobility, death, lack of availability, and refusal to be interviewed were all causes of attrition during the follow-up survey. There are two types of attrition: overall and differential. Overall attrition corresponds to the share of observations from the baseline sample that are missing at endline. This type of attrition could change the characteristics of the endline sample and thus affect the external validity of the study findings. Differential attrition occurs when the characteristics of those leaving the sample affects the balance between treatment and control achieved through randomization. Differential attrition could lead to incorrect estimates of program impact.

We investigate attrition by testing for statistical difference of baseline characteristics between 1) all ARBs and plots at baseline and the remaining ARBs and plots at follow-up (overall attrition), and 2) treatment and control groups for all non-missing ARBs and plots at endline (differential attrition). The analysis of overall attrition does not raise concerns for external validity; however, we do find some evidence of differential attrition between the treatment and control groups. Treatment ARBs present at endline had a higher socioeconomic status at baseline than their control counterparts. In contrast, control plots at endline had more favorable baseline characteristics than treatment plots at follow up.

Overall Attrition

While the attrition rates at the ARB level (16.3 percent) and plot level (14.4 percent) are moderate, we do not find strong evidence of overall attrition that could hinder our ability to extrapolate our findings to populations outside that of our study.[26] Five out of 40 outcomes at the ARB/household level and none of the 17 characteristics at the plot level are statistically different between attriters and the remaining panel (Table 6)[27]. Panel individuals are less likely to be women, are less likely to owe money to informal lenders, have lower likelihood of having completed high school, and have more years in farming and as primary tillers. However, if we consider all of the outcomes, the number of differences that turned out to be significant (5) is less than is likely to be significant purely by chance (6), and all five characteristics are only significant at the 10 percent level.

Differential Attrition

We find some evidence of differential attrition between the treatment and control groups at the ARB and plot levels. Treatment ARBs and their corresponding households have an attrition rate of 14.2 percent at endline, which is not statistically different from the attrition rate of their control counterparts (18.1 percent) (Table 5). In terms of plots, the attrition rate for treatment parcels was 15.1 percent. Control parcels were 1.26 percentage points more likely to be captured at endline, a difference that is not statistically significant. These average attrition rates at the ARB level (16.3 percent) and plot level (14.4 percent) could pose threats to the preservation of balance at endline.

[25] This excludes Davao Occidental and Bukidnon.

[26] However, it is important to note that our sample is not representative of any population and became even more unique before endline data collection for reasons not related to attrition as we had to drop the provinces of Bukidnon and Davao Occidental.

[27] Attrition tables can be found in Appendix H

Table 5: ARB attrition rate by study arm

	Treatment	Control	Difference
ARB Attrition Rate	14.2	18.1	-3.83
			(3.262)
Plot Attrition Rate	15.1	13.8	1.26
			(3.617)

Note: CLOA-clustered standard error in parentheses.
Plot Attrition Rate for the Parcels of Interest POI.
* p<0.1, ** p<0.05, *** p<0.01

We test key baseline characteristics of our endline sample at the ARB-level and household-level and find 10 out of 40 outcomes were statistically different between treatment and control. This is more than the number of outcome differences we could expect to turn out to be significant purely by chance. The average control ARB in the endline sample is more educated, worries less about the future, tills more plots, and thinks that they have higher odds of getting a commercial bank loan (if applied) than the average treatment ARBs (Table 8). In line with these results, control households seem to be wealthier: they have more assets, more income, larger per capita expenditures, and higher per capita savings. Education, income, expenditures, and savings are all correlated,[28] so a significant difference in one of these covariates could increase the chances of getting a significant result in all of the others. However, the consistency of the differences provides evidence that panel ARBs and their households in the control group were somewhat better off at baseline than their treatment counterparts.

At the plot level, 3 out of 17 outcomes are statistically different between treatment arms, slightly above the number of outcomes that are likely to be significant entirely due to chance (2 versus 3). The average control plot is more likely to be in an upland area, has a higher perceived risk of confiscation by a neighbor, and has a higher perceived risk index than its corresponding treatment counterpart. In particular, the perceived risk index comprises Likert scales of potential damage by typhoons, insect plagues, drought, flood, and crop diseases. The imbalances at the plot level tend to favor treatment plots as the direction of the difference suggests that treated parcels could be somewhat better off in certain dimensions (i.e. risk exposure, location, and neighbor tenure relationships).

We additionally find significant differences in 7 out of 12 measures of decision-making between treatment arms, much more than expected by change. Both ARBs and spouses in the treatment group have higher decision-making indices, while ARBs in the treatment group were more likely than those in the control group at baseline to report that their spouse was an owner of their parcel. These differences suggest that both ARBs and their spouses in the treatment group were more active in agricultural decision-making before the intervention.

Although there is some evidence suggesting imbalances in the endline sample that could represent threats to our internal validity, it is important to note that just two of these differences were significant at the 99 percent level of confidence. Moreover, while the imbalances at the ARB

[28] For example, the baseline correlations between the wealth index and the log of per capita household income, log per capita food expenditures, and log per capita savings is 0.3196 , 0.3225, 0.2624, respectively.

level tend to favor control ARBs (i.e. they were in a better position at baseline), the significant differences at the plot level go in the direction in which treatment parcels have better baseline characteristics than control ones. These differences are somewhat counterintuitive, suggesting that one sub-group may not be overwhelmingly contributing to differential attrition. Furthermore, it is noteworthy that 2 of the total 13 characteristics[29] that were imbalanced had missing values for over 10 percent of the sample, which calls for caution when interpreting these results.

Nonetheless, given that there is some evidence of differential attrition, the ITT and TOT impact estimations were repeated controlling for some of the baseline covariates that were statistically imbalanced. As discussed in Section 6.7, for the vast majority of the outcomes our results are robust to including these controls.

5. Parcelization: Design, methods, and implementation

5.1 Parcelization

Under Section 25 of Republic Act 6657 as amended by Section 10 of Republic Act No. 9700, the DAR is mandated to parcelize all collective titles that are not collectively farmed or operated in an integrated manner. The latest guidelines governing parcelization are detailed in the DAR's *Administrative Order No. 2, Series 2019: Guidelines and Procedures on the Parcelization of Landholdings with Collective Certificates of Land Ownership Award*.[30] These guidelines were largely validated during key informant interviews with DAR officials carrying out the parcelization process and through process monitoring of select pulong-pulong assemblies. Key elements of this process are as follows:

1) **Request for Survey Services (RSS)**: The DAR provincial office first compiles a list of collective CLOAs to be targeted for that year.[31] The MARPO then prepares a formal RSS for each target CLOA and submits it to the provincial office for their approval. The RSS is required before a land survey activity can be undertaken. Since the DAR's annual accomplishments are measured in hectares, there is an incentive to prioritize larger landholdings, and the guidelines also state that large compensable lands should be prioritized. The municipal offices reported that they do not interact with ARBs during this stage.[32]

2) **Pulong-pulong**: The pulong-pulong is one of the main interaction points between the DAR and ARBs. The MARPO drafts a letter in English and the local dialect inviting the collective CLOA's ARBs to an assembly where they are notified that their landholding will be parcelized, and the letter is commonly delivered by a barangay official. In addition, a notice is posted at the barangay hall. About 55 percent of ARBs who received the treatment reported that they were notified that their landholding will be parcelized and to attend the

[29] Logarithm of per capita household income and Indicator for whether plot is likely/somewhat likely to be confiscated by neighbor.

[30] While these are the latest guidelines, there were no changes during the course of the study that significantly affected how the intervention was implemented for our sample respondents.

[31] The DAR often refers to these lists as support lists.

[32] Although ARBs are supposed to be validated during this stage (e.g. they are still alive and tilling their parcel), the municipal offices said this usually is not done due to time and resource constraints, and they reportedly already know the status of the ARBs under their remit. For this study, we validated ARBs during this stage as discussed in Section 5.3.3.

pulong-pulong, and 53 percent attended the pulong-pulong.[33] 81 percent of those who reported being notified said they either received a letter or were visited by a barangay official, 9 percent reported reading the notification at the barangay hall, and the remaining 10 percent were notified by others in the community such as co-owners on the title. Among those who attended the pulong-pulong, 66 percent reported that all of the title's co-owners were present during the assembly. Municipal DAR officials identified this lack of attendance among ARBs during the pulong-pulong as a common challenge. The guidelines state that the authorized representative may hold several meetings and meet with ARBs individually in order to accomplish the aims of the pulong-pulong, though it is unclear to what extent this happened. When some co-owners do not attend, the DAR informs the ARBs present to inform the others of the subdivision survey. About 37 percent of treatment ARBs whose landholdings were subdivided believed they could access more information on the parcelization process if they desired.

During the pulong-pulong, the guidelines state that the MARPO or designated personnel should discuss the parcelization process, schedule of activities, and documentary requirements of the ARBs. Moreover, MARPOs report the ARBs should reach a consensus among the title's co-owners before proceeding with parcelization. They must agree on their respective parcel borders and are informed they must be present during the subdivision survey. Other topics of discussion may include the expected duration of the entire process; a 30-year amortization period for compensable lands to commence once the individual title is received; payment of property tax; the process of transferring the title to someone else's name; subdividing the parcel among children; and inclusion of a new farmer beneficiary within the landholding. It was confirmed with municipal DAR officers that there is no standardized material by which DAR officials should follow to administer the pulong-pulong nor are there standardized informational materials distributed to ARBs.

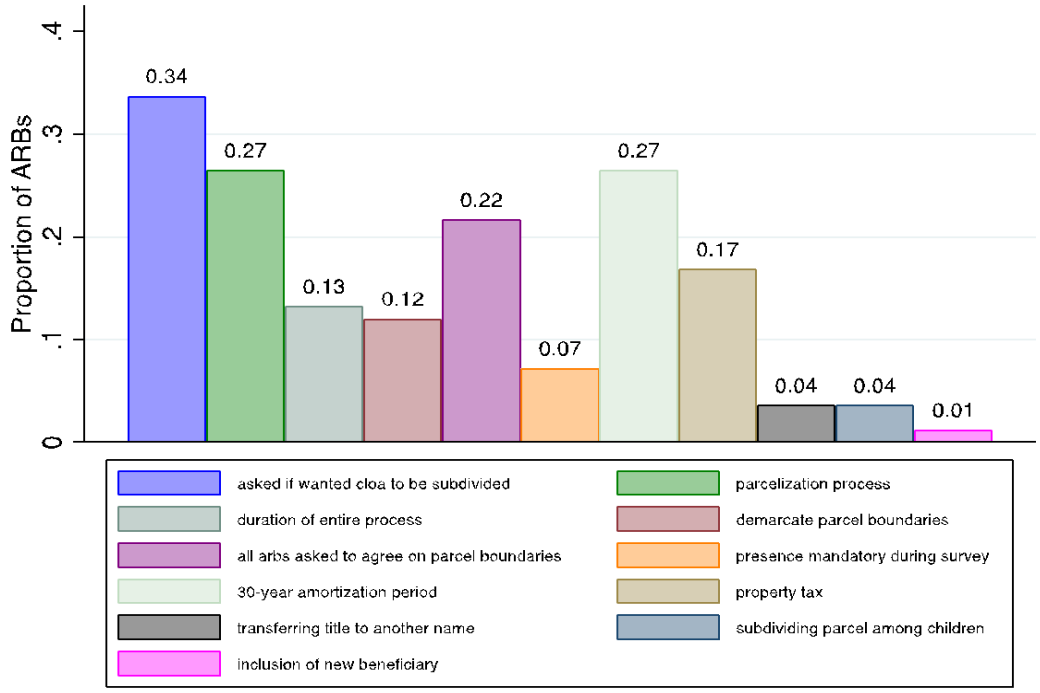
Figure 4 shows the proportion of ARBs who recalled various topics discussed during the assembly among those who participated. The most salient topics appear to be consent for parcelization, the parcelization process, the 30-year amortization period for compensable lands, and an agreement between all ARBs on their respective parcel's boundaries. Note that it had been an average of 20 months from the time the subdivision survey had completed until ARBs were interviewed for IPA's follow-up survey

Any ownership or border disputes typically arise during the pulong-pulong or subdivision survey, and the DAR cannot proceed until there is consensus among all ARBs. Small disputes are often resolved through the mediation of a municipal officer while larger disputes are referred to the DAR Adjudication Board (DARAB). Among the 159 sample ARBs the DAR reported to have received the intervention, nine ARBs across eight different collective titles reported land disputes during this stage, almost all of which involved border disputes that were resolved. Typically, the DAR official mediates these disputes by having the ARB who is determined to have encroached on another parcel return the respective land area while the neighboring ARB will pay them for the existing investment on that land. The amount to be paid is determined by the assessor's office. Of these reported conflicts, all but two were reported as resolved, and just one ARB believed it was not resolved fairly.

[33] These self-reported figures are limited to a sample of ARBs whose titles underwent subdivision surveys according to the DAR's administrative data.

ARBs must also hand over their collective title documents, which are eventually cancelled before the new individual titles are registered.

Figure 4: Reported content of pulong-pulong



3) **Subdivision survey**: After the pulong-pulong, either a private survey firm contracted by the DAR or the DAR directly administers the subdivision survey. The ARBs are instructed to be present during the survey, and markers (referred to as "monuments") are placed to delineate the borders of each parcel. A municipal officer is also required to attend if the survey is conducted by a private firm. Each ARB is allotted up to a maximum of three hectares each. The survey plans are then sent to the LMS for approval, and the ARBs' collective title documents are included as attachments. Once approved, the provincial office must verify that the survey plan is still reflective of the situation on the ground in terms of land use and the actual occupation of ARBs on the landholding. If there is a discrepancy, the DAR proceeds to amend the survey plan.

   About 56 percent of treatment ARBs reported that they were present during the subdivision survey, and about 76 percent reported that they were present for the pulong-pulong and/or the survey. For those ARBs who attended neither activity, it is unclear whether a DAR official or someone else met with them separately to discuss the process, though one municipal officer mentioned during this during a qualitative process interview.

4) **Registration and distribution:** Once the survey plans are approved, they are validated by the DARPO who prepares a Deed of Parcelization, which includes the approved survey plan. The ARBs then sign the Deed as proof that they accept the results of the survey, and they shoulder the cost of notarization (about US$10). If any ARB was unable to attend the pulong-pulong or subdivision survey, this is their opportunity to give their consent, though municipal officers report it is rare that ARBs would not sign the Deed. The

provincial office generates individual CLOAs for each co-owner under the collective title, which is then registered by the local Register of Deeds and the Land Registration Authority while the collective CLOAs are cancelled. Once registered, the MARPOs distribute the individual titles to the respective ARBs.[34] If it is a compensable landholding, the ARBs also receive a 30-year amortization schedule. They are encouraged to make monthly amortization payments (though they can pay quarterly or annually) which are collected by a representative from Land Bank at the municipal DAR office.

5.2 Compliance

In order to monitor compliance with the randomization, we collected the DAR's administrative field operations files on a monthly basis (see Appendix F). These files track the survey status of collective CLOAs from the time a Request for Survey Services is submitted through to the approval of subdivision survey plans by the LMS. Beyond this approval stage, we would then verify the registration and distribution status with the relevant staff involved in these processes. To ensure the accuracy of these reports, our Field Manager visited or called the provincial and municipal offices on a monthly basis and verified the parcelization status with those officials who were most knowledgeable. In addition, we collected self-reported data from ARBs on whether they received the intervention (see the *Intervention* module in Appendix C).

While the pre-analysis plan states that we will use self-reported compliance data from the endline survey in our analysis, we decided to use the administrative data because we believe it is more reliable. We made this decision in part because it appears those ARBs who did not receive the treatment may have confused the intervention with the initial survey conducted when the collective, or "mother", CLOA was issued; this process is quite similar as ARBs are also gathered in a pulong-pulong and a survey is conducted where markers were placed to delineate boundaries. About 47 percent of ARBs in the control group reported receiving the intervention where the DAR's administrative data says that they did not, and over half of these ARBs state the survey was conducted in 2014 before baseline data collection had even begun. In these cases, we suspect ARBs had actually reported an earlier date indicating when the landholding was surveyed for the collective title, but 2014 was the earliest option year in the questionnaire.[35] Although both the administrative and self-reported data may have some measurement error, we believe the administrative data is more reliable given the great lengths we went to validate these titles before the randomization and during the monitoring stage.

Due to the slow progress of the intervention, this study investigates the impact of the subdivision survey rather than the issuance of individual titles. In fact, individual CLOAs from only seven collective treatment titles were registered, two of which had been distributed to the respective ARBs. Moreover, any provinces that did not subdivide at least 25 percent of their treatment titles were not included in the follow-up survey. As seen in Table 6, Bukidnon and Davao Occidental did not meet this threshold, and thus were not included in the analysis. Most treatment titles had not been parcelized in Bukidnon because the survey equipment by which the staff usually directly administer the subdivision surveys was reportedly often broken or Land Bank had requested other titles be prioritized. Davao Occidental had made little progress due to a reported lack of funding for parcelization. Excluding these two provinces increases treatment compliance to 58 percent.

[34] While not in the guidelines, one provincial office mentioned that they distribute the titles within five days of registration.

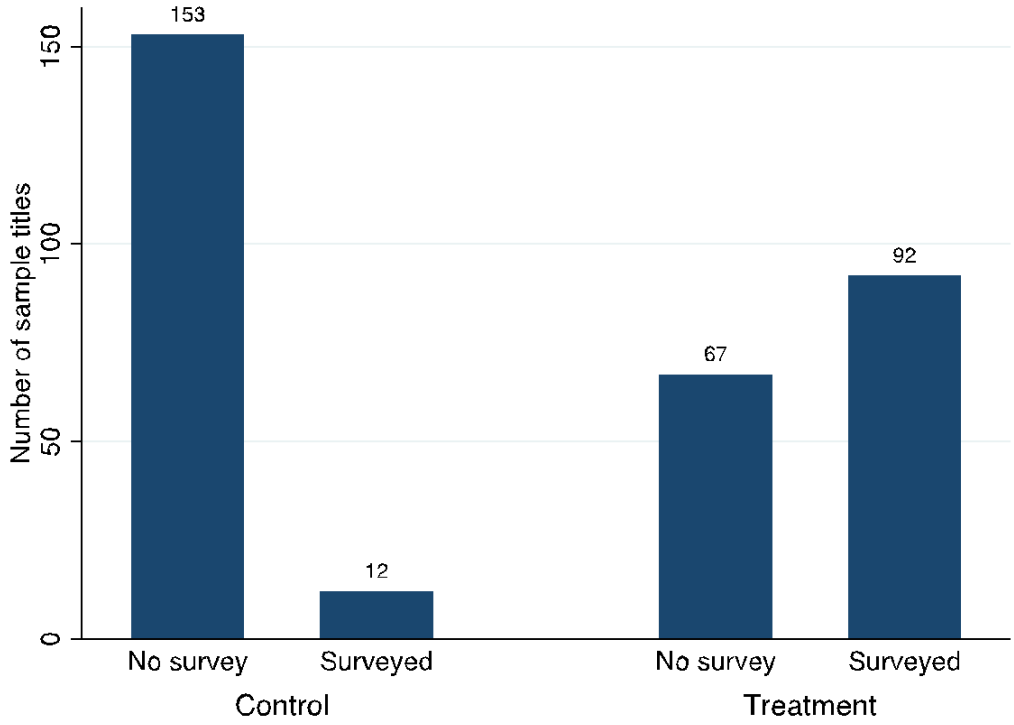
[35] This was verified in comments the enumerators made in the survey instrument.

Table 6: Treatment compliance by province			
Province	Subdivided titles	Total treatment titles	Percent compliance
Albay	7	12	58.3
Bukidnon	6	26	23.1
Camarines Sur	9	10	90
Davao Occidental	7	52	13.5
Davao Oriental	20	58	34.5
Davao del Sur	3	5	60
Misamis Oriental	17	21	81
North Cotabato	6	7	85.7
Sarangani	9	17	52.9
Sultan Kudarat	19	27	70.4
Total	103	235	43.8

Figure 5 shows compliance by treatment status for those titles included in the endline sample. Non-compliance primarily affected the treatment group, mostly due to delays in the intervention. Among the 67 treatment titles that had not been subdivided, 20 were identified to have encountered issues that would significantly delay or inhibit parcelization: in six titles the ARBs had refused parcelization, five had inclusion/exclusion cases where an ARB needed to be included or excluded from the landholding, four had ARBs who had informally sold their parcels, three were in areas with peace and order issues, one had an unresolved dispute among ARBs, and another was perpetually flooded and unable to be tilted. The remaining titles were still in the early stages of the process, the majority of them in Davao Oriental where there was a reported lack of sufficient funding. Among the control group, we have 93 percent compliance: eight titles had been subdivided before the randomization yet were not documented as such in the DAR's operations files, three were accidentally subdivided after the randomization, and another had been parcelized at a time unknown to the local DAR staff.[36]

[36] An additional control title had begun the stage where the survey firms were bidding for the contract, but the subdivision survey had not been conducted.

Figure 5: Compliance by treatment status



6. Impact analysis and results of the key evaluation questions

6.1 Methodology

6.1.1 Econometric specification

As we examine outcomes for farmers, married couples, and agricultural parcels, our analysis takes place at the individual, household, and plot level, with different specifications for each level and for different hypotheses. More detail on our hypotheses and regression specifications can be found in Appendix D.

Investment, output, gains from trade, productivity aspirations [37] and tenure security[38] are measured at the parcel level. The current parcel-level analysis is focused on the DAR-awarded parcel of interest. Further extensions of this work will also examine these outcomes for other parcels. We use the following specification for parcel-level outcomes:

$$Y_{jcst=1} = \beta_0 + \beta_1 T_{jcs} + \beta_2 Y_{jcst=0} + X_{jcst=0} + \lambda_s + \varepsilon$$

[37] In the pre-analysis plan, we had specified that productivity aspirations would be analyzed at the ARB-level. However, the questions were asked about aspirations for the parcel of interest. In addition, the plot characteristics are important to consider as controls for what aspirations farmers may have for their production.

[38] In the pre-analysis plan, we had specified that tenure security outcomes would be analyzed at the ARB-level. However, impacts on tenure security could plausibly be concentrated on the parcel of interest, so it is more relevant to study these outcomes on the parcel of interest rather than aggregate across multiple parcels.

Where Y_{jcst} takes the value of one of the outcome variables specified in the previous section for parcel *j* in collective title *c* in strata *s* at time *t=1 (i.e., endline)*, T_{jcs} is an indicator for the treatment status of parcel *j*, $X_{jcst=0}$ is a vector of control variables at baseline, and λ_s is a vector of strata fixed effects. $Y_{jcst=0}$ corresponds to the baseline value of the outcome when it is available[39]. Whenever $Y_{jcst=0}$ is included as control in the regression, the specification becomes an ANCOVA model and renders more precise estimates. Robust standard errors for all specifications are clustered at the collective CLOA level, which was the unit of randomization. Control variables for the parcel-level regressions include basic plot characteristics, a list of which can be found in Appendix D. The tables show three specifications: one with no baseline controls (without X_{jcs}) and all observations that have endline values, one with no baseline controls but only observations that have non-missing control values,[40] and one including all control variables.

Migration and welfare (including happiness, anxiety, and consumption) are measured at the level of the ARB and impacts on these variables are estimated using the following model:

$$Y_{ijcst=1} = \beta_0 + \beta_1 T_{jcs} + \beta_2 Y_{ijcst=0} + X_{ijcst=0} + \lambda_s + \varepsilon$$

Where $Y_{ijcst=1}$ is the outcome measure specified in the previous section of individual *i* in plot *j* of collective parcel *c* in strata *s* at time *t=1*, and the other variables are as specified above. Baseline values of anxiety and consumptions are available in the data and included in the models ($Y_{ijcst=0}$), so impact estimations for these outcomes follow an ANCOVA specification. Control variables for ARB-level regressions include basic demographic characteristics of the ARB at baseline, a list of which can be found in Appendix D.

Regressions for gendered impacts, including decision-making participation, spousal ownership and agency are measured at the individual level, using the responses of ARBs and their spouses in separate regressions. Our primary specification uses a POST estimate[41] including interactions for the gender of the ARB taking the form of:

$$Y_{ihjcst=1} = \beta_0 + \beta_1 T_{ihcs} + \beta_2 AF_i + \beta_3 T_{ihcs} * AF_i + X_{ihc} + \lambda_s + \varepsilon$$

Where Y_{ihjcst} is the outcome measure of individual *i* in household *h* owning plot *j* of collective parcel *c* in strata *s* at time *t*, AF_i is an indicator variable for whether the ARB is female, and the other variables are specified as above. Control variables used in regressions related to decision-

[39] The following tenure security questions were asked both at endline and baseline: 1) *If you let your parcel lay fallow for a year, what do you think is the likelihood that your land might be encroached upon or confiscated by other farmers in your barangay?* 2) *In your opinion, how likely is it that your parcel might be confiscated in whole or in part by the government within the next five years?* 3) *In your opinion, how likely is it that your parcel might be confiscated in whole or in part by anyone else within the next five years?* and 4) *How likely is it that you will be able to transfer ownership of your parcel to your children?*

[40] This second specification was not specified in the pre-analysis plan, but was added in order to determine whether any changes between the unadjusted and adjusted regressions come from a change in sample due to the number of observations with missing control values.

[41] Although the pre-analysis plan specified the use of ANCOVA, our primary gender estimates use POST estimations. Our baseline spousal survey was carried out after the primary baseline survey and excluded ARBs who were single or widowed. Attrition in the spousal survey also came from different households than those that attrited at endline. ANCOVA specification would have resulted in a smaller sample, and thus a POST estimate was used instead. .

making include baseline demographic characteristics of the husband and wife and which may be correlated with bargaining dynamics in the household, and a list of these variables is in Appendix D. Our primary measures for gender-related effects use a z-score index of related indicators, although we also examine the treatment effect on each individual indicator.

We measure household decision-making equality at the household level, using the responses of matched couples (husband and wife). Our POST estimate takes the form of:

$$EI_{hcst} = \beta_0 + \beta_1 T_{hcs} + \beta_2 AF_{ih} + \beta_3 T_{hcs} * AF_{ih} + X_{cht=0} + \lambda_s + \varepsilon$$

Where EI_{hcst} is the household decision-making equality z-score index and the other variables are as described above. We additionally measure the effect of parcelization on each individual indicator of decision-making parity.

Given imperfect compliance in both the treatment and control groups, our primary specifications measure the local average treatment effect (LATE) of the subdivision survey, instrumenting for survey subdivision with the randomized treatment assignment. We use DAR administrative records on survey subdivision, as they seemed to be the most reliable variable on compliance with the intervention.[42] In general, the results are very consistent between the LATE and the intent-to-treat (ITT) specifications, with the expected differences in magnitude and significance of the coefficients, and ITT estimates can be found in Appendix I.

6.1.2 Treatment of multiple hypothesis testing

We use three methods for controlling for multiple hypothesis testing. First, we clearly specified in our pre-analysis plan which outcomes are considered primary and which outcomes are considered secondary. Second, in cases where multiple indicators are used to measure an outcome of interest, we create indices that aggregate the different measures in a hypothesis. In many cases, we follow the methodology of Kling, Liebman, and Katz (2007) to create standardized z-score indices to group the multiple variables into a single indicator.[43] Cases in which individual variables are significant but not the standardized index are treated with caution in the interpretation of the findings. Finally, we report the Benjamini, Krieger, and Yekutieli (2006) adjusted q-values, which control the false discovery rate (FDR) and type I error. While we place more emphasis on treatment impacts that are robust to the FDR correction, we still discuss impacts that may not hold up to this correction, as it is equally important to not incur Type II errors and understate the impacts of the program.

6.1.3 Subgroup analyses

We examine heterogeneous impacts by interacting the baseline value of the moderator with the treatment dummy. We test heterogeneous impacts on 3 potential moderators of the program:[44]

[42] Although the pre-analysis plan specified the self-reported variable as the primary measure of compliance, there is evidence that ARB may have misunderstood the question. See section 6.2 for more.

[43] This methodology involves: (1) converting all outcomes so that the sign of the effect of all variables in a family goes in the same direction, (2) calculating the z-score of each variable by subtracting the control group mean and dividing by the control standard deviation, and (3) taking an average of the z-scores in each family.

[44] The pre-analysis plan mentioned a fourth moderator: major crop. At the time of this report, the sub-group analysis had not yet been completed by major crop, and this will be explored in further analysis of this work.

1) **Compensable vs. non-compensable land:** Depending on the mode of acquisition of the land that was distributed to the ARB under the CARP, some lands are subject to a 30-year amortization period in which the ARB must repay the land value in order to compensate the original landowner. Generally, lands that were acquired from private landholders are considered compensable lands and are subject to the 30-year amortization schedule, whereas lands that were previously under the government's control are considered non-compensable and do not require amortization. The subdivision survey may affect ARB on compensable and non-compensable lands differently, as amortization payments become enforceable once the individual parcel boundaries are clarified through subdivision.

2) **Landholding is part of an Agrarian Reform Community (ARC):** ARBs in ARCs receive access to additional support services from the DAR including farm-to-market roads, irrigation, support for business and enterprises, capacity-building, and credit access. These tend to be areas where there are concentrations of ARBs.

3) **Gender of the ARB:** Women and men may face different initial levels of tenure security, access to information, and access to services that may affect both their experiences with the program and their ability to reap the benefits of survey subdivision.

6.2 Average impacts on tenure security, land use, productivity and ARB welfare

Even though the majority of treatment ARBs had not yet received individual titles for their plots, they changed the way they use the awarded parcel, with robust impacts on plot leasing, sales, and whether or not the ARB is the primary tiller (Table 9). The number of ARBs who leased out their plot or at least a portion of it more than doubled: survey subdivision increased the share of those leasing the plot by 16 percentage points compared to a control group average of 9 percent. There was a similar decrease in the share of ARBs who were the primary tiller of their plot, with the subdivision survey leading to a decrease of 14 percentage points. Even though the parcelization process was not completed for most ARBs at the time of the endline survey, the initial stages of the process led to a 2 percentage point increase in land sales. The impacts on the way ARBs use the land are robust to adjustments for multiple hypothesis testing using the sharpened q-value.

Although changes in leasing and sales may be indicative of increased clarity of property rights, the subdivision survey process also seems to have decreased ARBs' perceptions of tenure security. In particular, undergoing the subdivision process decreased ARBs' feelings that they can restrict access to their parcel by 7 percent and decreased feelings of being secure from eviction by 9 percent. It also led to a 13 percent decrease in an overall index that combines these and other measures, including worries about losing ownership, the likelihood of being able to transfer ownership to children, and the likelihood of different entities confiscating the land (Table 10). Because ARBs were asked about their perceptions of tenure security using a 5-point Likert scale, we test the robustness of the results to two versions of a binary indicator constructed from the Likert scale (Table 11 and Table 12). The signs and approximate magnitudes of the coefficients are stable across all specifications; however, in some cases, they lose statistical significance.[45] In addition to testing the robustness of these results to transformations of the variable, we explore their robustness to multiple hypothesis testing using sharpened q-values, as described in Benjamini, Krieger, and Yekutieli (2006). As none of the regressions on tenure security are robust to the sharpened q-values, we interpret the results on perceptions of tenure security as suggestive evidence.

[45] See section 6.7 for more details on this robustness check.

A critical aspect of tenure security is the ability to enforce one's land rights, and we find robust evidence that the subdivision survey process decreased confidence that local officials could effectively protect ARBs' land rights in the event of a dispute. Using a 5-point Likert scale ranging from 1 "Very ineffective" to 5 "Very effective," we asked ARBs how effective they thought the Barangay Council would be in helping them enforce their land rights under different situations: disputes with a neighbor, disputes with the government, and disputes with a private company. We asked similar questions about the effectiveness of the Municipal Entity in helping them protect their land rights. Although in general both the Barangay Council and the Municipal Entities are both perceived as effective, with a control mean over 4.5 on a 5-point scale for all indicators, the subdivision survey process decreased perceived effectiveness on all indicators (Table 13). Reductions range from 10 to 16 percent depending on the indicator. This result is robust to indices combining the different variables, adjustments for multiple hypothesis testing, and to specifications using a binary indicator for effectiveness (Tables 14 and 15).

Aligned with a decrease in tenure security and in confidence that local authorities can effectively enforce land rights, the survey subdivision process increased the anxiety of ARBs and decreased their life satisfaction in both the present moment and expected life satisfaction in the near future. ARBs were asked about the frequency with which they feel stress by their job or economic activity, worried about the future, stressed about someone encroaching on their land, and worried about passing the land on to their children. The subdivision survey process increased an average indicator combining these measures by 9 percent (Table 14). Similarly, this process decreased ARBs' current life satisfaction by 26 percent using Cantril's ladder, which represents the worst life possible as rung 1 on a 10-step ladder and the best possible life as step 10 and asks the respondent which rung represents their current situation. When asked which step represents the situation they expect to have in one year, ARBs who had undergone the subdivision survey process reported a level that is 16 percent lower than those who did not undergo subdivision (Table 15). The decline in life satisfaction is robust to adjustments for multiple hypothesis testing.

Also aligned with a decrease in tenure security, we find suggestive evidence that the subdivision survey may decrease certain types of investment in the land, although these results are not robust to adjustments for multiple hypothesis testing. We do not find statistically significant impacts on recent investments in irrigation or physical structures, the number of trees planted, or the area of the plot planted. However, ARBs whose land underwent survey subdivision were 140 percent less likely to report that they leave their land fallow, compared to the control group mean (Table 16). In the context of uncertain tenure, farmers may decide to cultivate parcels as a way to protect land from encroachment by other community members, even if fallowing the land can be an investment in soil productivity (Goldstein and Udry 2008).[46] However, it may be more likely that ARBs do not leave the awarded parcel fallow because they are supposed to be tilling the land in order to receive the individual CLOA from the DAR. The actual tillage also serves as a basis for determining boundaries during the subdivision survey. Although there are not significant impacts on recent investments in physical structures, ARBs whose land underwent survey subdivision are 35 percent less likely than average control ARBs to plan to invest in large infrastructure, such as barns and granaries, in the next 5 years. Similar to the other investment results, this impact is not robust to adjustments for multiple hypothesis testing, and there are no statistically significant impacts on other investment plans, such as irrigation, new crops, new trees, or increasing the area tilled (Table 17).

[46] While land fallowing may be more commonly practiced in Ghana, 21 percent of ARBs reported practicing this method to improve yields at baseline.

Although the subdivision survey altered perceptions of tenure security and the way in which ARBs use the land, it did not have a significant impact on the agricultural output of the parcel of interest. There was no impact on either the extensive or intensive margin (Table 18). On the extensive margin, we captured whether or not there was a non-zero production level on the parcel of interest, as 23 percent of the control group have zero output.[47] On the intensive margin, we focus on the log of output value and the log of output value per hectare, as specified in the pre-analysis plan. However, the null result is robust to alternative specifications, including output value defined using the median price instead of the farmer-reported price, the inverse hyperbolic sine transformation (which can allow for 0 output values), and the quantity of the three main crops produced.[48]

We found no statistically significant impacts on secondary outcomes of interest, including food consumption, productivity aspirations, and migration. The program was expected to shift food consumption by increasing agricultural output or income. Consistent with null impacts on agricultural output, the subdivision survey did not impact food consumption on average (Table 19). Aligned with concerns about tenure security and suggestive declines in investment, the subdivision survey does not improve ARB aspirations for the productivity of their parcel of interest (Table 21). Similarly, there is no impact of the subdivision survey process on actual or planned migration, either for ARBs or their household members (Table 22), which is consistent with concerns about tenure security.

6.3. Average impact on intra-household decision making and agency

The subdivision survey changes the way that households make decisions on the agricultural parcel of interest, in particular in households of male ARBs. Consistent with already-high levels of decision-making power, male ARBs do not report any statistically significant differences in their own decision-making on the land (Table 23). However, wives of male ARBs report a significant decrease in their own decision-making authority (Table 24). Notably, wives of male ARBs report a 51 percentage point decline in the likelihood that their opinion can prevail after a disagreement with their spouse on a land-related decision, a result which is robust to adjustment for multiple hypothesis testing using the sharpened q-value. While other indicators in the index are not statistically significant, all of them except one trend in a downward direction, including the decision-making index.[49] Aligned with this result, there is a 33 percentage point decline in the share of husbands that indicate both spouses can make decisions on the land after the subdivision survey (Table 25). Despite this decline in decision-making authority, wives of male ARBs do not report a statistically significant decline in their agency, as measured by the Relative Autonomy Index, their ability to make their own personal decisions if they wanted to, their self-efficacy, or an index combining these three measures (Table 26). There is similarly no significant impact on ARBs' agency (Table 27). Although the subdivision survey seems to reinforce male ARBs' bargaining power over land decisions, it does not have a significant impact on their agency.

The decline in the decision-making authority of the wives of male ARBs may be linked with suggestive evidence of a shift in perceptions of spousal ownership of the land and shifts in gender norms among their husbands. Wives of male ARBs are statistically significantly less likely to state that their names are on the title of the parcel of interest after the subdivision survey (Table 28). Although this result is not robust to adjustments for multiple hypothesis testing, it is notable given

[47] This indicator was not included in the pre-analysis plan but was added because of the relatively high share of farmers who had 0 output.

[48] Results available upon request.

[49] See the Pre-analysis Plan for a description of the indicators used.

the low levels of spouses that state that their names are on the title. Despite legal provisions in the Family Code of the Philippines that land should be issued in the names of both spouses, including land distributed through the Comprehensive Agrarian Reform Program, only 6 percent of control group spouses and ARBs indicated that the spouse's name figured on the title. It is unclear whether this is due to a de facto difference from the conjugal property provision, from titles issued before the legal framework was adopted, or from lack of ARB and spouse awareness of the legal arrangement[50]. In addition to potential shifts in the perception of ownership, the subdivision survey also reduced male ARBs' opinion that women should be final decision makers on parcels that they own by 34 percentage points (Table 29). Although this result is not robust to adjustments for multiple hypothesis testing, it may suggest that the subdivision survey could have reinforced more conservative gender norms about land ownership and decision-making.

While spouses of male ARBs experience a decline in their bargaining power on the land after survey subdivision, we do not see a similar trend for spouses of female ARBs. Although the coefficients are not statistically significant by conventional standards—likely due to the relatively small sample of married female ARBs—the results instead point to a trend toward more gender-equal decision-making in the households of female ARBs. The coefficient of the decision equality index, though not statistically significant, is large in magnitude and suggestive of a 0.43 standard deviation increase due to the subdivision survey (Table 25). While there were not statistically significant impacts on female ARBs' decision-making as presented in Table 24, additional exploration of the data suggests the shift in decision-making equality is coming from female ARBs becoming more involved in decisions rather than no longer making decisions on their own. Even if more egalitarian decision-making processes are coming from female ARBs increasing their participation in decision-making, husbands of female ARB do not seem to perceive this as a loss of their own agency. If anything, husbands of female ARB seem to be experiencing an upward trend in their agency after the subdivision survey (Table 26), though this trend is not statistically significant.

6.4 Heterogeneous impacts by gender

Given the context of gender and household relations in the Philippines, it is unsurprising that we find differential impacts based on the gender of the ARB. While the Philippines scores highly compared to other Southeast Asian countries on many metrics of gender equality (WEF 2020), significant inequality still remains in agriculture, with men paid more than women for the same types of work (Briones 2018). Women in agricultural households have higher levels of education than men, and as such are more likely to earn income from off-farm employment (Estudillo et al 2001). These differences apply to our sample as well: gender differences at baseline show that in our panel sample female ARBs are more educated than their male counterparts, although their households have fewer assets (including agricultural assets) than those of male ARBs. Consistent with more years of education, female ARBs have less tilling experience and tend to till fewer plots than male ARBs, though female-owned parcels are more likely to have irrigation systems than those owned by men.[51]

[50] ARBs reported being married for a median length of 29 years at baseline, with 92 percent married longer than 10 years. This suggests that the majority were married at the time titles were received. Regardless of ARBs' marital status at the time of title receipt, however, the 1987 Family Code of the Philippines states that CARP-awarded land owned by either spouse before marriage is considered as conjugal property upon marriage, with equal ownership rights for both spouses.

[51] Gender comparisons of our panel sample are available upon request.

Because only approximately 30 percent of the ARBs in the sample are women, gender disaggregated analysis suffers from fairly low power. However, we find some suggestive evidence that the subdivision survey may affect male and female ARBs differently. We find suggestive evidence that female ARBs were more likely to lease out the plot or sell it and less likely to till it themselves after the subdivision survey. Although the likelihood is not statistically significantly different from treated male ARBs, the magnitude of the impact of survey subdivision on female ARBs was more than double that of the impact on male ARBs in the LATE estimates (Table 30) and is also robust to multiple hypothesis testing. Possibly consistent with a greater probability of leasing out, selling, or not tilling mainly by themselves, the subdivision survey led to greater declines in female ARBs' planned investment on the awarded parcel.[52] On average in the control group, female ARBs are more likely to have plans to invest in large infrastructure like barns or granaries, plans to plant new crops, and to increase the tilled area of their parcels within the next five years. However, survey subdivision significantly decreases female ARBs' plans to invest in all three of these indicators, a result that is robust to adjustments for multiple hypothesis testing. This decline in planned investment for female ARBs after subdivision more than erases the initially higher investment plans that female ARBs had in the control group compared to male ARBs (Table 38).

The subdivision survey has differential effects by gender on the three studied facets of tenure security: recent land conflicts, perceived tenure security, and perceived government ability to enforce property rights. These results suggest mixed evidence for how it affects female ARBs' overall tenure security. Female ARBs were less likely to report having heard of land-related conflicts in their community and having had recent conflicts on their parcel of interest after subdivision (Table 41), even after taking into account sharpened q-values. This suggests that in terms of recent experience, the intervention improves women's tenure security, whereas there is no statistically significant effect for men. Nevertheless, female ARBs see declines in their perceived tenure security similar to their male counterparts, but these declines come from different measured perceptions. While men primarily see declines in their perceived ability to restrict access to their parcel and security from eviction, women perceive a significantly higher likelihood of neighbor confiscation of their parcels. Women also see greater declines than men in other measures that, while not statistically significant, add up to a significant decline in their overall tenure security score (Table 31).[53] Concerning the third facet of tenure security, female ARBs show a stronger decline in perceptions of the local authorities' effectiveness in protecting their land rights than male ARBs. In particular, this decline erases the greater confidence in protection from public officials that female control ARBs show with respect to male ARB and is robust to both different definitions of the dependent variables (Likert scale, Binary 1, and Binary 2) and multiple hypothesis testing.

Consistent with lower confidence in public officials' ability to defend their land rights, the evidence suggests that treated female ARBs experience a stronger increase in their anxiety. Although the likelihood is not statistically significantly different than for treated male ARBs, the magnitude of the impact of survey subdivision on female ARB was more than five times greater that of the impact on male ARBs in the LATE estimates (Table 37).

6.5 Heterogeneous impacts by inclusion in an Agrarian Reform Community

[52] We do not have any information on lessees' actual or planned investments in the land.

[53] This decline is only significant when using the sum of outcomes using a Likert scale, although the coefficient is negative with all transformations.

Our randomization was stratified to ensure balance between ARBs who were members of Agrarian Reform Communities (ARCs) and those outside of them. ARCs are organized by the DAR from clusters of adjacent agrarian reform barangays and are targeted for additional support services, including but not limited to the construction of farm-to-market roads and irrigation infrastructure, provision of credit lines, capacity-building trainings, and support for small enterprises. A previous study (APPC 2007) found slightly higher incomes and agricultural outcomes for ARBs within ARCs compared to those outside them. ARCs were created in areas with a high density to facilitate the provision of these services, meaning that networks among ARBs are likely stronger as well, including information networks. 51 percent of endline respondents were located within ARCs, with equal proportions across treatment and control.

We find significant differential impacts of parcelization on agricultural practices, subjective well-being and decision-making depending on ARC membership. ARBs outside of ARCs report they were less likely to leave their parcels fallow for productivity reasons and increased the number of trees planted on their parcels. They were 16 percentage points more likely to lease out their parcels, and 15 percentage points less likely to till their own land. On the other hand, ARBs within ARCs saw no change in the likelihood of fallowing their land and were more likely to invest in irrigation or sheds, but slightly decreased the number of trees planted per hectare (Table 53).While parcels from treated ARBs in ARCs were no more likely to be leased out after the subdivision process, they were more than twice as likely to be sold than treated non-ARC parcels. However, this result is not robust to sharpened q-values and plot sales in our sample are not common; just 1 percent of the control endline plots had been sold at the time of the endline survey.

We find that effects on perceptions of tenure security and trust in public officials are concentrated among treated ARBs outside of ARCs. Treated ARBs within ARCs see no statistically significant impacts on perceptions of tenure security, with no significant effects under any measure. While the differences between ARBs within and outside ARCs were not always statistically significant, they were of an opposite sign and similar magnitude, resulting in statistically null impacts for ARBs within ARCs. Although this group reports declines in trust in government officials, these effects are significantly smaller than the declines seen among their treated counterparts outside of ARC clusters. On the other hand, after the subdivision process ARBs outside of ARCs felt less able to restrict access to their parcels and less secured from eviction. This result is robust to multiple hypothesis testing correction and different transformations of the outcome variable.

To the extent that lack of participation and information may be a driver of tenure insecurity, stronger information networks and social capital within ARCs may explain why we do not see declines in tenure security among this group. The ARC strategy seeks to create organized farming communities with a focus on building social capital and providing support services (APPC 2007). Information may be disseminated more easily in these more organized communities, and it appears it was the case in this study. ARBs were 27 percent more likely to report being notified about the pulong-pulong than those in non-ARCs, and they were 21 percent more likely to report attending the pulong-pulong. Moreover, the provision of support services and more repeated interaction between DAR officials and ARBs through which this may occur may help offset declines in trust of government officials we see among ARBs outside ARCs.

While ARBs outside ARC communities experience greater tenure insecurity feelings and less trust in the government, they are not significantly more anxious or less happy after the subdivision survey. Conversely, ARBs in ARC communities see no changes in tenure security and trust in government, but are significantly more anxious, less happy, and are more likely to report that they wish to migrate in the future. Negative impacts on subjective well-being may come as a result of additional time spent on the agricultural parcel, possibly at the expense of leisure time, which can

increase stress and anxiety among farmers (Yazd, Wheeler & Zuo 2019). It is also possible that ARBs within ARC have different customary arrangements related to land and social relationships than those outside of ARC. If these customary arrangements or institutions are affected differently by survey subdivision, these changes may cause additional stress and anxiety. Future extensions of this work will try to further understand the mechanisms behind these impacts.

With respect to decision-making, there were significant differential effects based on ARC membership, with a consistent overall decline in the agency and decision-making power of female ARBs and spouses within ARCs, and a commensurate increase for male ARBs. While male ARBs outside ARCs see no significant change (or a possible slight decrease) in their decision-making power, within ARCs there are large increases in male ARBs' decision-making indices, coming mainly from reports of their opinion always prevailing after a disagreement and high levels of input on agricultural decisions. Female ARBs within ARCs, meanwhile, see significant decreases in the same measures, while reporting no change or slight increases in decision-making power outside of ARCs. Consistent with male ARBs within ARCs reporting that their opinion always prevails after a disagreement over agricultural decisions, female spouses in ARCs see declines in their ability to prevail after a disagreement, as well as in their aggregated decision-making index. While there are no significant changes in agency for ARBs or spouses of either gender outside of ARCs, within ARCs male ARBs see significant increases in agency while female ARBs see significant decreases. Both changes come primarily from changes in reported autonomy over agricultural decisions, although all measures show a decline in agency for female ARBs and an increase for male ARBs.

The most notable takeaway from our ARC-disaggregated findings is that the generalized impacts reported in our main results section are not falling on the same group of ARBs. Indeed, our results seem to suggest two general populations within our treatment sample that see nearly mutually exclusive impacts. The first group, primarily those outside agrarian reform communities, see significant declines in tenure security and trust and government, which are associated with decreases in fallowing of land and increases in the planting of trees, both of which are indicative of short-term investments meant to shore up tenure on land with insecure rights (Deininger & Jin 2006). Additionally, farmers in this group were more likely to lease out their DAR-awarded parcels and less likely to till them. The second group, meanwhile, sees no significant change in tenure security, and may be willing to make longer-term investments in their parcels, with an increase in building of sheds or irrigation. However, this group is also more likely to see short-term negative psychological impacts, including decreased happiness and increased anxiety, and a general decrease in women's participation in agricultural decision-making.

6.6 Heterogeneous impacts by compensable/non-compensable lands

We find significant differential impacts on treated ARBs depending on whether their parcels are on lands considered as "Land Bank compensable." ARBs on compensable lands will receive amortization schedules with their individual titles, and once the amortization period has begun, defaulting on the payments can lead to foreclosure on the land.[54] 43 percent of ARBs in the treatment group were on Land Bank compensable land, while the remainder were on non-compensable lands, often those that were previously government-owned land. ARBs on non-compensable lands are not required to make amortization payments after parcelization, although they are required to pay land taxes on their parcels, as are ARBs on LBP-compensable land. Additionally, parcels on compensable land may also be of lower agricultural quality with respect to non-compensable lands, as in our sample the former were mainly acquired through Voluntary

[54] See sections 2.1 and 6.1.3 for more details.

Offers to Sell by their former owners, who would plausibly be willing to give out their relatively less productive parcels.

ARBs on LBP-compensable lands were significantly more likely to lease out their agricultural parcels, seeing a 25 percentage point increase in leasing out and conversely a 21 percentage point decrease in the likelihood of tilling their own land. ARBs in non-compensable lands saw no change in the likelihood of leasing their land, but were 20 percentage points less likely to leave their land fallow for productive reasons. These differences may be linked with two aspects of program design: tilling requirements and amortization. First, if compensable lands are of a lower quality and farmers were not previously using them productively, they may lease them out in order to meet the DAR's requirement that ARBs must be tilling the land in order to receive an individual title. Similarly, for non-compensable lands, farmers may be less likely to leave the land fallow in order to meet this requirement. Second, if those on compensable lands are concerned about making amortization payments, they may lease out the land in an effort to increase income and ensure they can maintain the payment schedule. Doing so may involve renting to more productive farmers with greater skills or access to inputs and/or engaging in off-farm income-generating activities.

Decreases in tenure security and trust in government were also primarily concentrated on compensable land, while ARBs on non-compensable land saw generally insignificant changes in tenure security and significant decreases in trust in government that were somewhat smaller than those seen in their counterparts on compensable land. In line with the reduction in tenure security and trust in the government and possibly also with an increase in leasing, ARBs on LBP-compensable lands decrease their plans to invest in barns or granaries. They also increase the number of trees planted, which could be suggestive of tenure insecurity if these trees were used to delimit plot boundaries. In contrast, ARBs on non-compensable lands were more likely to have made attempts to invest in large infrastructure like barns or granaries and to have plans to invest in new trees in the next five years.

The subdivision survey resulted in different changes in terms of subjective well-being and migration for ARBs on both compensable and non-compensable lands. While increases in anxiety in the treatment group were concentrated among ARBs on compensable lands, with no change in anxiety reported for those on non-compensable land, decreases in happiness were experienced by ARBs on non-compensable parcels. In terms of migration, ARBs on compensable lands were more likely to have migrated as a result of survey subdivision, while there was a decline in migration for those on non-compensable lands. Recent migration, however, is not indicative of overall interest in migration. Treatment ARBs on compensable land were less likely to wish to migrate, while the opposite was true of ARBs on non-compensable land. While we have significant results on actual and desired migration, both of these are not common in our sample with only 1 percent of control ARBs having migrated at endline, and 2 percent wishing to migrate in the future.

Taken together, these results suggest that on compensable lands, ARBs may be more concerned about the forthcoming need to make amortization payments and to meet the tilling requirement, which contributes to increased levels of anxiety. Consistent with these concerns, they are more likely to lease their lands. Their absence on the land may reduce their ability to stake their claim on the parcel during a key transition where doing so is important. Thus, they feel more tenure insecurity, have more anxiety and have less trust that government institutions can help enforce their property rights on land the government said they must be tilling. While they may be unwilling to migrate and leave their land unattended in the future given their concerns over maintaining their property rights, they may have migrated after the subdivision survey in order to diversify their

income sources and ensure they can maintain the forthcoming amortization schedule. In comparison, ARBs on non-compensable land may feel that they need to delay their migration plans, since they have not yet received the titles and must meet the tilling requirement. This could contribute to lower current life satisfaction if they feel that their current plans are on hold.

We generally see no significant differential impacts on household decision-making or on the agency of ARBs and spouses, although the decline in decision-making among female spouses may be stronger on non-compensable land.

6.7 Robustness Checks

We perform several robustness checks to ensure the accuracy of our results. First, we account for multiple hypothesis testing by using sharpened q-values, as described in Benjamini, Krieger, and Yekutieli (2006). This procedure corrects for Type I errors (stating something has an impact when in fact it does not); however, it can be a conservative correction that can lead to Type II errors (stating something does not have an impact when in fact it does). In particular, our results on the effectiveness of Barangay and the Municipal Entities in protecting property rights and the decline in ARB life satisfaction are robust to this correction. The significance of the results on tenure security and ARB anxiety no longer attain the 10 percent or less threshold when using sharpened q-values as the benchmark. Nonetheless, we still deem these results are suggestive and important, even more so as they seem to be consistent with the same underlying story suggested by our other significant results.

Second, ARBs reported their feelings of tenure security and perceived effectiveness of the Barangay Council and Municipal Entities in protecting their property rights using a 5-point Likert scale. To test the robustness of the results on these outcomes we used the raw variables and two different binary indicators constructed from the Likert scale. For perceptions of tenure security, the first transformation, labeled as binary 1, combines the neutral category with answer options indicating better tenure security (Table 11), whereas the second, labeled as binary 2, places the neutral category with answer options indicating worse feelings of tenure security (Table 12).[55] For perceived effectiveness of local officials in enforcing property rights, the neutral category is combined with more effective answer options in binary 1 and with less effective answer options in binary 2. While the results for some outcomes were more robust to different transformations than others, there are no outcomes for which we see significant positive coefficients under one transformation and significant negative coefficients under another. This suggests an underlying consistency of what we are measuring.

Third, three individuals independently estimated the impact of the intervention on tenure security and perceived effectiveness of government entities in protecting property rights, including generation of outcomes and controls from raw datasets. All of them generated very similar point estimates and significance levels for all of the outcomes considered. The results of this replication exercise add confidence in our estimations and analyses.[56]

[55] For example, for the question “How certain are you that you can restrict access to your parcel?” answer options including “very certain,” “somewhat certain,” and “neither certain nor uncertain” are coded to 1 for binary 1 and only “very certain” and “somewhat certain” are coded to 1 for binary 2. For the question “How worried are you about losing ownership of your parcel?” the answer options “Very worried” and “somewhat worried” are coded as 1 for binary 1, whereas binary 2 also codes “neither worried nor not worried” as 1.

[56] We are in the process of identifying what are the causes of some minor divergences for some coefficients and significance levels and conducting replication on other outcome variables.

Finally, given that there is some evidence that could suggest differential attrition, the ITT and TOT impact estimations were repeated controlling for some of the baseline covariates that were statistically imbalanced. We did not control for all of them since the number of missing values would have decreased our analysis sample significantly. With such a small sample, it would be impossible to account if a difference between our main results and the ones that control for attrition-relevant characteristics is due to attrition bias or to the effect of a largely restricted sample.

7. Discussion

Our findings on tenure security, investment, and anxiety diverge from the positive impacts of individual property rights predicted by theory and empirical evidence from other contexts. Perhaps the most important reason why is because we estimate the impacts of an intermediate stage of the parcelization process, rather than the provision of individual titles. Our results do not provide any evidence supporting or refuting the potential benefits of parcelization or of individual property rights. At the time of our endline survey, only 4 percent of ARBs had received their formal individual titles, while 58 percent had completed the subdivision survey stage. The ARBs were still in the midst of a transition at the time of the endline survey, and any process of change can breed uncertainty and anxiety. The context of our intervention was also somewhat different from a classical conceptualization of land property rights: for instance, the farmers in our study already possessed land titles prior to the intervention (albeit titles with incomplete rights associated with them). At the time of the endline survey, there were still significant barriers to efficient land markets for ARBs, as they were unable to legally sell their land or use it as collateral without official title documents. However, there are several aspects related to the implementation of parcel subdivision that may explain the observed declines in several outcomes of interest, including tenure security, trust in local officials, agricultural investment, psychological welfare of ARBs, and women's decision-making power in households of male ARBs. Lack of information and involvement in the process, long delays in provision of individual titles, temporary relinquishment of title documents, and concerns related to amortization may have contributed to these shifts.

Although the program design includes several stages in which ARBs are expected to be involved in and informed about the parcelization process, descriptive evidence from the endline survey suggests that in practice ARBs often lacked critical information and involvement. Of the ARBs whose collective parcels were subdivided, only 54 percent reported that they were invited to a pulong-pulong,[57] while 49 percent reported actually attending. Although all ARBs on the collective CLOAs must consent to parcelization, in practice, there may be challenges with this consent process. Beyond limited participation in the pulong-pulong, during which consent is obtained, 21 percent of treated ARBs reported feeling pressured to have their land subdivided during the parcelization process although it is not clear whether this pressure came from other ARBs on the collective title, family members, or DAR officials. Moreover, 5 percent of ARBs whose collective titles were subdivided reported that not all members of the collective parcel consented to having their land subdivided. Finally, a large proportion of ARBs reported that they were unaware of where to seek more information about the subdivision process, with only 37 percent stating that they could easily obtain additional information if desired.

In addition to information and participation challenges, the long duration of the parcelization process could raise concerns among ARBs. After completion of subdivision surveys, survey

[57] The required assembly of all members of a collective parcel before the commencement of the subdivision.

results are then sent to the DENR for approval. Once approved, ARBs sign the Deed of Parcelization, and the individual titles are then sent to the Land Registration Authority for registration. The approval of survey results can take from weeks to several months, while the generation of title documents usually lasts from a minimum of 6 months to upwards of several years.[58] At the time of the endline survey, on average 20 months after subdivision surveys had been carried out, a third of ARBs reported that they expected to receive their title documents in less than a year, a third expected not to receive them for another year or more, and a third stated they did not know when they would receive them. Within the context of a general lack of information about the parcelization process, there may be a great deal of uncertainty among ARBs at this stage, who do not fully understand the reasons behind the delays.

Potentially adding to the uncertainty of tenure status, ARBs must surrender their original collective title documents following the subdivision survey, leaving them effectively without proof of ownership until they receive individual titles.[59] This is compounded by the long delays ARBs expect until their new titles are received or simply do not know the likely duration. Lack of information about the status of the new titles and the timeline of receiving them may raise concerns about tenure security, increase anxiety, and decrease life satisfaction. The temporary relinquishment of collective title documents is likely also related with the observed declines in the perceived effectiveness of local officials in enforcing ARB's property rights- either due to uncertainty or dissatisfaction with local government officials' handling of parcelization. ARBs may be concerned that without any title documents local officials may not be able to effectively help them in the case of a dispute. Alternatively, if ARBs feel there is a lack of transparency in this first stage of the parcelization process, they may lose trust in the local officials and perceive them as less effective. Treatment titles in our impact evaluation were considered priority for subdivision by local DAR offices, meaning that they were likely subdivided faster than other titles in their area, despite being subject to long administrative delays. The impacts on tenure security and trust in government may if anything be biased downward compared to non-treatment titles, for which the subdivision process often takes even longer.

In the midst of a great deal of uncertainty due to lack of information, long delays, and temporary relinquishment of titles, we see decreases in tenure security and trust in government institutions. This is likely associated with the negative impacts on some recent or planned agricultural investments, as farmers may not wish to make long-term investments in their parcels if they are uncertain about their possession of that parcel in the future. Consistent with uncertainty leading to declines in tenure security, ARBs within ARCs reported both higher levels of information about the parcelization process and little to no declines in tenure security and trust in government, compared to much stronger declines and lower levels of information for ARBs outside ARCs. The high density and pre-existing support services within ARCs may serve to improve information dissemination and clarify some aspects of the parcelization process, mitigating the impacts on tenure security seen elsewhere. ARBs within ARCs were also somewhat more likely to make long-term investments such as building sheds or irrigation, perhaps either due to the higher availability of information within ARCs or the provision of support services that can facilitate investment.

An additional source of stress or uncertainty for some ARBs may be the prospect of future amortization payments after subdivision. Municipal DAR employees are generally responsible for the encouragement and facilitation of monthly payments from ARBs, and they may emphasize

[58] Long implementation delays may be linked with political debate about the program.

[59] Some municipal officers may encourage ARBs to make a photocopy of their collective title, but this is not a policy guideline.

the importance of making these payments and the consequences of non-payment--up to and including repossession of the agricultural parcel--during the pulong-pulong sessions. Although most ARBs did not receive their amortization schedule which is distributed with the individual CLOA, they may adjust their behavior in anticipation of LBP enforcing these payments in the future. ARBs on compensable lands that will have to make amortization payments are less likely to perceive local officials as being able to help them enforce their land rights. These ARBs are also more likely to lease their parcels to others and less likely to till them themselves. Increased leasing may be due to the clarification of land rights, but it may also be an effort to lease their land to more productive farmers or to free up time to engage in more lucrative off-farm work in order to pay for amortization. We additionally find that the tenure security effects are attenuated among ARBs in ARCs, where the provision of support services may enable farmers to make their land more productive, thereby aiding in amortization payments.

Even where the pulong-pulong and subdivision survey process may have greater participation among ARBs and there is a greater availability of support services, the survey subdivision may contribute to declines in psychological well-being and in women's decision-making power. These effects are concentrated in ARCs, even while we see some increases in investment and little to no effect on tenure security or trust in institutions. These are areas with higher availability of support services and fewer barriers to information. If the prospect of future individual property rights is resulting in additional investments in and time spent on the farm, the extra work may be an additional source of stress and anxiety, even if tenure security is not reduced. Moreover, if the way that support services are delivered inadvertently reinforces gender norms, women may lose bargaining power over the land.

Although we see decreases in several outcomes of interest, we see increases in the likelihood of leasing or selling the land. In particular, ARBs tend to lease to family or other farmers in the community: 58 percent of those who leased or bought the parcel were family members, and 32 percent were other farmers in the community. 32 percent of these family members and neighbors were other ARBs. Changes in the way ARBs use the land may be indicative of increased clarity in their land rights, or it may be linked with specific aspects of program design. During the pulong-pulong and the subdivision survey, the exact boundaries of each ARB's plot within the collective landholding are determined and demarcated. This clarity about ownership may enable ARBs who are interested in leasing the land to do so more easily because they know what area they can lease out without causing disputes with other ARBs on the collective title. Two aspects of program design may also be linked with increased leasing of the land. First, ARBs are informed that they must be tilling the land in order to be eligible to receive the individual title. ARBs who are older, face other challenges to tilling the land themselves, or prefer to focus on other parcels or off-farm work may lease the land in order to ensure they meet the tilling requirement. Second, if lessees may be more productive due to differences in age, knowledge about farming, or access to inputs, ARBs may lease the land to ensure they have the funds needed to make amortization payments or support household income more generally. Indeed, impacts on leasing are stronger outside of ARCs, where ARBs have less access to support services such as credit and may rely more on the *prenda* system, or the temporary transfer of property for credit to finance household needs.

At first glance, the combination of an increase in leasing and a decrease in tenure security may seem counterintuitive;[60] however, there are a few reasons that these are not necessarily contradictory results. First, these impacts are measured simultaneously, so it is not possible to identify the trajectory of impacts after the subdivision survey. It is possible that immediately

[60] Holden and colleagues (2011) find that land certificates in Ethiopia increase the ability of female landowners to rent out their land without risking dispossession.

following the subdivision survey ARBs felt more secure in their property rights and as such felt comfortable leasing out the land. However, as time progressed and they had not yet received their titles, ARBs may have become more anxious and concerned about their proof of individual ownership. This may particularly be the case if they had leased their land and became concerned that without legal proof of ownership they may have difficulty regaining control of the land after the contract with the lessee expires. Alternatively, if concerns with tenure security are linked with worries of defaulting on amortization payments, ARBs may seek lessees with greater levels of productivity, perhaps due to age, experience, or access to inputs, and use the leasing income to repay the debt. There is less evidence for this alternative channel, however, as survey subdivision does not have a statistically significant impact on the perceived likelihood of government confiscation.

The differential results by the gender of the ARB are important and are likely in part driven by pre-intervention differences between male and female ARBs. Female ARBs in the control group have more plans to invest in their land than men, which may be linked with their lower levels of assets. Treated female ARBs, however, see reductions in their investment plans and instead are more likely to lease out their parcels. Given that they have higher education levels than male ARBs, fewer assets, and less farming experience, after subdivision they may take advantage of the additional clarity in property rights to lease out their parcels and concentrate further on non-farm livelihoods with the perception that their comparative advantage lies elsewhere. This may particularly be the case if they have higher credit constraints due to possessing fewer assets, which may impede their access to agricultural inputs.

That tenure security impacts differ for men and women suggests that their perceptions or experiences of threats to tenure security may be different as well. The mixed evidence on how tenure security was affected for females also speaks to the various dimensions encompassed by this concept and calls for different and nuanced policy responses. The demarcation of land that occurs during the subdivision survey may provide women with the information necessary to negotiate with their fellow ARBs, resulting in a decline in conflicts. However, female ARBs perceive a higher likelihood of confiscation of their parcels by neighbors, perhaps related to their decreased trust in public institutions after subdivision, as they now believe local government officials are less able to protect their property rights. Collective ownership may also be perceived differently by male and female ARBs; sharing a title with others may act to collectivize risk. Female ARBs may perceive higher vulnerability once they no longer have a collective title, even if their parcels were not managed collectively. Previous work suggests that being a landowner and having a name on title documents are important for women's authority over land, and the temporary lack of a paper title may make women feel more concerned about their ability to protect their land rights. In addition, the literature has also emphasized that women's trust in local governments' effectiveness to enforce property rights is key for them to fully realize the benefits of land ownership.

Unlike their counterparts who find themselves more likely to lease out their parcels, ARBs within ARCs see no change in leasing, and instead are more likely to make certain investments in their land. We suspect it is not a coincidence that these households are the same ones that see changes in their decision-making patterns. Previous work on ARBs and decision-making has found that agricultural knowledge and farm experience are important drivers of decision-making power, and the perception that men are more knowledgeable may be behind the declines in women's participation in agricultural decision-making. The same work also found that parcel ownership and being named on title documents were more important drivers of decision-making authority for women than for men. The parcelization process may serve to consolidate decision-making power in the hands of the ARB, particularly given that invitations to pulong-pulong

sessions are issued only in the name of the original ARB, and only one person generally attends these assemblies. Finally, the increased anxiety and decreased happiness from tenurial changes or other aspects of the subdivision process may also manifest themselves in a retrenchment of traditional gender roles. Qualitative work carried out with ARBs and their spouses revealed a strong norm in favor of collaborative decision-making, with the perception that only one spouse making decisions would result in higher stress within the household. Notably, our heterogeneity analysis suggests that the households that see decreases in women's agency and decision-making power are the same households that see decreases in subjective well-being. Although it is possible that spouses retain or gain agency in other areas (such as off-farm employment), we see no shifts in decision-making power over household finances.[61]

8. Specific findings for policy and practice

8.1 Implications for the DARPP in the Philippines

The current results of this impact evaluation point to several ways in which the process of parcelization could be improved in order to mitigate the strain that ARBs and their households can feel while in the midst of this process. The DAR is already taking several measures to improve the functioning of the process with technical and financial assistance from a World Bank supported project (Support to Parcelization of Lands for Individual Titling, SPLIT).[62]

Our findings for policy and practice include:

1) Improve participation and transparency in the process: There is a need to ensure that ARBs are more involved in and informed about the parcelization process. Although the design of DARPP calls for ARB involvement during both the pulong-pulong and survey subdivision stage, approximately half do not receive the invitation to participate in the pulong-pulong and approximately one quarter do not attend either of these processes. A more thorough process evaluation could identify the potential bottlenecks in inviting ARBs to participate and encouraging their participation, and the monitoring and evaluation system should closely track whether attempts to address these challenges lead to greater engagement of ARBs in the process moving forward. As mentioned previously, we find higher levels of information among ARBs within agrarian reform communities. The higher density of ARBs within ARCs may improve the dissemination of information, both through the greater ease of arranging pulong-pulongs and the higher likelihood of information-sharing and well-established agrarian reform networks. A study of the information networks within ARCs may aid in understanding how to better inform ARBs about future parcelization efforts. Moreover, distribution of clear, simple written information about the process with an indication of how to seek additional information could help ensure the information ARBs receive is harmonized and that ARBs know how to seek additional information. Given the relatively low level of education among ARBs, any written documents should rely heavily on the use of pictures and infographics to ease understanding. The Stakeholder Engagement Plan under the SPLIT project calls for a comprehensive communication campaign, which may help address informational issues, and the incorporation of additional recommendations from this research may inform the finalization and implementation of that plan.

[61] Tables available upon request.

[62] http://documents.worldbank.org/curated/en/830251583314607826/pdf/Project-Information-Document-Support-to-Parcelization-of-Lands-for-Individual-Titling-SPLIT-Project-P172399-P172399.pdf

In making this recommendation, it is worth noting that 64 percent of titles were excluded during the sampling stage because they had already begun the subdivision process, many of which had likely already conducted a pulong-pulong and/or subdivision survey. Thus, engaging with ARBs outside of these two main activities may be important in order to allay any concerns they have during the process, especially when experiencing lengthy delays in implementation.

2) Encourage participation of spouses: In addition to ensuring that ARB are more informed about and involved in the parcelization process, specific efforts should be made to encourage the participation of both spouses when the land is conjugal property.[63] Evidence from the baseline survey for this project showed that information plays an important role in the reasons why one household member has more influence on a decision. Moreover, the endline results show that wives of male ARB experience a decline in their decision-making authority over the parcel of interest after the subdivision survey. Currently, the invitation to attend the pulong-pulong is only addressed to the ARB and not to their spouse. Changing the invitation to explicitly invite and encourage the participation of both the ARB and their spouse could shift norms about who should be involved in decisions related to the parcel of interest and ensure that both the ARB and the spouse have equal information on the parcelization process. Equal information may facilitate more equal bargaining power on decisions related to parcelization. Moreover, the pulong-pulong could specifically address what conjugal property means—both spouses will appear on the title, have a legal claim to the land, and need to sign off on decisions to sell the land or use it as collateral. Considerations such as the time of day of the pulong-pulong and the need and availability of childcare should be explored to ensure that both spouses have an equal opportunity to participate in this critical step of the process. The Stakeholder Engagement Plan under the SPLIT project incorporates information related to gender and land rights, and additional adjustments of the plan may be made in light of additional recommendations coming from this research. This is important for both ARBs and spouses, as female ARBs report larger declines in trust in government than men after subdivision surveys, possibly due to their greater interaction with government officials.

Moreover, declines in the decision-making authority of the wives of male ARBs are strongest in ARC communities. Previous work (Malapit et al 2020) has found that access to extension services such as those included in ARCs is associated with women's disempowerment and more unequal decision-making within households. Policymakers should ensure that the design and delivery of support services used after survey subdivision are gender sensitive and that information about these services is available to both conjugal property owners.

3) Improve the speed of the program: While lack of information may have contributed to a rise in worries about tenure security, anxiety, and a shift in balance in decision-making authority, addressing the long delays between the initiation of the process and the receipt of the individual title and improving the transparency of the process may also mitigate these concerns. The planned digitization of the parcelization process under the SPLIT project is designed to both increase efficiency and transparency. The digital system will enable each individual CLOA to be tracked throughout the process and should accelerate certain steps of the process currently done on paper. In addition, the information system will provide data that can be used to identify bottlenecks in the process, so they can be addressed. Moreover, one source of delays in the project relates to the number of agencies that are involved in the parcelization process. A project Steering Committee and Inter-Agency Agreement will facilitate agreement on performance standards and enable identified bottlenecks to be addressed quickly.

[63] All land acquired during civil or common-law marriage is considered conjugal property and includes the names of both spouses on the title.

4) **Broaden the DAR's targets to include the distribution of individual CLOAs**: The DAR currently defines its accomplishments as collective titles which have been subdivided and have approved survey plans. However, this intermediate stage appears to have some negative impacts such as declines in tenure security that may be reversed once the individual title is received, although confirming this reversal requires more research. Regardless, including the distribution of individual CLOAs as an additional level of accomplishments could better align the DARPP's performance system with its intention to provide formalized property rights and complete the land distribution process. While doing so would come with the caveat that the DAR does not administer the title registration process, it could help shift attention to ensuring ARBs receive their individual titles on a timely basis. Doing so would require revising the current M&E system to include indicators for title registration and distribution and tracking progress as mentioned previously. The SPLIT project incorporates individual title distribution as a key M&E indicator.

5) Ensure spouses are aware of their rights under the Family Code of the Philippines: Finally, in addition to ensuring that information about parcelization and support services are provided in a gender-sensitive way, it is important to ensure that the titles are issued in the names of both spouses de facto. Administrative Order 7, Series 2011 states that land distributed under CARP is conjugal property for married ARB, which means that both spouses should have their names on the title. Nevertheless, only 6 percent of control group ARBs or their spouses state that the spouse's name is on the title. It is not clear whether the low number of individuals citing joint titling is due to differences between the de jure and de facto implementation, the age of the joint titles which may have been issued before the legal framework was adopted, or the perceptions of the respondents not reflecting the actual state of the title document. Regardless, because joint titling can affect intra-household bargaining and shift decision-making on the land in agrarian households (Doss et al 2014), continued work on this program should ensure that both names are included on the titles and that beneficiaries understand the meaning of conjugal property. This may be important in reversing trends observed after the subdivision survey, with wives of male ARB losing influence over decisions on the parcel of interest. Joint titling will be enforced under the SPLIT project. Following this policy strictly is in adherence with both the Family Code of the Philippines and the DAR Administrative Order referenced above.

6) Address potential sources of transitional tenure security and anxiety: While increased transparency and efficiency and shorter delays in the process may alleviate some concerns related to the temporary absence of title documentation during the processing of the individual title, directly providing temporary documentation of ownership in the interim may also help ease anxieties. A thorough process evaluation may help identify any additional measures that could further address this concern as well as any potential concerns related to amortization. The SPLIT project team is working with LBP to clarify issues related to amortization and prepare clear informational documents for ARBs and local officials.

7) Extend support services to ARBs outside ARCs: ARBs outside ARCs are more likely to lease out their awarded parcel and less likely to till them, which suggests a role for additional support services to ensure the CARP's goal of creating smallholder owner-operated farms. For example, ARBs that receive targeted credit programs may be less likely to rely on the *prenda* system, or the temporary transfer of property for credit, and continue farming their land. In addition to maintaining owner cultivation, additional support services such as agricultural extension and improved infrastructure can enable ARBs to invest more.

8.2 Implications for other countries

Beyond the implementation of the DAR Parcelization Program, our impact evaluation offers insights for similar programs related to land reform, tenure security and agricultural policy elsewhere. A key takeaway of our results is the importance of measuring the process of a program rather than simply the final outcome, particularly with interventions that take place over a lengthy time period. Understanding interim effects can point to potential program modifications that can mitigate implementation challenges. Shifts in land tenure of any kind can be anxiety-producing, an effect that is likely compounded in this case by the lengthy time period of the implementation process. Making processes more efficient may be an important way to mitigate the negative impacts on subjective well-being seen in our results.

Beyond program design, a key takeaway from our findings is the importance of monitoring program implementation as well. While the DARPP was designed to involve ARBs at multiple stages of the process, the self-reported involvement of our respondents suggests this was not always the case. This implementation gap, and the resulting lack of salient information provided to beneficiaries of the program, may be a key element in understanding the short-term effects seen here. Transparency, trust, and access to information are key to ensuring that tenurial shifts are managed with minimal disruptions to farmers' tenure security and trust in government institutions. This message is highlighted by our results suggesting that farmers with greater access to information and more participation in the subdivision process saw little to no decline in their subjective tenure security.

Accompanying the implementation of land reform programs with the provision of support services may ease challenges beneficiaries face during the transition in their property rights and/or enable them to more fully benefit from the program. We find potential positive impacts on investment only for ARBs who are members of ARCs, and thus are party to additional support services such as agricultural infrastructure, credit and capacitation programs. For those who are not members of ARCs, we find only negative impacts on investment, as well as declines in subjective tenure security.

The negative impacts on women's agricultural decision-making power for the wives of male ARBs highlight the importance of including both men and women in agriculture and land-titling processes. Issuing titles in the name of both ARBs and their spouses may serve to highlight women's joint ownership of land and increase their bargaining power within the household, while focusing entirely on male landowners may serve to reinforce their ownership of the parcel at the expense of their spouses. It is also important that information be presented to both spouses rather than only to the ARB, to ensure that both are aware of the ensuing tenurial changes. More research is needed to understand the mechanism behind these impacts and how to best mitigate them. However, previous work with ARBs in the Philippines suggests that parcel ownership is an important determinant of women's agricultural decision-making power, and thus interventions should be designed to reinforce these rights.

8.3 Suggestions for future research

Important questions emerged during this study that merit further evaluation:

1) **What is the impact of receiving the individual title for DARPP beneficiaries?** This study only looks at the impact of the DARPP's first stage involving the survey subdivision and demarcation of parcels. Understanding the impact of the registration and distribution of individual titles will provide insights on whether the declines in tenure security and

psychological wellbeing are simply transitional or a persistent impact of the program. Moreover, it will allow us to test more fully the theoretical mechanisms by which formalized property rights may increase agricultural investment, productivity, welfare, and intra-household decision-making. Doing so would allow us to determine the cost-effectiveness of the program.

2) **What role does amortization play with regard to tenure security and land transfers?** While delays in the DARPP's implementation may breed uncertainty and contribute to tenure insecurity, further investigation into the possible contributions of amortization merits attention. Qualitative interviews revealed ARBs often express their tenure security in terms of their ability to make amortization payments. Moreover, the results show that declines in perceptions of tenure security and increased anxiety are concentrated among ARBs with compensable land who will be required to begin making amortization payments after parcelization. They are also more likely to lease out their parcel. An evaluation of the DARPP's second stage can determine whether these trends continue with after the distribution of individual CLOAs. If they do, the availability of support services may enable ARBs to more effectively use their land and help alleviate their concerns about the ability to repay the amortization. However, more analysis is needed to understand if support services are sufficient to address this concern.

3) **Is the collection of amortization payments an economically and socially sound policy?** Collecting the amortization payments incurs monetary costs to implement, supervise, and enforce. Our study shows that in addition to the monetary costs associated with the collection of amortization payments, these payments are associated with some negative social impacts, such as increased anxiety among the ARBs. A cost-benefit analysis of the collection of amortization payments would be useful to ensure that the revenue recuperated through this collection outweighs the economic and social costs associated with the enforcement of this policy.

4) **Does the provision of support services through ARCs enable ARBs to maximize the benefits of formal property rights?** The provision of support services or linking ARBs to existing support services can mitigate some concerns during the parcelization process. ARBs in ARCs do not experience the same declines in perceptions of tenure security or effectiveness of local officials as ARBs who do not receive this same support and may be more willing to invest in their land. Moreover, ARBs in ARCs are less likely to lease their land, perhaps because they benefit from credit programs and rely less on the *prenda* system to finance household needs. A more thorough investigation of the exact support services that ARBs receive and how they are designed and targeted is needed. In particular, understanding how support service delivery can be more gender sensitive may help mitigate the declines we observed in women's decision-making authority in ARC, as well as the declines seen in other studies (Malapit et al 2020). Moreover, while ARBs in ARC do not face similar declines in tenure security, they do face increased anxiety and decreased life satisfaction in ways that ARBs outside of ARC do not. Perhaps the types of services they use or the conditions of these services generate additional stress.

5) **Can the provision of information on conjugal property rights lead to more egalitarian intra-household decision-making on the land?** The wives of male ARBs appear to lose influence over decisions on the awarded parcel after the subdivision survey, and very few wives recognize their name is on the title. If there is a low level of understanding of the spouse's rights under this property regime, addressing this knowledge gap may lead to more egalitarian decision-making on the land. However,

further research is needed to confirm whether the provision of information is sufficient, or whether additional interventions are needed. Additional research may also examine the possibilities of spillovers into other areas of decision-making. For instance, women may become less involved in farming the DAR-awarded parcels but instead redirect their time toward other productive livelihoods.

6) **How does context affect the impacts of a participatory land demarcation process?** A comparison between this study and the land demarcation study in Goldstein et al. (2018) highlights the importance of context in evaluating the impact of the formalization of land rights. Although the first stage of both programs resembled each other, the impacts on tenure security, investment, and gender did not. This divergence points not only to implementation but also underlines that impacts are dependent on the initial land rights conditions. Further research on participatory land demarcation processes in other contexts can provide further insights into what conditions may be necessary for these programs to be successful. In addition, further research on different modes of implementation to ensure transparency and participation can help inform program design. Lastly, this study was one of the first to look at the impacts of land formalization on intra-household decision-making, and further research is needed to understand how changes in land tenure may affect intra-household decision making in other contexts. Further data gathering, both qualitative and quantitative, can shed light on which elements of the subdivision process are particularly helpful or challenging for ARBs and their household members, as well as the DAR staff implementing the process.

References

Ali, D, Collin, M, Deininger, K, Dercon, S, Sandefeur, J, & Zeitlin, A, 2014. “The price of empowerment: experimental evidence on land titling in Tanzania.” Policy Research Working Paper Series 6908, The World Bank.

APPC [Asia-Pacific Policy Center], 2007, “CARP Impact Assessment: Study on the Impact of CARP on Poverty Reduction and Prospects for Long-Term Growth,” monograph, September 12, 2007

Ayalew, D, Deininger, K, & Goldstein, M. 2011. Environmental and Gender Impacts of Land Tenure Regularization in Africa: Pilot Evidence from Rwanda. United Nations University World Institute for Development Economics Research (UNU-WIDER) Working Paper No. 2011/74.

Balisacan, A, 2007. “Agrarian Reform and Poverty Reduction in the Philippines.” Policy Dialogue on Agrarian Reform Issues and Rural Development and Poverty Alleviation.

Besley, T, 1995. “Property Rights and Investment Incentives: Theory and Evidence.” *Journal of Political Economy*, 103(5), pp. 903-937.

Besley, T, and Ghatak, M, 2010. Property Rights and Economic Development. Volume 5 of *Handbook of Development Economics*, Chapter 0, pp. 4525 – 4595. Elsevier.

Bestman, C. 1990. Land Tenure in the Middle Jubba: Customary Tenure and the Effect of Land Registration. Land Tenure Center, University of Wisconsin-Madison. LTC Research Paper 104.

Briones, R.M. 2018. “The Wage Gap between Male and Female Agricultural Workers: Analysis and Implications for Gender and Development Policy.” Working Paper, IDEAS Working Paper Series from RePEc

de Janvry, A, Emerick, K, Gonzalez-Navarro, M, Sadoulet, E. 2015. “Delinking Land Rights from Land Use: Certification and Migration in Mexico.” *American Economic Review*, 105(10), pp. 3125-3149. Available at: doi: https://doi.org/10.1257/aer.20130853

de Janvry, A & Sadoulet, E, 2002. “Land Reforms in Latin America: Ten Lessons towards a Contemporary Agenda,” paper prepared for the World Bank’s Latin America Workshop, Pachuca, Mexico. Available at: doi: https://are.berkeley.edu/~esadoulet/papers/Land_Reform_in_LA_10_lesson.pdf.

De Soto, H, 2000. The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else. New York, NY: Basic Books.

Deininger, K, Ayalew, A, & Alemu, T, 2011. "Impacts of Land Certification on Tenure Security, Investment, and Land Market Participation: Evidence from Ethiopia." *Land Economics*, 87(2), pp. 312-334. Available at: doi: https://doi.org/10.3368/le.87.2.312.

Deininger, K & Jin, S. 2009. “Land Rental Markets in the Process of Rural Structural Transformation: Productivity and Equity Impacts from China.” *Journal of Comparative Economics*, 37(4): pp. 629-646.

Deiniger, K & Jin, S. 2006. “Tenure security and land-related investment: Evidence from Ethiopia.” *European Economic Review* 50(5): 1245-1277

Deininger, K, Jin, S, Xia, F. 2019. “Property Rights Reform to support China’s rural-urban integration: household-level evidence from the Chengdu experiment.” *The Australian Journal of Agriculture and Resource Economics*, 64(1), pp. 30-54. Available at: doi: https://doi.org/10.1111/1467-8489.12328.

Demsetz, H. 1967. “Toward a Theory of Property Rights.” *American Economic Review*, 57(2), pp. 347 – 359.

Do, Q, & Iyer, L. 2008. “Land Titling and Rural Transition in Vietnam.” *Economic Development and Cultural Change*. 56(3), pp. 531-579. Available at: doi: https://doi.org/10.1086/533549.

Doss, C., Meinzen-Dick, R., & Bomuhangi, A. 2013. “Who Owns the Land? Perspectives from Rural Ugandans and Implications for Large-Scale Land Acquisitions.” *Feminist Economics* 20(1), pp. 76-100

Estudillo, J.P., Quisumbing, A., & Otsuka, K. 2001. “Gender differences in land inheritance, schooling and lifetime income: Evidence from the rural Philippines.” The Journal of Development Studies 37(4), pp. 23-48

Goldstein, M, Houngbedji, K, Kondylis, F, O'Sullivan, M, & Selod, H, 2018. "Formalization without certification? Experimental evidence on property rights and investment." *Journal of Development Economics*, vol. 132(C), pp. 57-74. Available at: doi: https://doi.org/10.1016/j.jdeveco.2017.12.008.

Goldstein, M & Udry, C. 2008. “The Profits of Power: Land Rights and Agricultural Investment in Ghana.” *Journal of Political Economy*, 116(6), pp. 981 - 1022. Available at: doi: https://doi.org/10.1086/595561.

Holden, S, Deininger, K, Ghebru, H. 2011. “Tenure Insecurity, Gender, Low-Cost Land Certification and Land Rental Market Participation in Ethiopia.” *Journal of Development Studies,* 47(1), pp. 31 - 47. Available at: doi: https://doi.org/10.1080/00220381003706460.

Lawry, S, Samii, C, Hall, R, Leopold, A, Hornby, D, & Mtero, F, 2014. “The impact of land property rights interventions on investment and agricultural productivity in developing countries: a systematic review.” *Campbell Systematic Reviews*. Available at: doi: https://doi.org/10.4073/csr.2014.1

Malapit, H., Ragasa, C., Martinez, E.M., Rubin, D., Seymour, G., & Quisumbing, A. 2020. “Empowerment in agricultural value chains: Mixed methods evidence from the Philippines.” Economics of Education Review 76: 240-253

North, D, & Thomas, R. 1973. The Rise of the Western World: A New Economic History. Cambridge, UK: Cambridge University Press.

World Bank, 2009,.Land reform, rural development, and poverty in the Philippines : revisiting the agenda - technical working paper (English). Washington, DC: World Bank. Available at: doi: http://documents.worldbank.org/curated/en/418671468143994746/Land-reform-rural-development-and-poverty-in-the-Philippines-revisiting-the-agenda-technical-working-paper.

Yazd, S D, Wheeler, S A, and Zuo, A. 2019. “Key Risk Factors Affecting Farmers’ Mental Health: A Systematic Review.” *International Journal of Environmental Research and Public Health* 16(23)

Annex 1: Results

A.1: Average Results

Table 9: LATE Impact on Gains from Trade

	Plot Leased Out	Plot Sold	ARB Tiller
Impact(Unadj. N1)	0.104	0.024	-0.111
	(0.052)**	(0.012)*	(0.041)***
Impact (Unadj. N2)	0.130	0.025	-0.119
	(0.056)**	(0.013)*	(0.044)***
Impact (Adj. N2)	0.143	0.021	-0.124
	(0.058)**	(0.012)*	(0.046)***
Control Endline Mean	0.09	0.01	0.96
N1	468	490	458
N2	450	471	441
R^2	0.362	0.377	0.381

IV models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
N1 corresponds to the total number of observations for which the outcome is not missing.
N2 corresponds to the total number of observations for which the outcome and the controls are not missing.
R2 of the adjusted models is reported. Controls include plot-level baseline indicator of irrigation, slope, drainage, and risk index.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N2): 0.021 , 0.031, 0.021.

Table 10: LATE Impact on Tenure Security (Likert Scale)

	Ability to Restrict Access to Parcel	Secure from Eviction	Worried about Losing Ownership	Likelihood: Transferring to Children	Likelihood: Neighbor Confiscation	Likelihood: Govt. Confiscation	Likelihood: Confiscation by Other	T.Security PCA Index	T. Security Raw Sum Score
Impact(Unadj. N1)	-0.270	-0.346	0.194	-0.102	0.054	0.043	0.184	-0.406	-4.087
	(0.145)*	(0.178)*	(0.333)	(0.119)	(0.252)	(0.252)	(0.225)	(0.279)	(1.878)**
Impact (Unadj. N2)	-0.263	-0.408	0.264	-0.144	0.052	0.144	0.234	-0.483	-3.958
	(0.151)*	(0.181)**	(0.355)	(0.125)	(0.266)	(0.262)	(0.239)	(0.294)	(1.960)**
Impact (Adj. N2)	-0.311	-0.420	0.269	-0.127	0.093	0.143	0.299	-0.556	-3.574
	(0.152)**	(0.183)**	(0.353)	(0.126)	(0.258)	(0.261)	(0.224)	(0.292)*	(1.980)*
Control Endline Mean	4.78	4.70	3.00	4.71	1.74	1.96	1.59	0.13	27.56
N1	444	444	443	392	396	391	396	438	490
N2	426	426	425	374	378	373	378	420	471
R^2	0.319	0.285	0.349	0.412	0.350	0.385	0.337	0.362	0.266

Ancova and IV models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

N2 corresponds to the total number of observations for which the outcome and the controls are not missing.

R2 of the adjusted models is reported. Controls include plot-level baseline indicator of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N2): 0.191 , 0.191, 0.468, 0.355, 0.491, 0.491, 0.224, 0.191, 0.191.

Table 11: LATE Impact on Tenure Security (Binary Scale 1)

	Ability to Restrict Access to Parcel	Secure from Eviction	Worried about Losing Ownership	Likelihood: Transferring to Children	Likelihood: Neighbor Confiscation	Likelihood: Govt. Confiscation	Likelihood: Confiscation by Other	Raw Sum Score
Impact(Unadj. N1)	-0.071	-0.096	0.031	-0.005	-0.018	-0.026	0.078	-0.239
	(0.038)*	(0.049)*	(0.089)	(0.026)	(0.068)	(0.073)	(0.059)	(0.245)
Impact (Unadj. N2)	-0.066	-0.116	0.053	-0.009	-0.033	0.005	0.084	-0.283
	(0.040)*	(0.049)**	(0.095)	(0.029)	(0.072)	(0.076)	(0.064)	(0.261)
Impact (Adj. N2)	-0.080	-0.113	0.064	0.000	-0.024	0.006	0.103	-0.349
	(0.040)**	(0.050)**	(0.093)	(0.030)	(0.070)	(0.078)	(0.061)*	(0.257)
Control Endline Mean	0.97	0.94	0.50	0.95	0.18	0.20	0.11	5.87
N1	444	444	443	392	396	391	396	438
N2	426	426	425	374	378	373	378	420
R^2	0.319	0.275	0.352	0.403	0.351	0.359	0.319	0.348

Ancova and IV models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

N2 corresponds to the total number of observations for which the outcome and the controls are not missing.

R2 of the adjusted models is reported. Controls include plot-level baseline indicator of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N2): : 0.235 , 0.235, 0.638, 0.988, 0.946, 0.988, 0.235, 0.321.

Table 12: LATE Impact on Tenure Security (Binary Scale 2)

	Ability to Restrict Access to Parcel	Secure from Eviction	Worried about Losing Ownership	Likelihood: Transferring to Children	Likelihood: Neighbor Confiscation	Likelihood: Govt. Confiscation	Likelihood: Confiscation by Other	Raw Sum Score
Impact(Unadj. N1)	-0.064	-0.066	0.063	-0.040	0.036	0.092	0.113	-0.457
	(0.043)	(0.054)	(0.089)	(0.037)	(0.072)	(0.078)	(0.074)	(0.269)*
Impact (Unadj. N2)	-0.048	-0.084	0.090	-0.065	0.021	0.106	0.100	-0.488
	(0.043)	(0.055)	(0.095)	(0.037)*	(0.077)	(0.081)	(0.078)	(0.282)*
Impact (Adj. N2)	-0.059	-0.082	0.103	-0.059	0.030	0.102	0.109	-0.521
	(0.043)	(0.056)	(0.096)	(0.037)	(0.076)	(0.080)	(0.072)	(0.275)*
Control Endline Mean	0.95	0.91	0.54	0.93	0.19	0.27	0.15	5.64
N1	444	444	443	392	396	391	396	438
N2	426	426	425	374	378	373	378	420
R^2	0.328	0.279	0.365	0.394	0.334	0.360	0.314	0.356

Ancova and IV models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

N2 corresponds to the total number of observations for which the outcome and the controls are not missing.

R2 of the adjusted models is reported. Controls include plot-level baseline indicator of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N2): : 0.372 , 0.372, 0.372, 0.372, 0.372, 0.372, 0.372, 0.372.

Table 13: LATE Impact on Perceived Effectiveness of Barangay Council & Municipal entity Effectiveness in Protecting Land Rights under Hypothetical Conflicts (Likert Scale)

	Barangay: Dispute with Neighbor	Barangay: Dispute with Govt	Barangay: Dispute with Private Company	Municipal: Dispute with Neighbor	Municipal: Dispute with Govt	Municipal: Dispute with Private Company	Barangay: Raw Sum	Municipal: Raw Sum	Barangay Index PCA	Municipal Index PCA
Impact(Unadj. N1)	-0.697	-0.521	-0.496	-0.353	-0.214	-0.362	-1.724	-0.919	-1.085	-0.628
	(0.176)***	(0.199)***	(0.153)***	(0.169)**	(0.208)	(0.168)**	(0.483)***	(0.509)*	(0.301)***	(0.340)*
Impact (Unadj. N2)	-0.668	-0.574	-0.501	-0.466	-0.385	-0.460	-1.768	-1.319	-1.111	-0.892
	(0.183)***	(0.204)***	(0.162)***	(0.179)***	(0.212)*	(0.178)***	(0.509)***	(0.532)**	(0.318)***	(0.356)**
Impact (Adj. N2)	-0.729	-0.582	-0.537	-0.519	-0.445	-0.510	-1.876	-1.471	-1.183	-0.994
	(0.180)***	(0.198)***	(0.158)***	(0.181)***	(0.206)**	(0.182)***	(0.490)***	(0.528)***	(0.306)***	(0.354)***
Control Endline Mean	4.67	4.53	4.70	4.67	4.57	4.69	13.92	13.95	0.18	0.13
N1	442	437	442	442	436	441	434	433	434	433
N2	424	419	424	424	418	423	416	415	416	415
R^2	0.381	0.468	0.359	0.356	0.379	0.321	0.426	0.371	0.420	0.369

IV models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

N2 corresponds to the total number of observations for which the outcome and the controls are not missing.

R2 of the adjusted models is reported. Controls include plot-level baseline indicator of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N2): : 0.001 , 0.004, 0.002, 0.004, 0.006, 0.004, 0.001, 0.004, 0.001, 0.004.

Table 14: LATE Impacts on ARB Anxiety

	Average Anxiety Score	Anxiety Index: 1st Component PCA
Impact(Unadj. N1)	0.320	0.540
	(0.137)**	(0.221)**
Impact (Unadj. N2)	0.271	0.474
	(0.134)**	(0.216)**
Impact (Adj. N2)	0.251	0.436
	(0.139)*	(0.223)*
Control Endline Mean	2.58	-0.04
N1	423	423
N2	405	405
R^2	0.291	0.293

IV models with marginal effects. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
Cronbach's alpha: 0.47. Controls include Gender, Age, HH size, Education, and Years as Primary Tiller.
N1 corresponds to the total number of observations for which the outcome is not missing.
N2 corresponds to the total number of observations for which the outcome and the controls are not missing.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N2): 0.076 , 0.076.

Table 15: LATE Impact on ARB Happiness

	Present step	1yr step	10yrs step
Impact(Unadj. N1)	-0.825	-0.806	-0.206
	(0.385)**	(0.375)**	(0.395)
Impact (Unadj. N2)	-1.128	-0.950	-0.476
	(0.395)***	(0.380)**	(0.402)
Impact (Adj. N2)	-1.102	-0.815	-0.382
	(0.402)***	(0.394)**	(0.412)
Control Endline Mean	4.29	5.36	7.04
N1	439	439	439
N2	410	410	410
R^2	0.309	0.312	0.278

IV models with marginal effects. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
Controls include Gender, Age, HH size, Education, and Years as Primary Tiller.
N1 corresponds to the total number of observations for which the outcome is not missing.
N2 corresponds to the total number of observations for which the outcome and the controls are not missing.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N2): 0.019 , 0.041, 0.134.

Table 16: LATE Impacts on Investments

	Irrigation & Shed Index - 1st PCA	Irrigation & # of Shed Index - 1st PCA	Attempt to build Irrigation or Shed	Left to Fallow for Productivity Reasons	# of Trees Planted	# of Trees Planted per Ha	Prop. of Parcel with Ground Crops	Total number of Ha Cultivated	All Land is Planted or Left to Fallow for Productivity
Impact(Unadj. N1)	0.005	-0.296	0.027	-0.066	-12.898	20.834	-0.001	-0.113	0.008
	(0.169)	(0.000)	(0.068)	(0.030)**	(110.897)	(58.481)	(0.045)	(0.096)	(0.083)
Impact (Unadj. N2)	0.003	-0.296	0.069	-0.069	60.501	26.734	-0.004	-0.092	-0.024
	(0.170)	(0.000)	(0.069)	(0.032)**	(104.471)	(57.197)	(0.047)	(0.101)	(0.086)
Impact (Adj. N2)	-0.014	0.146	0.071	-0.070	74.801	32.027	0.026	-0.038	-0.065
	(0.176)	(0.340)	(0.071)	(0.035)**	(103.478)	(57.357)	(0.049)	(0.110)	(0.091)
Control Endline Mean	0.06	0.07	0.22	0.05	340.59	178.70	0.20	0.38	0.58
N1	449	201	451	490	503	481	475	503	455
N2	432	201	433	471	483	462	456	483	437
R^2	0.463	0.712	0.394	0.305	0.511	0.464	0.520	0.529	0.362

Ancova and IV models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

N2 corresponds to the total number of observations for which the outcome and the controls are not missing.

R2 of the adjusted models is reported. Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N2): 1.000 , 1.000, 1.000, 0.608, 1.000, 1.000, 1.000, 1.000, 1.000.

Table 17: LATE Impact on Investment Plans

	Plan to Invest (5yrs): Irrigation	Plan to Invest (5yrs): Barn, Granary	Plan to Invest (5yrs): New Crops	Plan to Invest (5yrs): new trees	Plan to increase tilled area of parcel
Impact(Unadj. N1)	0.085	-0.126	0.006	0.059	-0.062
	(0.082)	(0.082)	(0.087)	(0.082)	(0.104)
Impact (Unadj. N2)	0.130	-0.139	-0.007	0.068	-0.095
	(0.084)	(0.085)	(0.089)	(0.086)	(0.108)
Impact (Adj. N2)	0.117	-0.193	-0.033	0.054	-0.097
	(0.087)	(0.089)**	(0.090)	(0.089)	(0.106)
Control Endline Mean	0.24	0.55	0.57	0.45	0.50
N1	423	421	421	424	421
N2	408	406	406	409	406
R^2	0.373	0.442	0.401	0.340	0.391

IV models with marginal effects. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
N1 corresponds to the total number of observations for which the outcome is not missing.
N2 corresponds to the total number of observations for which the outcome and the controls are not missing.
R2 of the adjusted models is reported. Controls include plot-level baseline indicator of irrigation, slope, drainage, and risk index.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N2): 0.569 , 0.180, 0.829, 0.829, 0.829.

Table 18: ITT Impact on Agricultural Output Value

	Probability of Producing Agricultural Output	Number of crops	Output value	Output value per Ha	Log Output value	Log Output value per Ha
Impact(Unadj. N1)	0.039	0.167	15,193.767	12,771.929	-0.013	0.116
	(0.032)	(0.174)	(12,488.268)	(7,402.612)	(0.172)	(1.082)
Impact (Unadj. N2)	0.043	0.167	6,001.172	4,295.747	-0.050	-0.084
	(0.033)	(0.180)	(10,273.302)	(4,041.287)	(0.177)	(1.130)
Impact (Adj. N2)	0.048	0.199	-3,228.050	-813.873	-0.084	-0.001
	(0.033)	(0.187)	(10,014.108)	(5,843.625)	(0.185)	(1.049)
Control Endline Mean	0.77	1.42	39954.78	22055.29	9.74	8.58
N1	503	490	503	475	384	369
N2	483	471	483	456	373	358
R^2	0.361	0.292	0.543	0.515	0.498	0.530

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
N1 corresponds to the total number of observations for which the outcome is not missing.
N2 corresponds to the total number of observations for which the outcome and the controls are not missing.
R2 of the adjusted models is reported. Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.
Randomization strata is included in all specifications.

Table 19: LATE Impact on HH Food Expenditures

	Per capita Food Exp.	Log Per Capita Food Exp.
Impact(Unadj. N1)	-28.372	-0.015
	(48.412)	(0.094)
Impact (Unadj. N2)	-21.031	0.021
	(48.512)	(0.093)
Impact (Adj. N2)	11.522	0.056
	(50.084)	(0.090)
Control Endline Mean	488.61	5.96
N1	399	398
N2	386	386
R^2	0.496	0.598

IV models with marginal effects. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
Controls include Gender, Age, HH size, Education, and Years as Primary Tiller.
N1 corresponds to the total number of observations for which the outcome is not missing.
N2 corresponds to the total number of observations for which the outcome and the controls are not missing.
Randomization strata is included in all specifications
BKY (2006) Sharpened Q-Values of Impact (Adj. N2): 1.000 , 1.000.

Table 20: LATE Impact on Land Conflicts

	Community Land Conflicts	Parcel Conflicts
Impact(Unadj. N1)	-0.097	-0.041
	(0.064)	(0.051)
Impact (Unadj. N2)	-0.091	-0.071
	(0.067)	(0.053)
Impact (Adj. N2)	-0.071	-0.083
	(0.063)	(0.055)
Control Endline Mean	0.16	0.08
N1	421	397
N2	402	379
R^2	0.354	0.351

IV models with marginal effects. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
N1 corresponds to the total number of observations for which the outcome is not missing.
N2 corresponds to the total number of observations for which the outcome and the controls are not missing.
R2 of the adjusted models is reported. Controls include plot-level baseline indicator of irrigation, slope, drainage, and risk index.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N2): 0.346 , 0.346.

Table 21: LATE Impact on Output/Ha Aspirations of Main Crop

	log aspired output (kgs) per Ha	Aspired output/max community	log aspired output/max community
Impact(Unadj. N1)	-0.670	576.492	0.416
	(0.000)	(0.000)	(0.000)
Impact (Unadj. N2)	-0.718	630.197	0.428
	(0.000)	(0.000)	(0.000)
Impact (Adj. N2)	-0.637	750.173	0.407
	(0.435)	(578.917)	(0.412)
Control Endline Mean	10.27	5.31	-0.32
N1	388	383	383
N2	376	371	371
R^2	0.717	0.235	0.515

IV models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
N1 corresponds to the total number of observations for which the outcome is not missing.
N2 corresponds to the total number of observations for which the outcome and the controls are not missing.
R2 of the adjusted models is reported. Controls include plot-level baseline indicator of irrigation, slope, drainage, and risk index.
Randomization strata and crop dummies are included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N2): 0.414 , 0.414, 0.414.

Table 22: LATE Impact on ARB & HH Migration

	ARB Migrated	ARB wished to migrate	Number of HH members who migrated
Impact(Unadj. N1)	0.006	0.028	0.121
	(0.014)	(0.033)	(0.123)
Impact (Unadj. N2)	0.006	0.015	0.122
	(0.015)	(0.033)	(0.126)
Impact (Adj. N2)	-0.003	0.020	-0.001
	(0.014)	(0.035)	(0.126)
Control Endline Mean	0.01	0.02	0.39
N1	439	433	439
N2	410	405	410
R^2	0.329	0.296	0.373

IV models with marginal effects. CLOA-clustered standard errors parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
Controls include Gender, Age, HH size, Education, and Years as Primary Tiller.
Randomization strata is included in all specifications.
N1 corresponds to the total number of observations for which the outcome is not missing.
N2 corresponds to the total number of observations for which the outcome and the controls are not missing.
BKY (2006) Sharpened Q-Values of Impact (Adj. N2): 1.000 , 1.000, 1.000.

Table 23: LATE Impact on ARB's Decision-making (gender interactions)

	Decision participation index	Makes decisions on parcel	Decision-making authority level	Opinion can prevail after disagreement	Opinion always prevails after disagreement	High level of input on parcel decisions
Treated (POST Unadj. N1)	0.035	-0.037	-0.093	0.074	-0.003	0.086
	(0.107)	(0.087)	(0.319)	(0.092)	(0.118)	(0.088)
Female ARB x Treated	-0.045	0.058	0.743	-0.143	-0.061	-0.201
	(0.265)	(0.197)	(0.759)	(0.206)	(0.192)	(0.219)
Treated (POST Adj. N1)	-0.020	-0.069	0.095	-0.022	-0.025	0.052
	(0.103)	(0.086)	(0.331)	(0.062)	(0.120)	(0.093)
Female ARB x Treated	0.083	0.132	0.410	0.039	0.002	-0.122
	(0.274)	(0.194)	(0.812)	(0.159)	(0.219)	(0.234)
Treated (POST Unadj. N2)	0.017	-0.100	0.100	0.040	-0.049	0.138
	(0.118)	(0.097)	(0.329)	(0.074)	(0.136)	(0.093)
Female ARB x Treated	-0.047	0.088	0.117	-0.010	0.007	-0.252
	(0.365)	(0.276)	(0.936)	(0.221)	(0.255)	(0.296)
Treated (POST Adj. N2)	-0.014	-0.142	0.250	-0.011	-0.045	0.112
	(0.121)	(0.098)	(0.371)	(0.072)	(0.145)	(0.099)
Female ARB x Treated	0.017	0.215	-0.113	0.027	-0.034	-0.171
	(0.372)	(0.272)	(1.048)	(0.218)	(0.300)	(0.297)
F-test B1 + B2 = 0 (N1)	0.785	0.683	0.442	0.899	0.896	0.729
F-test B1 + B2 = 0 (N2)	0.995	0.746	0.869	0.929	0.761	0.824
Control Endline Mean (N1)	0.14	0.88	5.71	0.76	0.39	0.70
Control Endline Mean (N2)	0.22	0.89	5.60	0.88	0.46	0.71
N1	481	481	481	481	481	481
N2	403	403	403	403	403	403
R2 (N1)	0.498	0.415	0.414	0.717	0.484	0.462
R2 (N2)	0.504	0.446	0.440	0.551	0.491	0.525

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total observations for which the outcome is not missing.

N2 corresponds to the total number of respondents who are not single or widowed.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

BKY (2006) Sharpened Q-Values of F-test treated + ARB female*treatment = 0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

Table 24: LATE Impact on Spouse's Decision-making (gender interactions)

	Decision participation index	Makes decisions on parcel	Decision-making authority level	Opinion can prevail after disagreement	Opinion always prevails after disagreement	High level of input on parcel decisions
Treated (POST Unadj. N1)	-0.156	-0.101	0.425	-0.402	-0.038	0.028
	(0.151)	(0.156)	(0.434)	(0.170)**	(0.076)	(0.131)
Female ARB x Treated	0.093	-0.013	-0.627	0.287	-0.115	0.300
	(0.404)	(0.347)	(1.006)	(0.345)	(0.291)	(0.428)
Treated (POST Adj. N1)	-0.267	-0.194	0.520	-0.514	-0.059	-0.033
	(0.164)	(0.164)	(0.430)	(0.173)***	(0.085)	(0.136)
Female ARB x Treated	0.160	0.029	-0.964	0.431	-0.071	0.325
	(0.510)	(0.393)	(1.261)	(0.427)	(0.351)	(0.486)
F-test B1 + B2 = 0	0.814	0.618	0.696	0.829	0.686	0.517
Control Endline Mean	0.12	0.48	5.16	0.66	0.15	0.32
N1	379	379	379	379	379	379
R^2	0.658	0.559	0.493	0.438	0.571	0.495

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 0.359 , 0.422, 0.422, 0.021, 0.553, 0.553

BKY (2006) Sharpened Q-Values of F-test treated + ARB female*treatment = 0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

Table 25: LATE Impact on Decision-making Equality (gender interactions)

	Decision equality index	Husband says both make decisions	Wife says both make decisions	Husband's decision equality score	Wife's decision equality score	Couple's minimum decision equality score	Husband says both make the final decision	Wife says both make the final decision
Treated (POST Unadj. N1)	-0.063	-0.240	-0.013	0.229	0.042	0.305	0.088	-0.346
	(0.189)	(0.172)	(0.192)	(0.275)	(0.270)	(0.365)	(0.192)	(0.217)
Female ARB x Treated	0.322	-0.142	0.281	-0.553	0.363	-0.141	0.296	0.877
	(0.463)	(0.495)	(0.511)	(0.726)	(0.770)	(1.009)	(0.525)	(0.609)
Treated (POST Adj. N1)	-0.183	-0.327	-0.115	0.108	0.008	0.144	-0.036	-0.279
	(0.185)	(0.167)*	(0.182)	(0.302)	(0.230)	(0.330)	(0.196)	(0.199)
Female ARB x Treated	0.615	0.390	0.508	0.187	0.091	0.349	0.198	0.694
	(0.257)**	(0.262)	(0.298)*	(0.330)	(0.387)	(0.437)	(0.330)	(0.312)**
F-test B1 + B2 = 0	0.113	0.826	0.200	0.451	0.804	0.298	0.626	0.189
Control Endline Mean	0.00	0.36	0.36	4.70	4.59	4.34	0.40	0.51
N1	313	313	313	313	313	313	313	313
R^2	0.564	0.485	0.554	0.475	0.582	0.556	0.480	0.496

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

TOT estimates use the subdivision status of the title as instrument

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 0.703, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000

BKY (2006) Sharpened Q-Values of F-test treated + ARB female*treatment = 0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000

Table 26: LATE Impact on Spouse's Agency (gender interactions)

	Agency index	Relative Autonomy Index	Self-efficacy Scale	High autonomy over agricultural decisions
Treated (POST Unadj. N1)	0.083	-0.051	0.235	-0.005
	(0.211)	(0.478)	(0.311)	(0.145)
Female ARB x Treated	-0.128	-1.466	0.162	0.166
	(0.501)	(1.486)	(0.620)	(0.387)
Treated (POST Adj. N1)	-0.216	-0.355	-0.024	-0.182
	(0.211)	(0.400)	(0.287)	(0.147)
Female ARB x Treated	0.718	-0.230	0.664	0.688
	(0.380)*	(1.093)	(0.406)	(0.311)**
F-test B1 + B2 = 0	0.237	0.598	0.165	0.104
Control Endline Mean	0.09	0.75	4.30	0.39
N1	378	378	378	378
R^2	0.408	0.384	0.412	0.450

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
N1 corresponds to the total number of observations for which the outcome is not missing.
R2 and F-test of the adjusted models are reported.
Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000
BKY (2006) Sharpened Q-Values of F-test treated + ARB female*treatment = 0: 0.464 , 0.464, 0.464, 0.464

Table 27: LATE Impact on ARB's Agency (gender interactions)

	Agency index	Relative Autonomy Index	Self-efficacy Scale	High autonomy over agricultural decisions
Treated (POST Unadj. N1)	0.151	0.404	-0.069	0.132
	(0.152)	(0.398)	(0.173)	(0.092)
Female ARB x Treated	-0.222	-0.820	0.144	-0.148
	(0.290)	(0.726)	(0.360)	(0.192)
Treated (POST Adj. N1)	0.127	0.498	-0.145	0.115
	(0.164)	(0.413)	(0.185)	(0.096)
Female ARB x Treated	-0.113	-0.833	0.296	-0.086
	(0.316)	(0.796)	(0.402)	(0.209)
Treated (POST Unadj. N2)	0.212	0.446	0.084	0.105
	(0.162)	(0.443)	(0.179)	(0.098)
Female ARB x Treated	-0.338	-1.051	-0.069	-0.101
	(0.340)	(0.781)	(0.418)	(0.247)
Treated (POST Adj. N2)	0.190	0.600	-0.009	0.085
	(0.176)	(0.456)	(0.191)	(0.105)
Female ARB x Treated	-0.238	-1.156	0.089	-0.027
	(0.390)	(0.866)	(0.493)	(0.268)
F-test B1 + B2 = 0 (N1)	0.956	0.581	0.640	0.872
F-test B1 + B2 = 0 (N2)	0.886	0.454	0.843	0.804
Control Endline Mean (N1)	0.07	0.71	4.84	0.72
Control Endline Mean (N2)	0.07	0.75	4.83	0.72
N1	489	489	489	489
N2	405	405	405	405
R2 (N1)	0.412	0.360	0.428	0.441
R2 (N2)	0.489	0.435	0.526	0.487

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total observations for which the outcome is not missing.

N2 corresponds to the total number of respondents who are not single or widowed.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

TOT estimates use the subdivision status of the title as instrument

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000

BKY (2006) Sharpened Q-Values of F-test treated + ARB female*treatment = 0: 1.000 , 1.000, 1.000, 1.000

Table 28: LATE Impact on Spousal Ownership (gender interactions)

	Spouse reports name is on title	ARB reports spouse's name is on title	Spouse makes decisions because they are a title owner	ARB reports spouse makes decisions because they are a title owner
Treated (POST Unadj. N1)	-0.105	-0.039	0.027	-0.020
	(0.065)	(0.061)	(0.032)	(0.024)
Female ARB x Treated	0.173	0.030	-0.065	-0.017
	(0.122)	(0.202)	(0.097)	(0.076)
Treated (POST Adj. N1)	-0.135	-0.071	0.021	-0.023
	(0.066)**	(0.060)	(0.039)	(0.026)
Female ARB x Treated	0.162	0.100	-0.078	-0.024
	(0.151)	(0.214)	(0.123)	(0.085)
F-test B1 + B2 = 0	0.843	0.873	0.676	0.515
Control Endline Mean (N1)	0.06	0.06	0.02	0.02
N1	384	384	384	384
R^2	0.502	0.529	0.507	0.570

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
N1 corresponds to the total number of observations for which the outcome is not missing.
R2 and F-test of the adjusted models are reported.
Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 0.199 , 0.565, 0.783, 0.641
BKY (2006) Sharpened Q-Values of F-test treated + ARB female*treatment = 0: 1.000 , 1.000, 1.000, 1.000

Table 29: LATE Impact on ARB's Gender Views (gender interactions)

	Men should be the final decision-makers on parcels they own	Women should be the final decision-makers on parcels they own	Women should make decisions about their own income	Men should make decisions about their own income	It is okay if a woman does not work outside the household	It is okay if a man does not work outside the household
Treated (POST Unadj. N1)	-0.107	-0.210	-0.071	-0.039	0.015	-0.169
	(0.110)	(0.126)*	(0.124)	(0.126)	(0.101)	(0.091)*
Female ARB x Treated	-0.005	0.627	0.181	0.053	-0.170	-0.031
	(0.211)	(0.262)**	(0.241)	(0.212)	(0.216)	(0.161)
Treated (POST Adj. N1)	-0.143	-0.284	-0.114	-0.118	0.007	-0.158
	(0.117)	(0.136)**	(0.133)	(0.134)	(0.110)	(0.099)
Female ARB x Treated	0.050	0.770	0.311	0.194	-0.130	-0.066
	(0.233)	(0.287)***	(0.258)	(0.241)	(0.239)	(0.184)
Treated (POST Unadj. N2)	-0.018	-0.257	-0.013	0.057	0.004	-0.149
	(0.127)	(0.144)*	(0.142)	(0.136)	(0.112)	(0.106)
Female ARB x Treated	0.026	0.540	0.041	-0.107	-0.094	-0.294
	(0.284)	(0.338)	(0.296)	(0.280)	(0.297)	(0.212)
Treated (POST Adj. N2)	-0.050	-0.343	-0.043	0.005	-0.006	-0.152
	(0.136)	(0.160)**	(0.156)	(0.150)	(0.127)	(0.120)
Female ARB x Treated	0.089	0.724	0.169	-0.001	-0.071	-0.332
	(0.313)	(0.384)*	(0.323)	(0.320)	(0.328)	(0.253)
F-test B1 + B2 = 0 (N1)	0.608	0.028	0.309	0.681	0.523	0.104
F-test B1 + B2 = 0 (N2)	0.881	0.222	0.624	0.986	0.780	0.018
Control Endline Mean (N1)	0.80	0.62	0.62	0.60	0.72	0.18
Control Endline Mean (N2)	0.78	0.64	0.63	0.61	0.75	0.18
N1	493	493	493	493	493	493
N2	407	407	407	407	407	407
R2 (N1)	0.386	0.337	0.420	0.418	0.364	0.339
R2 (N2)	0.430	0.401	0.439	0.454	0.397	0.380

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total observations for which the outcome is not missing.

N2 corresponds to the total number of respondents who are not single or widowed.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

TOT estimates use the subdivision status of the title as instrument

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 0.574, 1.000, 1.000, 1.000, 1.000

BKY (2006) Sharpened Q-Values of F-test treated + ARB female*treatment = 0: 1.000 , 1.000, 1.000, 1.000, 1.000, 0.252

A.2: Heterogeneous Impacts by Gender of ARB

Table 30: LATE Program Impacts on Gains from Trade by ARB Gender

	Plot Leased Out	Plot Sold	ARB Tiller
Treat	0.079	0.003	-0.054
	(0.064)	(0.019)	(0.050)
Female	0.016	-0.008	0.022
	(0.046)	(0.011)	(0.028)
Female X Treat	0.165	0.060	-0.167
	(0.149)	(0.045)	(0.105)
Control Endline Mean	0.09	0.01	0.96
N	438	459	430
R2	0.384	0.378	0.382
Treat + Female X Treat=0	0.047	0.059	0.013

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Treat=0: 0.758 , 0.758, 0.132.
BKY (2006) Sharpened Q-Values of Treat + Female X Treat=0: 0.042 , 0.042, 0.023.

Table 31: LATE Program Impacts on Tenure Security (Likert Scale) by ARB Gender

	Ability to Restrict Access to Parcel	Secure from Eviction	Worried about Losing Ownership	Likelihood: Transferring to Children	Likelihood: Neighbor Confiscation	Likelihood: Govt. Confiscation	Likelihood: Confiscation by Other	T.Security PCA Index	T. Security Raw Sum Score
Treat	-0.412	-0.609	0.417	-0.141	-0.252	-0.124	0.313	-0.526	-1.301
	(0.204)**	(0.241)**	(0.466)	(0.175)	(0.314)	(0.364)	(0.262)	(0.327)	(2.220)
Female	-0.018	-0.002	0.308	-0.025	-0.656	-0.354	-0.223	0.289	0.561
	(0.147)	(0.171)	(0.317)	(0.132)	(0.280)**	(0.283)	(0.274)	(0.253)	(1.518)
Female X Treat	0.355	0.584	-0.044	-0.129	1.317	0.885	0.091	-0.290	-5.676
	(0.362)	(0.447)	(0.917)	(0.408)	(0.640)**	(0.768)	(0.581)	(0.748)	(4.435)
Control Endline Mean	4.78	4.70	3.00	4.71	1.74	1.96	1.59	0.13	27.56
N	416	416	415	364	368	363	368	410	459
R2	0.317	0.276	0.356	0.422	0.357	0.394	0.348	0.372	0.281
Treat + Female X Treat=0	0.830	0.942	0.610	0.391	0.049	0.200	0.409	0.213	0.066

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.207 , 0.116, 0.571, 0.571, 0.571, 0.958, 0.535, 0.333, 0.720.

BKY (2006) Sharpened Q-Values of Treat + Female X Treat=0: 1.000 , 1.000, 0.922, 0.915, 0.423, 0.595, 0.915, 0.595, 0.423.

Table 32: LATE Program Impacts on Tenure Security (Binary Scale 1) by ARB Gender

	Ability to Restrict Access to Parcel	Secure from Eviction	Worried about Losing Ownership	Likelihood: Transferring to Children	Likelihood: Neighbor Confiscation	Likelihood: Govt. Confiscation	Likelihood: Confiscation by Other	Raw Sum Score
Treat	-0.119	-0.188	0.073	-0.015	-0.090	-0.040	0.081	-0.349
	(0.054)**	(0.067)***	(0.126)	(0.044)	(0.080)	(0.106)	(0.072)	(0.305)
Female	-0.027	-0.030	0.066	-0.032	-0.107	-0.072	-0.061	0.079
	(0.039)	(0.046)	(0.085)	(0.024)	(0.079)	(0.085)	(0.075)	(0.219)
Female X Treat	0.128	0.247	0.033	0.029	0.286	0.157	0.088	-0.159
	(0.099)	(0.123)**	(0.255)	(0.094)	(0.175)	(0.217)	(0.161)	(0.679)
Control Endline Mean	0.97	0.94	0.50	0.95	0.18	0.20	0.11	5.87
N	416	416	415	364	368	363	368	410
R2	0.311	0.263	0.358	0.403	0.362	0.362	0.326	0.353
Treat + Female X Treat=0	0.909	0.549	0.595	0.840	0.198	0.495	0.215	0.379

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.104 , 0.039, 0.730, 0.730, 0.463, 0.730, 0.463, 0.463.

BKY (2006) Sharpened Q-Values of Treat + Female X Treat=0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000.

Table 33: LATE Program Impacts on Tenure Security (Binary Scale 2) by ARB Gender

	Ability to Restrict Access to Parcel	Secure from Eviction	Worried about Losing Ownership	Likelihood: Transferring to Children	Likelihood: Neighbor Confiscation	Likelihood: Govt. Confiscation	Likelihood: Confiscation by Other	Raw Sum Score
Treat	-0.095	-0.170	0.180	-0.085	-0.076	0.012	0.127	-0.589
	(0.061)	(0.077)**	(0.122)	(0.051)*	(0.091)	(0.115)	(0.082)	(0.326)*
Female	0.001	-0.027	0.102	0.018	-0.176	-0.100	-0.042	0.154
	(0.046)	(0.059)	(0.085)	(0.046)	(0.087)**	(0.094)	(0.077)	(0.251)
Female X Treat	0.125	0.242	-0.116	0.016	0.391	0.271	-0.024	-0.035
	(0.114)	(0.161)	(0.240)	(0.122)	(0.199)**	(0.253)	(0.165)	(0.738)
Control Endline Mean	0.95	0.91	0.54	0.93	0.19	0.27	0.15	5.64
N	416	416	415	364	368	363	368	410
R2	0.324	0.254	0.366	0.410	0.343	0.373	0.330	0.362
Treat + Female X Treat=0	0.713	0.564	0.743	0.456	0.062	0.141	0.472	0.319

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.232 , 0.232, 0.232, 0.232, 0.232, 0.299, 0.232, 0.232.

BKY (2006) Sharpened Q-Values of Treat + Female X Treat=0: 1.000 , 1.000, 1.000, 1.000, 0.998, 0.998, 1.000, 1.000.

Table 34: LATE Program Impacts on Perceived Effectiveness of Barangay Council & Municipal Entity Effectiveness in Protecting Land Rights under Hypothetical Conflicts (Likert Scale) by ARB Gender

	Barangay: Dispute with Neighbor	Barangay: Dispute with Govt	Barangay: Dispute with Private Company	Municipal: Dispute with Neighbor	Municipal: Dispute with Govt	Municipal: Dispute with Private Company	Barangay: Raw Sum	Municipal: Raw Sum	Barangay Index PCA	Municipal Index PCA
Treat	-0.467	-0.333	-0.234	-0.262	-0.145	-0.236	-0.965	-0.470	-0.608	-0.330
	(0.191)**	(0.231)	(0.171)	(0.200)	(0.262)	(0.200)	(0.494)*	(0.572)	(0.308)**	(0.382)
Female	0.247	0.425	0.293	0.318	0.344	0.203	1.060	1.021	0.648	0.669
	(0.129)*	(0.193)**	(0.109)***	(0.132)**	(0.171)**	(0.105)*	(0.328)***	(0.360)***	(0.203)***	(0.239)***
Female X Treat	-0.453	-0.507	-0.665	-0.461	-0.821	-0.574	-1.915	-2.254	-1.215	-1.483
	(0.366)	(0.516)	(0.368)*	(0.370)	(0.526)	(0.394)	(1.091)*	(1.166)*	(0.680)*	(0.777)*
Control Endline Mean	4.67	4.53	4.70	4.67	4.57	4.69	13.92	13.95	0.18	0.13
N	414	409	414	414	408	413	406	405	406	405
R2	0.391	0.442	0.370	0.362	0.357	0.321	0.422	0.358	0.417	0.357
Treat + Female X Treat=0	0.006	0.054	0.005	0.028	0.024	0.020	0.004	0.010	0.003	0.010

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.168 , 0.283, 0.283, 0.283, 0.460, 0.314, 0.181, 0.460, 0.181, 0.460.

BKY (2006) Sharpened Q-Values of Treat + Female X Treat=0: 0.016 , 0.023, 0.016, 0.017, 0.017, 0.017, 0.016, 0.016, 0.016, 0.016.

Table 35: LATE Program Impacts on Perceived Effectiveness of Barangay Council & Municipal Entity Effectiveness in Protecting Land Rights under Hypothetical Conflicts (Binary 1) by ARB Gender

	Barangay: Dispute with Neighbor	Barangay: Dispute with Govt	Barangay: Dispute with Private Company	Municipal: Dispute with Neighbor	Municipal: Dispute with Govt	Municipal: Dispute with Private Company	Barangay: Raw Sum	Municipal: Raw Sum
Treat	-0.081	-0.123	-0.022	-0.033	-0.029	-0.007	-0.235	-0.037
	(0.050)	(0.062)**	(0.040)	(0.047)	(0.074)	(0.043)	(0.125)*	(0.140)
Female	0.041	0.063	0.052	0.044	0.070	0.044	0.181	0.192
	(0.026)	(0.048)	(0.021)**	(0.037)	(0.036)*	(0.018)**	(0.065)***	(0.066)***
Female X Treat	-0.091	-0.043	-0.150	-0.112	-0.174	-0.190	-0.338	-0.556
	(0.102)	(0.141)	(0.098)	(0.104)	(0.138)	(0.107)*	(0.310)	(0.315)*
Control Endline Mean	0.97	0.94	0.98	0.96	0.96	0.98	2.90	2.90
N	414	409	414	414	408	413	406	405
R2	0.343	0.432	0.346	0.316	0.364	0.309	0.392	0.332
Treat + Female X Treat=0	0.073	0.148	0.039	0.121	0.065	0.041	0.039	0.041

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.311 , 0.311, 1.000, 1.000, 1.000, 1.000, 0.311, 1.000.

BKY (2006) Sharpened Q-Values of Treat + Female X Treat=0: 0.091 , 0.091, 0.091, 0.091, 0.091, 0.091, 0.091, 0.091.

Table 36: LATE Program Impacts on ARB Anxiety by ARB Gender

	Average Anxiety Score	Anxiety Index: 1st Component PCA
Treat	0.079	0.201
	(0.180)	(0.289)
Female	-0.048	-0.035
	(0.142)	(0.229)
Female X Treat	0.542	0.748
	(0.340)	(0.547)
Control Endline Mean	2.58	-0.04
N	402	402
R2	0.305	0.309
Treat + Female X Treat=0	0.017	0.023

Ancova OLS models. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
Cronbach's alpha: 0.47. Controls include Gender, Age, HH size, Education, and Years as Primary Tiller.
Randomization strata is included in all specifications. Treat + Female X Treat=0 reports p-value of corresponding F-test
BKY (2006) Sharpened Q-Values of Treat=0: 1.000 , 1.000
BKY (2006) Sharpened Q-Values of Treat + Female X Treat=0: 0.025 , 0.025

Table 37: LATE Program Impacts on ARB's Spouse Anxiety by ARB Gender

	Spouse's Average Anxiety Score	Spouse's Anxiety Index: 1st Component PCA
Treat	-0.190	-0.331
	(0.237)	(0.380)
Female	-0.287	-0.523
	(0.265)	(0.429)
Female X Treat	1.163	2.118
	(0.846)	(1.376)
Control Endline Mean	2.58	-0.04
N	268	268
R2	0.440	0.439
Treat + Female X Treat=0	0.176	0.128

OLS models. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
Cronbach's alpha: 0.47. Controls include Gender, Age, HH size, Education, and Years as Primary Tiller.
Randomization strata is included in all specifications. Treat + Female X Treat=0 reports p-value of corresponding F-test
BKY (2006) Sharpened Q-Values of Treat=0: 0.728 , 0.728
BKY (2006) Sharpened Q-Values of Treat + Female X Treat=0: 0.214 , 0.214

Table 38: LATE Program Impacts on Plot Investments by ARB Gender

	Irrigation & Shed Index - 1st PCA	Irrigation & # of Shed Index - 1st PCA	Attempt to build Irrigation or Shed	Left to Fallow for Productivity Reasons	# of Trees Planted	# of Trees Planted per Ha	Prop. of Parcel with Ground Crops	Total number of Ha Cultivated	All Land is Planted or Left to Fallow for Productivity
Treat	-0.117	-0.178	0.100	-0.082	52.397	29.504	0.035	-0.086	-0.153
	(0.199)	(0.390)	(0.088)	(0.044)*	(128.946)	(63.978)	(0.066)	(0.133)	(0.124)
Female	-0.209	-0.674	0.004	-0.029	-17.536	-17.648	-0.056	-0.095	-0.044
	(0.165)	(0.347)*	(0.084)	(0.015)*	(80.022)	(39.907)	(0.045)	(0.077)	(0.087)
Female X Treat	0.323	1.424	-0.011	0.013	168.616	23.344	0.001	0.185	0.206
	(0.381)	(0.733)*	(0.184)	(0.052)	(300.590)	(142.736)	(0.117)	(0.209)	(0.220)
Control Endline Mean	0.06	0.07	0.22	0.05	340.59	178.70	0.20	0.38	0.58
N	422	192	423	459	470	450	445	470	427
R2	0.471	0.708	0.402	0.309	0.520	0.465	0.523	0.526	0.359
Treat + Female X Treat=0	0.539	0.051	0.546	0.085	0.369	0.673	0.685	0.580	0.745

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000.

BKY (2006) Sharpened Q-Values of Treat + Female X Treat=0: 1.000 , 0.616, 1.000, 0.616, 1.000, 1.000, 1.000, 1.000, 1.000.

Table 39: LATE Program Impacts on Plot Investments Plans by ARB Gender

	Plan to Invest (5yrs): Irrigation	Plan to Invest (5yrs): Barn, Granary	Plan to Invest (5yrs): New Crops	Plan to Invest (5yrs): new trees	Plan to increase tilled area of parcel
Treat	0.160	-0.024	0.248	0.088	0.179
	(0.116)	(0.116)	(0.109)**	(0.113)	(0.122)
Female	0.053	0.232	0.421	-0.018	0.348
	(0.091)	(0.098)**	(0.105)***	(0.092)	(0.101)***
Female X Treat	-0.139	-0.555	-0.753	-0.021	-0.694
	(0.211)	(0.265)**	(0.244)***	(0.253)	(0.243)***
Control Endline Mean	0.24	0.55	0.57	0.45	0.50
N	399	397	397	400	397
R2	0.384	0.446	0.425	0.346	0.399
Treat + Female X Treat=0	0.896	0.006	0.013	0.744	0.013

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Treat=0: 0.288 , 0.501, 0.132, 0.388, 0.288.
BKY (2006) Sharpened Q-Values of Treat + Female X Treat=0: 0.559 , 0.023, 0.023, 0.559, 0.023.

Table 40: LATE Program Impacts on ARB Food Expenditures by ARB Gender

	Per capita Food Exp.	Log Per Capita Food Exp.
Treat	-63.130	0.021
	(75.687)	(0.119)
Female	52.365	0.152
	(60.791)	(0.104)
Female X Treat	68.770	-0.038
	(122.630)	(0.257)
Control Endline Mean	488.61	5.96
N	383	383
R2	0.418	0.597
Treat + Female X Treat=0	0.951	0.932

Ancova models. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
Controls include Gender, Age, HH size, Education, and Years as Primary Tiller.
Randomization strata is included in all specifications. Treat + Female X Treat=0 reports p-value of corresponding F-test
BKY (2006) Sharpened Q-Values of Treat=0: 1.000 , 1.000
BKY (2006) Sharpened Q-Values of Treat + Female X Treat=0: 1.000 , 1.000

Table 41: LATE Program Impacts on Plot Conflicts by ARB Gender

	Community Land Conflicts	Parcel Conflicts
Treat	-0.041	-0.083
	(0.072)	(0.066)
Female	0.050	0.020
	(0.065)	(0.042)
Female X Treat	-0.219	-0.096
	(0.147)	(0.103)
Control Endline Mean	0.16	0.08
N	399	417
R2	0.363	0.353
Treat + Female X Treat=0	0.030	0.039

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Treat=0: 0.737 , 0.737.
BKY (2006) Sharpened Q-Values of Treat + Female X Treat=0: 0.041 , 0.041.

Table 42: LATE Program Impacts on Plot Output/Ha Aspirations by ARB Gender

	log aspired output (kgs) per Ha	Aspired output/max community	log aspired output/max community
Treat	0.310	142.343	-0.063
	(0.693)	(180.489)	(0.372)
Female	0.214	-310.502	-0.192
	(0.651)	(248.538)	(0.251)
Female X Treat	-2.513	1,946.507	1.518
	(1.615)	(1,522.897)	(0.982)
Control Endline Mean	10.27	5.31	-0.32
N	368	363	363
R2	0.420	0.176	0.499
Treat + Female X Treat=0	0.133	0.192	0.129

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.
Randomization strata and crop dummies are included in all specifications.
BKY (2006) Sharpened Q-Values of Treat=0: 1.000 , 1.000, 0.132.
BKY (2006) Sharpened Q-Values of Treat + Female X Treat=0: 0.237 , 0.237, 0.023.

Table 43: LATE Program Impacts ARB & HH Migration by ARB Gender

	ARB Migrated	ARB wished to migrate	Number of HH members who migrated
Treat	-0.019	-0.028	-0.121
	(0.016)	(0.038)	(0.172)
Female	0.021	-0.012	-0.067
	(0.021)	(0.033)	(0.122)
Female X Treat	0.047	0.149	0.351
	(0.045)	(0.093)	(0.335)
Control Endline Mean	0.01	0.02	0.39
N	407	402	407
R2	0.332	0.276	0.372
Treat + Female X Treat=0	0.461	0.138	0.355

OLS models. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
Controls include Gender, Age, HH size, Education, and Years as Primary Tiller.
Randomization strata is included in all specifications. Treat + Female X Treat=0 reports p-value of corresponding F-test
BKY (2006) Sharpened Q-Values of Treat=0: 0.932 , 0.932, 0.932
BKY (2006) Sharpened Q-Values of Treat + Female X Treat=0: 0.707 , 0.707, 0.707

A.3: Heterogenous Impacts by ARC Membership

Table 44: LATE Program Impacts on Gains from Trade by Agrarian Reform Community

	Plot Leased Out	Plot Sold	ARB Tiller
Treat	0.160	-0.005	-0.149
	(0.074)**	(0.004)	(0.062)**
ARC	-0.029	-0.022	-0.007
	(0.135)	(0.017)	(0.094)
ARC X Treat	-0.046	0.062	0.059
	(0.114)	(0.031)**	(0.090)
Control Endline Mean	0.09	0.01	0.96
N	450	471	441
R2	0.363	0.360	0.381
Treat + ARC X Treat=0	0.195	0.064	0.162

CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Treat=0: 0.051 , 0.051, 0.593.
BKY (2006) Sharpened Q-Values of Treat + ARC X Treat=0: 0.238 , 0.238, 1.000.

Table 45: LATE Program Impacts on Tenure Security (Likert Scale) by Agrarian Reform Community

	Ability to Restrict Access to Parcel	Secure from Eviction	Worried about Losing Ownership	Likelihood: Transferring to Children	Likelihood: Neighbor Confiscation	Likelihood: Govt. Confiscation	Likelihood: Confiscation by Other	T.Security PCA Index	T. Security Raw Sum Score
Treat	-0.522	-0.732	1.061	-0.204	-0.207	0.419	0.355	-1.001	-3.121
	(0.218)**	(0.231)***	(0.480)**	(0.198)	(0.289)	(0.274)	(0.278)	(0.349)***	(2.337)
ARC	-0.393	-0.718	2.232	-0.559	0.137	0.081	0.310	-1.337	-4.108
	(0.221)*	(0.264)***	(0.549)***	(0.326)*	(0.529)	(0.639)	(0.718)	(0.739)*	(4.961)
ARC X Treat	0.392	0.543	-1.259	0.060	0.799	-0.690	-0.067	0.706	-2.174
	(0.328)	(0.388)	(0.730)*	(0.274)	(0.572)	(0.542)	(0.449)	(0.549)	(3.708)
Control Endline Mean	4.78	4.70	3.00	4.71	1.74	1.96	1.59	0.13	27.56
N	426	426	425	374	378	373	378	420	471
R2	0.318	0.283	0.352	0.417	0.359	0.389	0.337	0.366	0.261
Treat + ARC X Treat=0	0.577	0.535	0.707	0.375	0.199	0.560	0.411	0.497	0.086

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.040 , 0.014, 0.050, 0.233, 0.294, 0.145, 0.168, 0.017, 0.168.

BKY (2006) Sharpened Q-Values of Treat + ARC X Treat=0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000.

Table 46: LATE Program Impacts on Tenure Security (Binary Scale 1) by Agrarian Reform Community

	Ability to Restrict Access to Parcel	Secure from Eviction	Worried about Losing Ownership	Likelihood: Transferring to Children	Likelihood: Neighbor Confiscation	Likelihood: Govt. Confiscation	Likelihood: Confiscation by Other	Raw Sum Score
Treat	-0.142	-0.204	0.313	-0.031	-0.067	0.037	0.101	-0.865
	(0.058)**	(0.073)***	(0.122)**	(0.048)	(0.078)	(0.087)	(0.066)	(0.337)**
ARC	-0.184	-0.276	0.630	-0.129	0.157	-0.090	0.061	-1.673
	(0.054)***	(0.077)***	(0.154)***	(0.062)**	(0.168)	(0.204)	(0.211)	(0.611)***
ARC X Treat	0.096	0.138	-0.414	0.048	0.145	-0.099	0.019	0.790
	(0.088)	(0.104)	(0.195)**	(0.062)	(0.154)	(0.151)	(0.113)	(0.476)*
Control Endline Mean	0.97	0.94	0.50	0.95	0.18	0.20	0.11	5.87
N	426	426	425	374	378	373	378	420
R2	0.322	0.278	0.352	0.410	0.361	0.361	0.319	0.358
Treat + ARC X Treat=0	0.461	0.379	0.483	0.622	0.533	0.629	0.194	0.829

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.030 , 0.030, 0.030, 0.285, 0.253, 0.336, 0.113, 0.030.

BKY (2006) Sharpened Q-Values of Treat + ARC X Treat=0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000.

Table 47: LATE Program Impacts on Tenure Security (Binary Scale 2) by Agrarian Reform Community

	Ability to Restrict Access to Parcel	Secure from Eviction	Worried about Losing Ownership	Likelihood: Transferring to Children	Likelihood: Neighbor Confiscation	Likelihood: Govt. Confiscation	Likelihood: Confiscation by Other	Raw Sum Score
Treat	-0.104	-0.214	0.350	-0.079	-0.056	0.215	0.145	-1.144
	(0.059)*	(0.067)***	(0.131)***	(0.061)	(0.079)	(0.082)***	(0.094)	(0.324)***
ARC	-0.162	-0.314	0.579	-0.102	0.002	-0.095	0.121	-1.530
	(0.059)***	(0.077)***	(0.143)***	(0.081)	(0.167)	(0.154)	(0.240)	(0.635)**
ARC X Treat	0.062	0.226	-0.427	0.024	0.217	-0.311	-0.062	1.075
	(0.090)	(0.114)**	(0.191)**	(0.083)	(0.162)	(0.167)*	(0.146)	(0.525)**
Control Endline Mean	0.95	0.91	0.54	0.93	0.19	0.27	0.15	5.64
N	426	426	425	374	378	373	378	420
R2	0.331	0.282	0.371	0.395	0.340	0.373	0.314	0.364
Treat + ARC X Treat=0	0.521	0.894	0.571	0.247	0.233	0.496	0.444	0.868

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.066 , 0.006, 0.013, 0.127, 0.200, 0.013, 0.091, 0.004.

BKY (2006) Sharpened Q-Values of Treat + ARC X Treat=0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000.

Table 48: LATE Program Impacts on Perceived Effectiveness of Barangay Council & Municipal Entity Effectiveness in Protecting Land Rights under Hypothetical Conflicts (Likert Scale) by Agrarian Reform Community

	Barangay: Dispute with Neighbor	Barangay: Dispute with Govt	Barangay: Dispute with Private Company	Municipal: Dispute with Neighbor	Municipal: Dispute with Govt	Municipal: Dispute with Private Company	Barangay: Raw Sum	Municipal: Raw Sum	Barangay Index PCA	Municipal Index PCA
Treat	-0.821	-0.381	-0.574	-0.301	-0.491	-0.500	-1.719	-1.302	-1.097	-0.862
	(0.219)***	(0.230)*	(0.206)***	(0.204)	(0.252)*	(0.257)*	(0.603)***	(0.647)**	(0.379)***	(0.436)**
ARC	0.932	1.094	0.658	1.025	0.682	0.870	3.057	2.818	1.914	1.930
	(0.493)*	(0.352)***	(0.316)**	(0.474)**	(0.598)	(0.439)**	(1.150)***	(1.535)*	(0.724)***	(1.019)*
ARC X Treat	0.484	-0.193	0.272	-0.228	0.289	0.224	0.416	0.337	0.288	0.193
	(0.327)	(0.391)	(0.315)	(0.320)	(0.374)	(0.327)	(0.932)	(0.931)	(0.581)	(0.624)
Control Endline Mean	4.67	4.53	4.70	4.67	4.57	4.69	13.92	13.95	0.18	0.13
N	424	419	424	424	418	423	416	415	416	415
R2	0.408	0.484	0.371	0.382	0.390	0.347	0.453	0.399	0.448	0.397
Treat + ARC X Treat=0	0.145	0.061	0.194	0.027	0.448	0.170	0.053	0.132	0.053	0.118

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.002 , 0.070, 0.013, 0.070, 0.041, 0.041, 0.013, 0.041, 0.013, 0.041.

BKY (2006) Sharpened Q-Values of Treat + ARC X Treat=0: 0.182 , 0.182, 0.182, 0.182, 0.262, 0.182, 0.182, 0.182, 0.182, 0.182.

Table 49: LATE Program Impacts on Perceived Effectiveness of Barangay Council & Municipal Entity Effectiveness in Protecting Land Rights under Hypothetical Conflicts (Binary 1) by Agrarian Reform Community

	Barangay: Dispute with Neighbor	Barangay: Dispute with Govt	Barangay: Dispute with Private Company	Municipal: Dispute with Neighbor	Municipal: Dispute with Govt	Municipal: Dispute with Private Company	Barangay: Raw Sum	Municipal: Raw Sum
Treat	-0.219	-0.147	-0.146	-0.093	-0.142	-0.132	-0.538	-0.398
	(0.054)***	(0.058)**	(0.047)***	(0.045)**	(0.066)**	(0.053)**	(0.142)***	(0.147)***
ARC	0.111	0.185	0.087	0.207	0.121	0.167	0.434	0.516
	(0.182)	(0.127)	(0.127)	(0.162)	(0.206)	(0.164)	(0.459)	(0.561)
ARC X Treat	0.245	0.047	0.177	0.081	0.157	0.168	0.468	0.470
	(0.081)***	(0.091)	(0.066)***	(0.072)	(0.092)*	(0.069)**	(0.201)**	(0.209)**
Control Endline Mean	0.97	0.94	0.98	0.96	0.96	0.98	2.90	2.90
N	424	419	424	424	418	423	416	415
R2	0.362	0.478	0.340	0.328	0.379	0.329	0.429	0.356
Treat + ARC X Treat=0	0.670	0.154	0.524	0.836	0.820	0.420	0.617	0.626

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.001 , 0.011, 0.004, 0.017, 0.017, 0.011, 0.001, 0.009.

BKY (2006) Sharpened Q-Values of Treat + ARC X Treat=0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000.

Table 50: LATE Program Impacts on Perceived Effectiveness of Barangay Council & Municipal Entity Effectiveness in Protecting Land Rights under Hypothetical Conflicts (Binary 2) by Agrarian Reform Community

	Barangay: Dispute with Neighbor	Barangay: Dispute with Govt	Barangay: Dispute with Private Company	Municipal: Dispute with Neighbor	Municipal: Dispute with Govt	Municipal: Dispute with Private Company	Barangay: Raw Sum	Municipal: Raw Sum
Treat	-0.186	-0.070	-0.225	-0.043	-0.137	-0.198	-0.409	-0.364
	(0.072)***	(0.070)	(0.067)***	(0.061)	(0.066)**	(0.071)***	(0.177)**	(0.171)**
ARC	0.281	0.303	0.151	0.273	0.136	0.329	0.874	0.817
	(0.174)	(0.132)**	(0.125)	(0.180)	(0.217)	(0.174)*	(0.423)**	(0.565)
ARC X Treat	0.152	-0.133	0.092	-0.106	0.040	0.044	0.012	-0.026
	(0.117)	(0.133)	(0.113)	(0.095)	(0.117)	(0.104)	(0.314)	(0.284)
Control Endline Mean	0.91	0.88	0.94	0.92	0.90	0.95	2.73	2.77
N	424	419	424	424	418	423	416	415
R2	0.340	0.402	0.375	0.381	0.336	0.365	0.398	0.382
Treat + ARC X Treat=0	0.710	0.066	0.140	0.046	0.295	0.042	0.115	0.077

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.023 , 0.100, 0.006, 0.135, 0.034, 0.020, 0.027, 0.034.

BKY (2006) Sharpened Q-Values of Treat + ARC X Treat=0: 0.230 , 0.183, 0.183, 0.183, 0.203, 0.183, 0.183, 0.183.

Table 51: Program Impacts on ARB Anxiety by Agrarian Reform Community

	Average Anxiety Score	Anxiety Index: 1st Component PCA
Treat	0.033	0.074
	(0.184)	(0.300)
ARC	-0.484	-0.746
	(0.295)	(0.454)*
ARC X Treat	0.445	0.761
	(0.268)*	(0.435)*
Control Endline Mean	2.58	-0.04
N	402	402
R2	0.298	0.300
Treat + ARC X Treat=0	0.013	0.008

Ancova OLS models. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
Cronbach's alpha: 0.47. Controls include Gender, Age, HH size, Education, and Years as Primary Tiller.
Randomization strata is included in all specifications. Treat + ARC X Treat=0 reports p-value of corresponding F-test
BKY (2006) Sharpened Q-Values of Treat=0: 1.000 , 1.000
BKY (2006) Sharpened Q-Values of Treat + ARC X Treat=0: 0.014 , 0.014

Table 52: LATE Program Impacts on ARB Happiness by Agrarian Reform Community

	Present step	1yr step	10yrs step
Treat	-0.712	-0.460	0.275
	(0.551)	(0.427)	(0.446)
ARC	0.852	0.445	0.694
	(0.804)	(0.824)	(0.890)
ARC X Treat	-0.656	-0.715	-1.732
	(0.825)	(0.788)	(0.835)**
Control Endline Mean	4.29	5.36	7.04
N	407	407	407
R2	0.314	0.317	0.288
Treat + ARC X Treat=0	0.019	0.081	0.040

OLS models. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
Controls include Gender, Age, HH size, Education, and Years as Primary Tiller.
Randomization strata is included in all specifications. Treat + ARC X Treat=0 reports p-value of corresponding F-test
BKY (2006) Sharpened Q-Values of Treat=0: 0.727 , 0.727, 0.727
BKY (2006) Sharpened Q-Values of Treat + ARC X Treat=0: 0.060 , 0.060, 0.060

Table 53: LATE Program Impacts on Plot Investments by Agrarian Reform Community

	Irrigation & Shed Index - 1st PCA	Irrigation & # of Shed Index - 1st PCA	Attempt to build Irrigation or Shed	Left to Fallow for Productivity Reasons	# of Trees Planted	# of Trees Planted per Ha	Prop. of Parcel with Ground Crops	Total number of Ha Cultivated	All Land is Planted or Left to Fallow for Productivity
Treat	0.083	-0.064	-0.093	-0.122	278.026	203.971	0.057	0.124	-0.237
	(0.175)	(0.365)	(0.086)	(0.051)**	(149.219)*	(86.721)**	(0.069)	(0.171)	(0.121)*
ARC	0.023	-0.633	-0.060	-0.150	183.291	197.596	-0.094	0.081	-0.422
	(0.305)	(0.686)	(0.213)	(0.073)**	(140.763)	(88.996)**	(0.106)	(0.123)	(0.168)**
ARC X Treat	-0.222	0.242	0.375	0.096	-445.133	-349.605	-0.096	-0.368	0.288
	(0.351)	(0.770)	(0.136)***	(0.063)	(221.625)**	(120.212)***	(0.091)	(0.196)*	(0.186)
Control Endline Mean	0.06	0.07	0.22	0.05	340.59	178.70	0.20	0.38	0.58
N	432	201	433	471	483	462	456	483	437
R2	0.459	0.717	0.394	0.306	0.516	0.475	0.525	0.537	0.365
Treat + ARC X Treat=0	0.647	0.796	0.006	0.494	0.279	0.062	0.506	0.018	0.708

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.657 , 0.915, 0.391, 0.092, 0.123, 0.092, 0.499, 0.499, 0.123.

BKY (2006) Sharpened Q-Values of Treat + ARC X Treat=0: 1.000 , 1.000, 0.055, 1.000, 0.720, 0.171, 1.000, 0.076, 1.000.

Table 54: Program Impacts on Plot Investments Plans by Agrarian Reform Community

	Plan to Invest (5yrs): Irrigation	Plan to Invest (5yrs): Barn, Granary	Plan to Invest (5yrs): New Crops	Plan to Invest (5yrs): new trees	Plan to increase tilled area of parcel
Treat	0.218	-0.128	0.077	0.066	-0.111
	(0.108)**	(0.089)	(0.118)	(0.093)	(0.126)
ARC	0.263	0.254	0.176	0.007	-0.023
	(0.182)	(0.161)	(0.230)	(0.188)	(0.212)
ARC X Treat	-0.176	-0.081	-0.228	-0.029	0.029
	(0.177)	(0.186)	(0.188)	(0.187)	(0.229)
Control Endline Mean	0.24	0.55	0.57	0.45	0.50
N	408	406	406	409	406
R2	0.377	0.445	0.394	0.339	0.392
Treat + ARC X Treat=0	0.757	0.199	0.267	0.820	0.656

CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Treat=0: 0.271 , 0.424, 0.593, 0.593, 0.593.
BKY (2006) Sharpened Q-Values of Treat + ARC X Treat=0: 1.000 , 1.000, 1.000, 1.000, 1.000.

Table 55: Program Impacts on Plot Conflicts by Agrarian Reform Community

	Community Land Conflicts	Parcel Conflicts
Treat	-0.035	-0.053
	(0.082)	(0.081)
ARC	0.019	0.072
	(0.115)	(0.094)
ARC X Treat	-0.091	-0.069
	(0.141)	(0.117)
Control Endline Mean	0.16	0.08
N	411	427
R2	0.340	0.354
Treat + ARC X Treat=0	0.237	0.141

CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Treat=0: 1.000 , 1.000.
BKY (2006) Sharpened Q-Values of Treat + ARC X Treat=0: 0.312 , 0.312

Table 56: LATE Program Impacts ARB & HH Migration by Agrarian Reform Community

	ARB Migrated	ARB wished to migrate	Number of HH members who migrated
Treat	-0.010	-0.035	0.090
	(0.023)	(0.048)	(0.152)
ARC	-0.008	0.016	0.220
	(0.019)	(0.079)	(0.271)
ARC X Treat	0.017	0.150	-0.196
	(0.031)	(0.072)**	(0.248)
Control Endline Mean	0.01	0.02	0.39
N	407	402	407
R2	0.328	0.280	0.375
Treat + ARC X Treat=0	0.723	0.028	0.593

OLS models. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
Controls include Gender, Age, HH size, Education, and Years as Primary Tiller.
Randomization strata is included in all specifications. Treat + ARC X Treat=0 reports p-value of corresponding F-test
BKY (2006) Sharpened Q-Values of Treat=0: 1.000 , 1.000, 1.000
BKY (2006) Sharpened Q-Values of Treat + ARC X Treat=0: 0.930 , 0.091, 0.930

Table 57: LATE Program Impacts on Plot Output/Ha Aspirations by Agrarian Reform Community

	log aspired output (kgs) per Ha	Aspired output/max community	log aspired output/max community
Treat	-0.952	-49.988	0.019
	(0.974)	(96.373)	(0.457)
ARC	-0.201	-781.734	-0.289
	(1.036)	(641.492)	(0.735)
ARC X Treat	0.652	1,564.900	0.849
	(1.380)	(1,184.237)	(0.849)
Control Endline Mean	10.27	5.31	-0.32
N	376	371	371
R2	0.430	0.187	0.491
Treat + ARC X Treat=0	0.740	0.184	0.217

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.
Randomization strata and crop dummies are included in all specifications.
BKY (2006) Sharpened Q-Values of Treat=0: 1.000 , 1.000, 0.593.
BKY (2006) Sharpened Q-Values of Treat + ARC X Treat=0: 0.482 , 0.482, 1.000.

Table 58: LATE Impact on ARB's Decision-making (ARC interactions, female ARBs)

	Decision participation index	Makes decisions on parcel	Decision-making authority level	Opinion can prevail after disagreement	Opinion always prevails after disagreement	High level of input on parcel decisions
Treated (POST Unadj. N1)	0.919	0.271	2.146	0.458	0.417	0.354
	(0.484)*	(0.214)	(1.411)	(0.487)	(0.341)	(0.480)
ARC x Treated	-1.910	-0.521	-2.115	-0.865	-1.104	-1.354
	(0.898)**	(0.578)	(2.658)	(0.748)	(0.556)**	(0.705)*
Treated (POST Adj. N1)	0.655	0.323	2.612	0.093	0.250	0.051
	(0.550)	(0.315)	(1.575)*	(0.323)	(0.373)	(0.551)
ARC x Treated	-2.032	-0.851	-3.866	-0.461	-1.025	-1.209
	(1.004)**	(0.663)	(2.686)	(0.706)	(0.555)*	(0.792)
Treated (POST Unadj. N2)	0.787	0.000	2.333	0.333	0.667	0.167
	(1.755)	(0.000)	(4.714)	(0.610)	(1.354)	(1.254)
ARC x Treated	-2.389	-0.167	-3.333	-1.167	-2.000	-1.333
	(2.748)	(1.562)	(7.250)	(1.705)	(1.895)	(2.088)
Treated (POST Adj. N2)	-0.756	-0.320	3.571	-1.503	0.847	-1.912
	(3.726)	(1.544)	(8.533)	(2.178)	(1.791)	(2.420)
ARC x Treated	-3.185	-1.456	-5.794	-0.829	-2.307	-1.005
	(4.175)	(2.515)	(8.021)	(3.435)	(1.809)	(2.588)
F-test B1 + B2 = 0 (N1)	0.126	0.423	0.578	0.564	0.069	0.051
F-test B1 + B2 = 0 (N2)	0.374	0.585	0.684	0.541	0.313	0.247
Control Endline Mean (N1)	-0.18	0.74	5.51	0.54	0.16	0.61
Control Endline Mean (N2)	-0.13	0.69	5.40	0.67	0.20	0.64
N1	147	147	147	147	147	147
N2	109	109	109	109	109	109
R2 (N1)	0.670	0.754	0.755	0.787	0.743	0.705
R2 (N2)	0.604	0.782	0.790	0.642	0.835	0.715

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

N2 corresponds to the total number of respondents who are not single or widowed.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

BKY (2006) Sharpened Q-Values of F-test treated + ARC*treatment = 0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.00

Table 59: LATE Impact on ARB's Decision-making (ARC interactions, male ARBs)

	Decision participation index	Makes decisions on parcel	Decision-making authority level	Opinion can prevail after disagreement	Opinion always prevails after disagreement	High level of input on parcel decisions
Treated (POST Unadj. N1)	-0.234	-0.096	0.121	-0.077	-0.335	-0.069
	(0.129)*	(0.120)	(0.417)	(0.110)	(0.189)*	(0.101)
ARC x Treated	0.664	-0.076	-0.505	0.442	1.135	0.245
	(0.294)**	(0.174)	(0.842)	(0.275)	(0.395)***	(0.208)
Treated (POST Adj. N1)	-0.149	-0.072	0.307	-0.026	-0.256	-0.083
	(0.117)	(0.119)	(0.442)	(0.074)	(0.173)	(0.115)
ARC x Treated	0.345	-0.126	-0.336	0.088	0.808	0.169
	(0.251)	(0.185)	(0.747)	(0.148)	(0.335)**	(0.216)
Treated (POST Unadj. N2)	-0.246	-0.138	0.134	-0.023	-0.358	-0.083
	(0.136)*	(0.125)	(0.453)	(0.063)	(0.207)*	(0.102)
ARC x Treated	0.774	-0.075	0.206	0.289	1.135	0.443
	(0.287)***	(0.186)	(0.779)	(0.185)	(0.393)***	(0.196)**
Treated (POST Adj. N2)	-0.218	-0.134	0.332	-0.038	-0.305	-0.120
	(0.139)	(0.126)	(0.460)	(0.065)	(0.203)	(0.120)
ARC x Treated	0.666	-0.107	0.277	0.236	0.945	0.446
	(0.281)**	(0.198)	(0.760)	(0.177)	(0.394)**	(0.204)**
F-test B1 + B2 = 0 (N1)	0.377	0.214	0.963	0.642	0.053	0.632
F-test B1 + B2 = 0 (N2)	0.072	0.137	0.338	0.223	0.059	0.057
Control Endline Mean (N1)	0.28	0.94	5.79	0.85	0.49	0.74
Control Endline Mean (N2)	0.35	0.96	5.68	0.96	0.55	0.73
N1	334	334	334	334	334	334
N2	294	294	294	294	294	294
R2 (N1)	0.575	0.445	0.503	0.755	0.536	0.596
R2 (N2)	0.474	0.460	0.509	0.463	0.494	0.621

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

N2 corresponds to the total number of respondents who are not single or widowed.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 0.672 , 0.672, 0.672, 0.672, 0.672, 0.672

BKY (2006) Sharpened Q-Values of F-test treated + ARC*treatment = 0: 0.170 , 0.170, 0.204, 0.170, 0.170, 0.170

Table 60: LATE Impact on Spouse's Decision-making (ARC interactions- female spouses)

	Decision participation index	Makes decisions on parcel	Decision-making authority level	Opinion can prevail after disagreement	Opinion always prevails after disagreement	High level of input on parcel decisions
Treated (POST Unadj. N1)	0.120	0.120	0.361	-0.048	0.028	0.055
	(0.180)	(0.211)	(0.645)	(0.221)	(0.089)	(0.156)
ARC x Treated	-0.618	-0.496	-0.101	-0.813	-0.140	0.016
	(0.337)*	(0.372)	(1.129)	(0.403)**	(0.129)	(0.289)
Treated (POST Adj. N1)	0.006	0.006	0.626	-0.151	0.019	-0.069
	(0.192)	(0.253)	(0.653)	(0.232)	(0.097)	(0.183)
ARC x Treated	-0.670	-0.527	0.109	-0.894	-0.201	0.021
	(0.388)*	(0.446)	(1.053)	(0.437)**	(0.164)	(0.304)
F-test B1 + B2 = 0	0.051	0.138	0.382	0.005	0.166	0.851
Control Endline Mean	-0.06	0.38	5.04	0.57	0.05	0.27
N1	276	276	276	276	276	276
R^2	0.632	0.540	0.574	0.454	0.586	0.646

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

BKY (2006) Sharpened Q-Values of F-test treated + ARC*treatment = 0: 0.146 , 0.200, 0.333, 0.030, 0.200, 0.397

Table 61: LATE Impact on Spouse's Decision-making (ARC interactions- male spouses)

	Decision participation index	Makes decisions on parcel	Decision-making authority level	Opinion can prevail after disagreement	Opinion always prevails after disagreement	High level of input on parcel decisions
Treated (POST Adj. N1)	0.125	0.976	-2.206	-0.169	0.481	-0.446
	(0.913)	(0.977)	(1.947)	(0.665)	(0.680)	(1.389)
ARC x Treated	1.828	-2.081	7.011	0.814	-1.425	5.024
	(7.558)	(3.957)	(14.808)	(2.423)	(3.507)	(12.674)
F-test B1 + B2 = 0	0.788	0.748	0.740	0.760	0.764	0.703
Control Endline Mean	0.57	0.73	5.46	0.89	0.39	0.46
N1	103	103	103	103	103	103
R^2	0.850	0.916	0.859	0.904	0.940	0.534

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

BKY (2006) Sharpened Q-Values of F-test treated + ARB female*treatment = 0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

Table 62: LATE Impact on Decision-making Equality (ARC interactions- female ARBs)

	Decision equality index	Husband says both make decisions	Wife says both make decisions	Husband's decision equality score	Wife's decision equality score	Couple's minimum decision equality score	Husband says both make the final decision	Wife says both make the final decision
Treated (POST Adj. N1)	-5.050	-12.461	-13.592	-1.203	1.582	0.379	4.164	4.918
	(11.409)	(29.335)	(36.925)	(52.105)	(5.949)	(46.156)	(11.898)	(4.923)
ARC ARB x Treated	4.965	8.270	8.655	-0.190	0.640	0.449	0.280	-0.999
	(7.808)	(20.074)	(25.268)	(35.656)	(4.071)	(31.585)	(8.142)	(3.369)
F-test B1 + B2 = 0	0.984	0.694	0.712	0.941	0.305	0.960	0.305	0.031
Control Endline Mean	0.00	0.36	0.36	4.70	4.59	4.34	0.40	0.51
N1	69	69	69	69	69	69	69	69
R^2	0.998	0.987	0.980	0.975	1.000	0.990	0.998	1.000

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
N1 corresponds to the total number of observations for which the outcome is not missing.
R2 and F-test of the adjusted models are reported.
F-test of the adjusted model is reported
Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000
BKY (2006) Sharpened Q-Values of F-test treated + ARC*treatment = 0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 0.334

Table 63: LATE Impact on Decision-making Equality (ARC interactions- male ARBs)

	Decision equality index	Husband says both make decisions	Wife says both make decisions	Husband's decision equality score	Wife's decision equality score	Couple's minimum decision equality score	Husband says both make the final decision	Wife says both make the final decision
Treated (POST Adj. N1)	0.174	-0.138	0.052	-0.112	0.297	0.222	0.572	-0.083
	(0.314)	(0.241)	(0.272)	(0.472)	(0.413)	(0.638)	(0.296)*	(0.299)
ARC ARB x Treated	-0.784	-0.012	-0.398	1.052	-0.915	-0.011	-1.393	-1.021
	(0.562)	(0.379)	(0.499)	(0.782)	(0.615)	(0.963)	(0.471)***	(0.560)*
F-test B1 + B2 = 0	0.162	0.604	0.372	0.127	0.132	0.753	0.022	0.021
Control Endline Mean	0.00	0.36	0.36	4.70	4.59	4.34	0.40	0.51
N1	244	244	244	244	244	244	244	244
R^2	0.539	0.593	0.599	0.507	0.640	0.557	0.529	0.509

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
N1 corresponds to the total number of observations for which the outcome is not missing.
R2 and F-test of the adjusted models are reported.
F-test of the adjusted model is reported
Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 0.789, 1.000
BKY (2006) Sharpened Q-Values of F-test treated + ARC*treatment = 0: 0.242 , 0.351, 0.351, 0.242, 0.242, 0.394, 0.096, 0.096

Table 64: LATE Impact on Spouse's Agency (ARC interactions- female spouses)

	Agency index	Relative Autonomy Index	Self-efficacy Scale	High autonomy over agricultural decisions
Treated (POST Adj. N1)	-0.024	0.498	-0.099	-0.125
	(0.289)	(0.591)	(0.453)	(0.184)
ARC x Treated	-0.293	-0.840	-0.054	-0.127
	(0.513)	(1.024)	(0.715)	(0.348)
F-test B1 + B2 = 0	0.477	0.726	0.788	0.464
Control Endline Mean	0.01	0.77	4.19	0.35
N1	275	275	275	275
R^2	0.511	0.476	0.494	0.566

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
N1 corresponds to the total number of observations for which the outcome is not missing.
R2 and F-test of the adjusted models are reported.
Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000
BKY (2006) Sharpened Q-Values of F-test treated + ARC*treatment = 0: 1.000 , 1.000, 1.000, 1.000

Table 65: LATE Impact on Spouse's Agency (ARC interactions- male spouses)

	Agency index	Relative Autonomy Index	Self-efficacy Scale	High autonomy over agricultural decisions
Treated (POST Adj. N1)	-0.287	1.165	0.915	-1.280
	(0.900)	(4.003)	(0.584)	(0.763)*
ARC x Treated	1.169	-5.572	-1.200	3.996
	(7.427)	(26.669)	(2.945)	(7.006)
F-test B1 + B2 = 0	0.900	0.855	0.915	0.679
Control Endline Mean	0.27	0.72	4.58	0.50
N1	103	103	103	103
R^2	0.925	0.829	0.977	0.865

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
N1 corresponds to the total number of observations for which the outcome is not missing.
R2 and F-test of the adjusted models are reported.
Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 0.629 , 0.629, 0.320, 0.320
BKY (2006) Sharpened Q-Values of F-test treated + ARC*treatment = 0: 1.000 , 1.000, 1.000, 1.000

Table 66: LATE Impact on ARB's Agency (ARC interactions - female ARBs)

	Agency index	Relative Autonomy Index	Self-efficacy Scale	High autonomy over agricultural decisions
Treated (POST Unadj. N1)	0.467	-0.632	0.436	0.591
	(0.629)	(0.919)	(0.759)	(0.428)
ARC x Treated	-2.206	0.131	-1.909	-1.966
	(0.982)**	(2.487)	(1.130)*	(0.885)**
Treated (POST Adj. N1)	0.411	-0.300	0.568	0.316
	(0.688)	(1.053)	(1.044)	(0.446)
ARC x Treated	-2.047	0.384	-1.970	-1.780
	(0.954)**	(2.359)	(1.246)	(0.892)**
Treated (POST Unadj. N2)	0.550	-2.142	1.250	0.667
	(1.010)	(2.086)	(1.531)	(1.220)
ARC x Treated	-3.188	3.175	-4.250	-2.833
	(3.276)	(5.966)	(3.505)	(2.991)
Treated (POST Adj. N2)	0.033	-2.534	1.367	-0.026
	(3.518)	(6.587)	(2.801)	(2.325)
ARC x Treated	-3.311	0.581	-3.823	-2.450
	(3.852)	(7.089)	(3.658)	(3.471)
F-test B1 + B2 = 0 (N1)	0.027	0.970	0.152	0.071
F-test B1 + B2 = 0 (N2)	0.448	0.795	0.514	0.557
Control Endline Mean (N1)	-0.09	0.87	4.53	0.64
Control Endline Mean (N2)	-0.10	0.93	4.48	0.64
N1	151	151	151	151
N2	109	109	109	109
R2 (N1)	0.656	0.791	0.715	0.627
R2 (N2)	0.702	0.866	0.820	0.610

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
N1 corresponds to the total number of observations for which the outcome is not missing.
N2 corresponds to the total number of respondents who are not single or widowed.
R2 and F-test of the adjusted models are reported.
Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000
BKY (2006) Sharpened Q-Values of F-test treated + ARC*treatment = 0: 1.000 , 1.000, 1.000, 1.000

Table 67: LATE Impact on ARB's Agency (ARC interactions- male ARBs)

	Agency index	Relative Autonomy Index	Self-efficacy Scale	High autonomy over agricultural decisions
Treated (POST Unadj. N1)	-0.114	0.325	-0.289	-0.080
	(0.181)	(0.539)	(0.251)	(0.112)
ARC x Treated	0.572	-0.040	0.631	0.423
	(0.400)	(1.097)	(0.402)	(0.234)*
Treated (POST Adj. N1)	-0.084	0.389	-0.306	-0.046
	(0.192)	(0.568)	(0.259)	(0.131)
ARC x Treated	0.443	-0.113	0.525	0.330
	(0.437)	(1.174)	(0.415)	(0.263)
Treated (POST Unadj. N2)	-0.133	0.291	-0.186	-0.164
	(0.171)	(0.533)	(0.240)	(0.112)
ARC x Treated	0.884	0.282	0.735	0.699
	(0.391)**	(1.168)	(0.407)*	(0.222)***
Treated (POST Adj. N2)	-0.096	0.438	-0.216	-0.138
	(0.177)	(0.553)	(0.241)	(0.117)
ARC x Treated	0.767	0.262	0.628	0.609
	(0.434)*	(1.239)	(0.412)	(0.252)**
F-test B1 + B2 = 0 (N1)	0.348	0.779	0.471	0.196
F-test B1 + B2 = 0 (N2)	0.090	0.515	0.218	0.035
Control Endline Mean (N1)	0.15	0.65	4.98	0.76
Control Endline Mean (N2)	0.14	0.68	4.96	0.75
N1	338	338	338	338
N2	296	296	296	296
R2 (N1)	0.481	0.397	0.511	0.507
R2 (N2)	0.544	0.429	0.543	0.548

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
N1 corresponds to the total number of observations for which the outcome is not missing.
N2 corresponds to the total number of respondents who are not single or widowed.
R2 and F-test of the adjusted models are reported.
Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000
BKY (2006) Sharpened Q-Values of F-test treated + ARC*treatment = 0: 0.165 , 0.347, 0.220, 0.165

Table 68: LATE Impact on Spousal Ownership (ARC interactions, female spouses)

	Spouse reports name is on title	ARB reports spouse's name is on title	Spouse makes decisions because they are a title owner	ARB reports spouse makes decisions because they are a title owner
Treated (POST Adj. N1)	-0.277	-0.036	0.057	-0.000
	(0.119)**	(0.073)	(0.054)	(0.007)
ARC x Treated	0.242	-0.015	-0.050	-0.022
	(0.182)	(0.158)	(0.055)	(0.030)
F-test B1 + B2 = 0	0.773	0.715	0.617	0.423
Control Endline Mean (N1)	0.06	0.06	0.02	0.02
N1	281	281	281	281
R^2	0.526	0.632	0.680	0.677

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
N1 corresponds to the total number of observations for which the outcome is not missing.
R2 and F-test of the adjusted models are reported.
Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 0.093 , 1.000, 0.780, 1.000
BKY (2006) Sharpened Q-Values of F-test treated + ARC*treatment = 0: 1.000 , 1.000, 1.000, 1.000

Table 69: LATE Impact on ARB's Gender Views (ARC interactions- female ARBs)

	Men should be the final decision-makers on parcels they own	Women should be the final decision-makers on parcels they own	Women should make decisions about their own income	Men should make decisions about their own income	It is okay if a woman does not work outside the household	It is okay if a man does not work outside the household
Treated (POST Unadj. N1)	-0.240	0.620	0.040	0.140	-0.140	-0.080
	(0.427)	(0.407)	(0.370)	(0.339)	(0.325)	(0.093)
ARC x Treated	0.477	-0.258	0.260	-0.352	-0.060	-0.020
	(0.695)	(0.849)	(0.670)	(0.674)	(0.735)	(0.503)
Treated (POST Adj. N1)	-0.400	0.524	0.044	-0.035	-0.286	-0.019
	(0.423)	(0.398)	(0.355)	(0.358)	(0.432)	(0.210)
ARC x Treated	0.850	0.161	0.372	-0.175	-0.083	-0.167
	(0.649)	(0.769)	(0.757)	(0.660)	(0.836)	(0.530)
Treated (POST Unadj. N2)	0.667	1.167	0.833	0.833	-0.333	-0.000
	(1.596)	(1.328)	(1.229)	(0.798)	(1.331)	(0.000)
ARC x Treated	-1.167	-1.333	-0.333	-1.500	0.667	-0.500
	(1.964)	(2.120)	(1.829)	(1.785)	(2.161)	(1.354)
Treated (POST Adj. N2)	-0.097	2.096	0.502	-0.164	-1.396	0.973
	(1.957)	(3.197)	(1.518)	(1.654)	(3.315)	(0.999)
ARC x Treated	-0.698	-0.286	-0.270	-0.950	0.924	-1.030
	(1.722)	(3.355)	(2.096)	(2.625)	(3.538)	(1.276)
F-test B1 + B2 = 0 (N1)	0.354	0.325	0.509	0.736	0.624	0.707
F-test B1 + B2 = 0 (N2)	0.554	0.585	0.910	0.700	0.893	0.958
Control Endline Mean (N1)	0.75	0.57	0.60	0.46	0.62	0.14
Control Endline Mean (N2)	0.71	0.55	0.57	0.50	0.66	0.14
N1	153	153	153	153	153	153
N2	110	110	110	110	110	110
R2 (N1)	0.744	0.672	0.840	0.765	0.677	0.754
R2 (N2)	0.888	0.665	0.874	0.821	0.626	0.881

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

N2 corresponds to the total number of respondents who are not single or widowed.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

BKY (2006) Sharpened Q-Values of F-test treated + ARC*treatment = 0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

Table 70: LATE Impact on ARB's Gender Views (ARC interactions- male ARBs)

	Men should be the final decision-makers on parcels they own	Women should be the final decision-makers on parcels they own	Women should make decisions about their own income	Men should make decisions about their own income	It is okay if a woman does not work outside the household	It is okay if a man does not work outside the household
Treated (POST Unadj. N1)	-0.238	-0.304	-0.129	-0.047	-0.116	-0.188
	(0.155)	(0.129)**	(0.146)	(0.198)	(0.133)	(0.102)*
ARC x Treated	0.371	0.375	0.191	0.145	0.222	0.164
	(0.242)	(0.295)	(0.294)	(0.332)	(0.227)	(0.260)
Treated (POST Adj. N1)	-0.245	-0.341	-0.145	-0.112	-0.092	-0.201
	(0.171)	(0.144)**	(0.164)	(0.202)	(0.135)	(0.104)*
ARC x Treated	0.299	0.294	0.181	0.164	0.146	0.168
	(0.252)	(0.322)	(0.309)	(0.330)	(0.222)	(0.251)
Treated (POST Unadj. N2)	-0.247	-0.325	-0.014	0.154	-0.009	-0.183
	(0.163)	(0.151)**	(0.169)	(0.196)	(0.144)	(0.117)
ARC x Treated	0.473	0.428	-0.004	-0.184	0.044	-0.026
	(0.267)*	(0.311)	(0.340)	(0.337)	(0.238)	(0.292)
Treated (POST Adj. N2)	-0.271	-0.391	-0.034	0.087	0.011	-0.199
	(0.174)	(0.175)**	(0.189)	(0.200)	(0.155)	(0.125)
ARC x Treated	0.501	0.458	0.052	-0.052	-0.012	-0.053
	(0.256)*	(0.337)	(0.363)	(0.346)	(0.249)	(0.293)
F-test B1 + B2 = 0 (N1)	0.763	0.867	0.890	0.837	0.767	0.889
F-test B1 + B2 = 0 (N2)	0.237	0.815	0.951	0.900	0.995	0.357
Control Endline Mean (N1)	0.82	0.63	0.63	0.66	0.77	0.20
Control Endline Mean (N2)	0.81	0.67	0.65	0.65	0.79	0.19
N1	340	340	340	340	340	340
N2	297	297	297	297	297	297
R2 (N1)	0.559	0.520	0.489	0.442	0.510	0.468
R2 (N2)	0.582	0.561	0.490	0.471	0.544	0.484

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

N2 corresponds to the total number of respondents who are not single or widowed.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 0.360 , 0.360, 1.000, 0.986, 1.000, 0.360

BKY (2006) Sharpened Q-Values of F-test treated + ARC*treatment = 0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

A.4: Heterogeneous Impacts by Compensable/Non-Compensable Land

Table 71: LATE Program Impacts on Gains from Trade by Compensable/Non-Compensable Land

	Plot Leased Out	Plot Sold	ARB Tiller
Treat	0.246	0.008	-0.213
	(0.089)***	(0.013)	(0.072)***
Non-Compensable	-0.299	-0.010	0.077
	(0.084)***	(0.010)	(0.052)
Non-Compensable X Treat	-0.157	0.024	0.154
	(0.117)	(0.027)	(0.097)
Control Endline Mean	0.09	0.01	0.96
N	449	470	440
R2	0.366	0.374	0.381
Treat + Non-Compensable X Treat=0	0.243	0.148	0.343

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Treat=0: 0.009 , 0.009, 0.262.
BKY (2006) Sharpened Q-Values of Treat + Non-Compensable X Treat=0: 0.522 , 0.522, 1.000

Table 72: LATE Program Impacts on Tenure Security (Likert Scale) by Compensable/Non-Compensable Land

	Ability to Restrict Access to Parcel	Secure from Eviction	Worried about Losing Ownership	Likelihood: Transferring to Children	Likelihood: Neighbor Confiscation	Likelihood: Govt. Confiscation	Likelihood: Confiscation by Other	T.Security PCA Index	T. Security Raw Sum Score
Treat	-0.696	-0.694	0.330	-0.222	-0.438	-0.168	0.298	-0.759	-3.660
	(0.260)***	(0.268)***	(0.494)	(0.197)	(0.408)	(0.401)	(0.382)	(0.427)*	(2.819)
Non-Compensable	-0.168	0.007	-1.621	-0.402	-1.058	-0.583	0.309	1.001	9.103
	(0.339)	(0.439)	(0.962)*	(0.421)	(0.634)*	(0.475)	(0.813)	(1.180)	(4.312)**
Non-Compensable X Treat	0.724	0.580	-0.106	0.221	0.981	0.614	-0.011	0.354	-0.046
	(0.325)**	(0.377)	(0.678)	(0.266)	(0.514)*	(0.561)	(0.477)	(0.570)	(3.843)
Control Endline Mean	4.78	4.70	3.00	4.71	1.74	1.96	1.59	0.13	27.56
N	425	425	424	373	377	372	377	419	470
R2	0.318	0.283	0.360	0.412	0.358	0.385	0.337	0.369	0.274
Treat + Non-Compensable X Treat=0	0.883	0.659	0.632	0.995	0.077	0.220	0.282	0.278	0.158

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.046 , 0.046, 0.608, 0.397, 0.397, 0.743, 0.595, 0.215, 0.397.

BKY (2006) Sharpened Q-Values of Treat + Non-Compensable X Treat=0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000.

Table 73: LATE Program Impacts on Tenure Security (Binary Scale 1) by Compensable/Non-Compensable Land

	Ability to Restrict Access to Parcel	Secure from Eviction	Worried about Losing Ownership	Likelihood: Transferring to Children	Likelihood: Neighbor Confiscation	Likelihood: Govt. Confiscation	Likelihood: Confiscation by Other	Raw Sum Score
Treat	-0.133	-0.166	0.073	0.007	-0.190	-0.015	0.109	-0.369
	(0.070)*	(0.075)**	(0.131)	(0.045)	(0.113)*	(0.134)	(0.111)	(0.390)
Non-Compensable	-0.030	-0.098	-0.397	-0.108	-0.314	-0.169	0.031	0.982
	(0.101)	(0.157)	(0.258)	(0.070)	(0.239)	(0.130)	(0.207)	(1.086)
Non-Compensable X Treat	0.098	0.124	-0.014	-0.009	0.316	0.051	-0.014	0.003
	(0.088)	(0.103)	(0.180)	(0.063)	(0.137)**	(0.161)	(0.132)	(0.506)
Control Endline Mean	0.97	0.94	0.50	0.95	0.18	0.20	0.11	5.87
N	425	425	424	373	377	372	377	419
R2	0.318	0.272	0.361	0.407	0.361	0.359	0.318	0.356
Treat + Non-Compensable X Treat=0	0.473	0.533	0.633	0.954	0.111	0.687	0.145	0.241

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.283 , 0.283, 0.929, 1.000, 0.283, 1.000, 0.525, 0.525.

BKY (2006) Sharpened Q-Values of Treat + Non-Compensable X Treat=0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000.

Table 74: LATE Program Impacts on Tenure Security (Binary Scale 2) by Compensable/Non-Compensable Land

	Ability to Restrict Access to Parcel	Secure from Eviction	Worried about Losing Ownership	Likelihood: Transferring to Children	Likelihood: Neighbor Confiscation	Likelihood: Govt. Confiscation	Likelihood: Confiscation by Other	Raw Sum Score
Treat	-0.154	-0.168	0.175	-0.085	-0.089	0.033	0.122	-0.787
	(0.071)**	(0.085)**	(0.132)	(0.058)	(0.112)	(0.124)	(0.125)	(0.381)**
Non-Compensable	-0.035	-0.098	-0.374	-0.014	-0.380	-0.243	0.176	1.162
	(0.109)	(0.161)	(0.265)	(0.114)	(0.226)*	(0.086)***	(0.269)	(1.180)
Non-Compensable X Treat	0.172	0.182	-0.130	0.049	0.228	0.141	-0.029	0.426
	(0.090)*	(0.113)	(0.182)	(0.075)	(0.145)	(0.173)	(0.156)	(0.532)
Control Endline Mean	0.95	0.91	0.54	0.93	0.19	0.27	0.15	5.64
N	425	425	424	373	377	372	377	419
R2	0.326	0.280	0.374	0.392	0.344	0.359	0.315	0.363
Treat + Non-Compensable X Treat=0	0.733	0.853	0.723	0.458	0.142	0.120	0.273	0.319

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.147 , 0.147, 0.227, 0.220, 0.405, 0.421, 0.382, 0.147.

BKY (2006) Sharpened Q-Values of Treat + Non-Compensable X Treat=0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000.

Table 75: LATE Program Impacts on Perceived Effectiveness of Barangay Council & Municipal Entity Effectiveness in Protecting Land Rights under Hypothetical Conflicts (Likert Scale) by Compensable/Non-Compensable Land

	Barangay: Dispute with Neighbor	Barangay: Dispute with Govt	Barangay: Dispute with Private Company	Municipal: Dispute with Neighbor	Municipal: Dispute with Govt	Municipal: Dispute with Private Company	Barangay: Raw Sum	Municipal: Raw Sum	Barangay Index PCA	Municipal Index PCA
Treat	-0.911	-0.703	-0.607	-0.755	-0.425	-0.583	-2.247	-1.653	-1.408	-1.126
	(0.240)***	(0.285)**	(0.216)***	(0.255)***	(0.305)	(0.287)**	(0.692)***	(0.721)**	(0.430)***	(0.485)**
Non-Compensable	-1.144	-0.593	-0.454	-1.297	-1.228	-0.950	-2.313	-3.773	-1.456	-2.525
	(0.753)	(0.758)	(0.572)	(0.682)*	(0.877)	(0.668)	(2.283)	(2.419)	(1.435)	(1.617)
Non-Compensable X Treat	0.473	0.339	0.211	0.585	0.150	0.247	1.097	0.928	0.677	0.640
	(0.316)	(0.371)	(0.305)	(0.314)*	(0.384)	(0.336)	(0.900)	(0.909)	(0.563)	(0.609)
Control Endline Mean	4.67	4.53	4.70	4.67	4.57	4.69	13.92	13.95	0.18	0.13
N	423	418	423	423	417	422	415	414	415	414
R2	0.400	0.474	0.361	0.386	0.393	0.333	0.439	0.397	0.432	0.395
Treat + Non-Compensable X Treat=0	0.040	0.149	0.070	0.391	0.255	0.096	0.056	0.232	0.053	0.232

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.002 , 0.012, 0.007, 0.006, 0.034, 0.024, 0.004, 0.014, 0.004, 0.014.

BKY (2006) Sharpened Q-Values of Treat + Non-Compensable X Treat=0: 0.214 , 0.214, 0.214, 0.243, 0.214, 0.214, 0.214, 0.214, 0.214, 0.214.

Table 76: LATE Program Impacts on Perceived Effectiveness of Barangay Council & Municipal Entity Effectiveness in Protecting Land Rights under Hypothetical Conflicts (Binary 1) by Compensable/Non-Compensable Land

	Barangay: Dispute with Neighbor	Barangay: Dispute with Govt	Barangay: Dispute with Private Company	Municipal: Dispute with Neighbor	Municipal: Dispute with Govt	Municipal: Dispute with Private Company	Barangay: Raw Sum	Municipal: Raw Sum
Treat	-0.169	-0.182	-0.092	-0.077	-0.031	-0.038	-0.436	-0.108
	(0.060)***	(0.071)***	(0.048)*	(0.061)	(0.093)	(0.057)	(0.152)***	(0.179)
Non-Compensable	-0.427	-0.205	-0.210	-0.419	-0.359	-0.308	-0.920	-1.226
	(0.208)**	(0.213)	(0.179)	(0.210)**	(0.278)	(0.236)	(0.657)	(0.780)
Non-Compensable X Treat	0.115	0.103	0.049	0.034	-0.050	-0.038	0.241	-0.081
	(0.079)	(0.092)	(0.062)	(0.071)	(0.102)	(0.067)	(0.197)	(0.206)
Control Endline Mean	0.97	0.94	0.98	0.96	0.96	0.98	2.90	2.90
N	423	418	423	423	417	422	415	414
R2	0.392	0.476	0.354	0.354	0.397	0.348	0.444	0.389
Treat + Non-Compensable X Treat=0	0.329	0.189	0.314	0.296	0.103	0.060	0.153	0.124

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.021 , 0.021, 0.075, 0.203, 0.509, 0.452, 0.021, 0.452.

BKY (2006) Sharpened Q-Values of Treat + Non-Compensable X Treat=0: 0.434 , 0.434, 0.434, 0.434, 0.434, 0.434, 0.434, 0.434.

Table 77: LATE Program Impacts on Perceived Effectiveness of Barangay Council & Municipal Entity Effectiveness in Protecting Land Rights under Hypothetical Conflicts (Binary 2) by Compensable/Non-Compensable Land

	Barangay: Dispute with Neighbor	Barangay: Dispute with Govt	Barangay: Dispute with Private Company	Municipal: Dispute with Neighbor	Municipal: Dispute with Govt	Municipal: Dispute with Private Company	Barangay: Raw Sum	Municipal: Raw Sum
Treat	-0.238	-0.199	-0.315	-0.184	-0.115	-0.318	-0.755	-0.589
	(0.078)***	(0.091)**	(0.075)***	(0.087)**	(0.089)	(0.101)***	(0.227)***	(0.227)***
Non-Compensable	-0.296	-0.254	-0.242	-0.299	-0.376	-0.370	-0.839	-1.129
	(0.269)	(0.215)	(0.177)	(0.270)	(0.286)	(0.236)	(0.712)	(0.861)
Non-Compensable X Treat	0.185	0.116	0.232	0.154	0.021	0.218	0.600	0.401
	(0.111)*	(0.124)	(0.110)**	(0.100)	(0.115)	(0.114)*	(0.302)**	(0.275)
Control Endline Mean	0.91	0.88	0.94	0.92	0.90	0.95	2.73	2.77
N	423	418	423	423	417	422	415	414
R2	0.334	0.393	0.363	0.374	0.345	0.337	0.384	0.378
Treat + Non-Compensable X Treat=0	0.511	0.366	0.311	0.595	0.213	0.118	0.461	0.298

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 0.004 , 0.016, 0.001, 0.016, 0.042, 0.004, 0.004, 0.008.

BKY (2006) Sharpened Q-Values of Treat + Non-Compensable X Treat=0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000.

Table 78: LATE Program Impacts on ARB Anxiety by Compensable/Non-Compensable Land

	Average Anxiety Score	Anxiety Index: 1st Component PCA
Treat	0.496	0.836
	(0.254)*	(0.410)**
Non-Compensable	-0.283	-0.522
	(0.316)	(0.486)
Non-Compensable X Treat	-0.405	-0.660
	(0.289)	(0.465)
Control Endline Mean	2.58	-0.04
N	404	404
R2	0.289	0.291
Treat + Non-Compensable X Treat=0	0.533	0.452

Ancova OLS models. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
Cronbach's alpha: 0.47. Controls include Gender, Age, HH size, Education, and Years as Primary Tiller.
Randomization strata is included in all specifications. Treat + Non-Compensable X Treat=0 reports p-value of corresponding F-test
BKY (2006) Sharpened Q-Values of Treat=0: 0.054 , 0.054
BKY (2006) Sharpened Q-Values of Treat + Non-Compensable X Treat=0: 1.000 , 1.000

Table 79: LATE Program Impacts on ARB Happiness by Compensable/Non-Compensable Land

	Present step	1yr step	10yrs step
Treat	-0.622	-0.188	0.357
	(0.643)	(0.559)	(0.533)
Non-Compensable	-1.460	-2.409	-3.023
	(0.538)***	(0.715)***	(0.474)***
Non-Compensable X Treat	-0.910	-1.123	-1.315
	(0.825)	(0.756)	(0.798)*
Control Endline Mean	4.29	5.36	7.04
N	409	409	409
R2	0.312	0.328	0.306
Treat + Non-Compensable X Treat=0	0.002	0.012	0.098

OLS models. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
Controls include Gender, Age, HH size, Education, and Years as Primary Tiller.
Randomization strata is included in all specifications. Treat + Non-Compensable X Treat=0 reports p-value of corresponding F-test
BKY (2006) Sharpened Q-Values of Treat=0: 1.000 , 1.000, 1.000
BKY (2006) Sharpened Q-Values of Treat + Non-Compensable X Treat=0: 0.008 , 0.012, 0.034

Table 80: LATE Program Impacts on Plot Investments by Compensable/Non-Compensable Land

	Irrigation & Shed Index - 1st PCA	Irrigation & # of Shed Index - 1st PCA	Attempt to build Irrigation or Shed	Left to Fallow for Productivity Reasons	# of Trees Planted	# of Trees Planted per Ha	Prop. of Parcel with Ground Crops	Total number of Ha Cultivated	All Land is Planted or Left to Fallow for Productivity
Treat	0.146	0.406	-0.130	0.044	252.300	194.922	-0.019	-0.105	0.051
	(0.228)	(0.400)	(0.125)	(0.045)	(147.693)*	(86.733)**	(0.088)	(0.210)	(0.140)
Non-Compensable	-0.083	-1.776	-0.141	0.044	-53.728	85.118	0.028	0.248	-0.259
	(0.245)	(0.409)***	(0.214)	(0.039)	(80.554)	(81.886)	(0.038)	(0.093)***	(0.090)***
Non-Compensable X Treat	-0.278	-0.994	0.364	-0.200	-299.122	-271.921	0.076	0.111	-0.192
	(0.332)	(0.774)	(0.147)**	(0.067)***	(201.356)	(112.976)**	(0.102)	(0.221)	(0.175)
Control Endline Mean	0.06	0.07	0.22	0.05	340.59	178.70	0.20	0.38	0.58
N	431	200	432	470	482	461	455	482	436
R2	0.457	0.727	0.390	0.294	0.511	0.468	0.518	0.529	0.369
Treat + Non-Compensable X Treat=0	0.601	0.362	0.003	0.002	0.739	0.301	0.289	0.957	0.195

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Treat=0: 1.000 , 0.842, 0.842, 0.842, 0.540, 0.285, 1.000, 1.000, 1.000.

BKY (2006) Sharpened Q-Values of Treat + Non-Compensable X Treat=0: 1.000 , 0.732, 0.016, 0.016, 1.000, 0.727, 0.727, 1.000, 0.727.

Table 81: LATE Program Impacts on Plot Investments Plans by Compensable/Non-Compensable Land

	Plan to Invest (5yrs): Irrigation	Plan to Invest (5yrs): Barn, Granary	Plan to Invest (5yrs): New Crops	Plan to Invest (5yrs): new trees	Plan to increase tilled area of parcel
Treat	0.237	-0.239	-0.029	-0.257	-0.228
	(0.135)*	(0.106)**	(0.122)	(0.142)*	(0.165)
Non-Compensable	-0.270	-0.372	0.067	-0.167	-0.100
	(0.129)**	(0.143)***	(0.108)	(0.256)	(0.152)
Non-Compensable X Treat	-0.214	0.108	-0.012	0.598	0.256
	(0.174)	(0.165)	(0.176)	(0.178)***	(0.218)
Control Endline Mean	0.24	0.55	0.57	0.45	0.50
N	408	406	406	409	406
R2	0.366	0.446	0.401	0.352	0.388
Treat + Non-Compensable X Treat=0	0.836	0.323	0.749	0.002	0.843

CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Treat=0: 0.133 , 0.133, 0.262, 0.133, 0.151.
BKY (2006) Sharpened Q-Values of Treat + Non-Compensable X Treat=0: 1.000 , 1.000, 1.000, 0.011, 1.000.

Table 82: LATE Program Impacts on Plot Conflicts by Compensable/Non-Compensable Land

	Community Land Conflicts	Parcel Conflicts
Treat	-0.063	-0.057
	(0.108)	(0.065)
Non-Compensable	-0.016	-0.131
	(0.060)	(0.097)
Non-Compensable X Treat	-0.018	-0.055
	(0.128)	(0.105)
Control Endline Mean	0.16	0.08
N	410	426
R2	0.339	0.360
Treat + Non-Compensable X Treat=0	0.243	0.177

CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Treat=0: 1.000 , 1.000.
BKY (2006) Sharpened Q-Values of Treat + Non-Compensable X Treat=0: 0.321 , 0.321.

Table 83: LATE Program Impacts on Plot Output/Ha Aspirations by Compensable/Non-Compensable Land

	log aspired output (kgs) per Ha	Aspired output/max community	log aspired output/max community
Treat	0.586	-49.547	0.535
	(0.725)	(127.663)	(0.530)
Non-Compensable	-2.103	-178.042	-2.201
	(0.390)***	(229.747)	(0.393)***
Non-Compensable X Treat	-1.994	1,336.201	-0.026
	(1.237)	(1,001.616)	(0.724)
Control Endline Mean	10.27	5.31	-0.32
N	376	371	371
R2	0.438	0.189	0.510
Treat + Non-Compensable X Treat=0	0.156	0.177	0.336

CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
Controls include plot-level baseline indicator of area, type of irrigation, slope, drainage, and risk index.
Randomization strata and crop dummies are included in all specifications.
BKY (2006) Sharpened Q-Values of Treat=0: 1.000 , 1.000, 0.262.
BKY (2006) Sharpened Q-Values of Treat + Non-Compensable X Treat=0: 0.363 , 0.363, 1.000.

Table 84: LATE Program Impacts ARB & HH Migration by Compensable/Non-Compensable Land

	ARB Migrated	ARB wished to migrate	Number of HH members who migrated
Treat	0.044	-0.148	0.274
	(0.024)*	(0.047)***	(0.215)
Non-Compensable	0.028	-0.098	-0.230
	(0.015)*	(0.042)**	(0.189)
Non-Compensable X Treat	-0.083	0.311	-0.460
	(0.032)***	(0.071)***	(0.260)*
Control Endline Mean	0.01	0.02	0.39
N	409	404	409
R2	0.334	0.271	0.365
Treat + Non-Compensable X Treat=0	0.043	0.002	0.229

OLS models. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
Controls include Gender, Age, HH size, Education, and Years as Primary Tiller.
Randomization strata is included in all specifications. Treat + Non-Compensable X Treat=0 reports p-value of corresponding F-test
BKY (2006) Sharpened Q-Values of Treat=0: 0.068 , 0.005, 0.105
BKY (2006) Sharpened Q-Values of Treat + Non-Compensable X Treat=0: 0.046 , 0.005, 0.083

Table 85: LATE Impact on ARB's Decision-making (Non-compensable interactions, female ARBs)

	Decision participation index	Makes decisions on parcel	Decision-making authority level	Opinion can prevail after disagreement	Opinion always prevails after disagreement	High level of input on parcel decisions
Treated (POST Unadj. N1)	0.367	-0.329	0.914	0.729	0.143	0.114
	(0.988)	(0.419)	(2.301)	(0.667)	(0.623)	(0.642)
Non-compensable x Treated	-0.262	0.613	0.790	-0.971	-0.258	-0.360
	(1.085)	(0.538)	(2.712)	(0.763)	(0.687)	(0.736)
Treated (POST Adj. N1)	-0.242	-0.497	0.507	0.102	-0.102	-0.154
	(0.949)	(0.427)	(3.129)	(0.328)	(0.658)	(0.688)
Non-compensable x Treated	0.187	0.679	1.043	-0.298	-0.078	-0.291
	(1.088)	(0.564)	(3.278)	(0.522)	(0.768)	(0.847)
Treated (POST Unadj. N2)	-0.244	-0.500	-0.000	-0.000	-0.000	0.000
	(1.413)	(0.510)	(5.392)	(0.000)	(1.019)	(1.019)
Non-compensable x Treated	-0.327	0.833	1.333	-0.500	-0.667	-1.000
	(2.805)	(1.562)	(7.713)	(1.526)	(1.955)	(2.273)
Treated (POST Adj. N2)	-3.379	-1.516	-1.172	-2.195	-1.046	-2.751
	(4.291)	(2.622)	(5.938)	(3.815)	(1.714)	(3.056)
Non-compensable x Treated	-5.754	-1.800	-1.584	-4.229	-1.833	-5.183
	(15.507)	(7.983)	(19.870)	(12.096)	(5.066)	(10.423)
F-test B1 + B2 = 0 (N1)	0.928	0.700	0.223	0.645	0.609	0.402
F-test B1 + B2 = 0 (N2)	0.613	0.743	0.894	0.669	0.615	0.525
Control Endline Mean (N1)	-0.18	0.74	5.51	0.54	0.16	0.61
Control Endline Mean (N2)	-0.13	0.69	5.40	0.67	0.20	0.64
N1	147	147	147	147	147	147
N2	109	109	109	109	109	109
R2 (N1)	0.620	0.729	0.730	0.793	0.712	0.669
R2 (N2)	.	0.569	0.667	.	0.621	.

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

N2 corresponds to the total number of respondents who are not single or widowed.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

BKY (2006) Sharpened Q-Values of F-test treated + Non-compensable *treatment = 0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

Table 86: LATE Impact on ARB's Decision-making (Non-compensable interactions, male ARBs)

	Decision participation index	Makes decisions on parcel	Decision-making authority level	Opinion can prevail after disagreement	Opinion always prevails after disagreement	High level of input on parcel decisions
Treated (POST Unadj. N1)	0.292	-0.041	-0.335	0.145	0.405	0.298
	(0.191)	(0.100)	(0.593)	(0.164)	(0.248)	(0.150)**
Non-compensable x Treated	-0.507	-0.189	0.505	-0.059	-0.588	-0.497
	(0.233)**	(0.177)	(0.751)	(0.208)	(0.303)*	(0.186)***
Treated (POST Adj. N1)	0.189	-0.059	0.067	-0.002	0.272	0.229
	(0.177)	(0.092)	(0.582)	(0.110)	(0.224)	(0.147)
Non-compensable x Treated	-0.383	-0.166	0.247	0.071	-0.405	-0.464
	(0.230)*	(0.183)	(0.745)	(0.138)	(0.290)	(0.193)**
Treated (POST Unadj. N2)	0.274	-0.117	0.104	0.042	0.383	0.333
	(0.214)	(0.092)	(0.567)	(0.137)	(0.273)	(0.155)**
Non-compensable x Treated	-0.459	-0.141	0.205	0.076	-0.624	-0.444
	(0.254)*	(0.184)	(0.751)	(0.156)	(0.334)*	(0.183)**
Treated (POST Adj. N2)	0.257	-0.154	0.461	0.011	0.356	0.285
	(0.205)	(0.096)	(0.603)	(0.135)	(0.254)	(0.149)*
Non-compensable x Treated	-0.434	-0.095	-0.009	0.087	-0.583	-0.427
	(0.255)*	(0.196)	(0.773)	(0.155)	(0.324)*	(0.188)**
F-test B1 + B2 = 0 (N1)	0.196	0.163	0.527	0.427	0.474	0.074
F-test B1 + B2 = 0 (N2)	0.270	0.145	0.384	0.180	0.288	0.257
Control Endline Mean (N1)	0.28	0.94	5.79	0.85	0.49	0.74
Control Endline Mean (N2)	0.35	0.96	5.68	0.96	0.55	0.73
N1	334	334	334	334	334	334
N2	294	294	294	294	294	294
R2 (N1)	0.577	0.464	0.508	0.762	0.572	0.604
R2 (N2)	0.495	0.475	0.508	0.506	0.546	0.636

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

N2 corresponds to the total number of respondents who are not single or widowed.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 0.471 , 0.471, 0.471, 0.471, 0.471, 0.471

BKY (2006) Sharpened Q-Values of F-test treated + Non-compensable *treatment = 0: 0.527 , 0.527, 0.527, 0.527, 0.527, 0.527

Table 87: LATE Impact on Spouse's Decision-making (Non-compensable interactions- female spouses)

	Decision participation index	Makes decisions on parcel	Decision-making authority level	Opinion can prevail after disagreement	Opinion always prevails after disagreement	High level of input on parcel decisions
Treated (POST Adj. N1)	-0.232	-0.368	1.451	-0.378	-0.075	-0.173
	(0.254)	(0.320)	(0.678)**	(0.267)	(0.111)	(0.253)
Non-compensable x Treated	-0.086	0.306	-1.591	-0.288	0.025	0.225
	(0.339)	(0.425)	(1.040)	(0.435)	(0.149)	(0.310)
F-test B1 + B2 = 0	0.177	0.818	0.861	0.038	0.624	0.769
Control Endline Mean	-0.06	0.38	5.04	0.57	0.05	0.27
N1	276	276	276	276	276	276
R^2	0.652	0.538	0.572	0.481	0.599	0.644

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 0.714 , 0.714, 0.253, 0.657, 0.714, 0.714

BKY (2006) Sharpened Q-Values of F-test treated + Non-compensable *treatment = 0: 0.797 , 1.000, 1.000, 0.298, 1.000, 1.000

Table 88: LATE Impact on Spouse's Decision-making (Non-compensable interactions- male spouses)

	Decision participation index	Makes decisions on parcel	Decision-making authority level	Opinion can prevail after disagreement	Opinion always prevails after disagreement	High level of input on parcel decisions
Treated (POST Adj. N1)	-1.338	-0.333	-0.911	-0.554	-0.708	-0.943
	(1.022)	(1.219)	(2.338)	(1.097)	(1.244)	(2.047)
Non-compensable x Treated	6.207	0.195	6.947	2.114	0.850	8.457
	(10.253)	(5.986)	(22.925)	(4.419)	(5.866)	(16.965)
F-test B1 + B2 = 0	0.629	0.980	0.779	0.701	0.978	0.646
Control Endline Mean	0.57	0.73	5.46	0.89	0.39	0.46
N1	103	103	103	103	103	103
R^2	0.803	0.912	0.830	0.888	0.940	0.379

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

BKY (2006) Sharpened Q-Values of F-test treated + Non-compensable *treatment = 0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

Table 89: LATE Impact on Decision-making Equality (Non-compensable interactions- female ARBs)

	Decision equality index	Husband says both make decisions	Wife says both make decisions	Husband's decision equality score	Wife's decision equality score	Couple's minimum decision equality score	Husband says both make the final decision	Wife says both make the final decision
Treated (POST Adj. N1)	-0.738	-0.855	-1.493	0.155	0.158	0.312	-0.185	-0.273
	(1.222)	(3.141)	(3.954)	(5.580)	(0.637)	(4.942)	(1.274)	(0.527)
Non-compensable x Treated	1.773	3.279	3.280	-0.126	-0.429	-0.555	-0.192	0.134
	(2.677)	(6.883)	(8.664)	(12.226)	(1.396)	(10.830)	(2.792)	(1.155)
F-test B1 + B2 = 0	0.484	0.524	0.709	0.997	0.724	0.968	0.807	0.828
Control Endline Mean	0.00	0.36	0.36	4.70	4.59	4.34	0.40	0.51
N1	69	69	69	69	69	69	69	69
R^2	0.998	0.987	0.980	0.975	1.000	0.990	0.998	1.000

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000

BKY (2006) Sharpened Q-Values of F-test treated + Non-compensable *treatment = 0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000

Table 90: LATE Impact on Decision-making Equality (Non-compensable interactions- male ARBs)

	Decision equality index	Husband says both make decisions	Wife says both make decisions	Husband's decision equality score	Wife's decision equality score	Couple's minimum decision equality score	Husband says both make the final decision	Wife says both make the final decision
Treated (POST Adj. N1)	-0.476	0.012	-0.424	0.040	-0.425	-0.399	-0.207	-0.632
	(0.364)	(0.362)	(0.409)	(0.468)	(0.434)	(0.698)	(0.384)	(0.442)
Public ARB x Treated	0.533	-0.248	0.505	0.442	0.564	0.990	0.343	0.215
	(0.543)	(0.444)	(0.538)	(0.807)	(0.684)	(1.047)	(0.495)	(0.608)
F-test B1 + B2 = 0	0.869	0.283	0.778	0.420	0.750	0.391	0.633	0.215
Control Endline Mean	0.00	0.36	0.36	4.70	4.59	4.34	0.40	0.51
N1	244	244	244	244	244	244	244	244
R^2	0.552	0.596	0.584	0.488	0.638	0.546	0.530	0.541

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
N1 corresponds to the total number of observations for which the outcome is not missing.
R2 and F-test of the adjusted models are reported.
Controls for the full sample include Age, Education, Marital status, and Enumerator gender.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000
BKY (2006) Sharpened Q-Values of F-test treated + Non-compensable *treatment = 0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000, 1.000, 1.000

Table 91: LATE Impact on Spouse's Agency (Non-compensable interactions- female spouses)

	Agency index	Relative Autonomy Index	Self-efficacy Scale	High autonomy over agricultural decisions
Treated (POST Adj. N1)	-0.214	0.009	-0.051	-0.273
	(0.439)	(0.812)	(0.609)	(0.294)
Non-compensable x Treated	0.146	0.297	-0.146	0.200
	(0.528)	(1.076)	(0.754)	(0.359)
F-test B1 + B2 = 0	0.800	0.691	0.626	0.750
Control Endline Mean	0.01	0.77	4.19	0.35
N1	275	275	275	275
R^2	0.515	0.475	0.498	0.570

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
N1 corresponds to the total number of observations for which the outcome is not missing.
R2 and F-test of the adjusted models are reported.
Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000
BKY (2006) Sharpened Q-Values of F-test treated + Non-compensable *treatment = 0: 1.000 , 1.000, 1.000, 1.000

Table 92: LATE Impact on Spouse's Agency (Non-compensable interactions- male spouses)

	Agency index	Relative Autonomy Index	Self-efficacy Scale	High autonomy over agricultural decisions
Treated (POST Adj. N1)	0.364	0.086	0.537	0.172
	(1.212)	(4.014)	(1.128)	(1.315)
Non-compensable x Treated	0.096	-5.396	-0.808	2.216
	(11.286)	(40.069)	(5.272)	(9.791)
F-test B1 + B2 = 0	0.965	0.889	0.955	0.800
Control Endline Mean	0.27	0.72	4.58	0.50
N1	103	103	103	103
R^2	0.924	0.821	0.975	0.832

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
N1 corresponds to the total number of observations for which the outcome is not missing.
R2 and F-test of the adjusted models are reported.
Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000
BKY (2006) Sharpened Q-Values of F-test treated + Non-compensable *treatment = 0: 1.000 , 1.000, 1.000, 1.000

Table 93: LATE Impact on ARB's Agency (Non-compensable interactions - female ARBs)

	Agency index	Relative Autonomy Index	Self-efficacy Scale	High autonomy over agricultural decisions
Treated (POST Unadj. N1)	-1.050	-1.701	-0.726	-0.486
	(0.957)	(1.711)	(0.992)	(0.778)
Non-compensable x Treated	0.708	1.775	0.307	0.244
	(1.044)	(2.099)	(1.161)	(0.893)
Treated (POST Adj. N1)	-1.045	-1.251	-0.507	-0.767
	(0.737)	(1.889)	(0.923)	(0.654)
Non-compensable x Treated	0.578	1.783	-0.108	0.325
	(0.905)	(1.958)	(1.083)	(0.736)
Treated (POST Unadj. N2)	-1.095	-1.975	-0.667	-0.500
	(1.271)	(1.701)	(1.891)	(0.883)
Non-compensable x Treated	0.101	2.842	-0.417	-0.500
	(2.478)	(5.042)	(2.816)	(2.215)
Treated (POST Adj. N2)	-2.683	-2.057	-1.765	-2.039
	(3.308)	(6.775)	(2.655)	(3.089)
Non-compensable x Treated	-2.729	0.560	-1.653	-3.023
	(11.279)	(16.800)	(9.715)	(9.480)
F-test B1 + B2 = 0 (N1)	0.442	0.673	0.428	0.357
F-test B1 + B2 = 0 (N2)	0.681	0.949	0.750	0.655
Control Endline Mean (N1)	-0.09	0.87	4.53	0.64
Control Endline Mean (N2)	-0.10	0.93	4.48	0.64
N1	151	151	151	151
N2	109	109	109	109
R2 (N1)	0.698	0.809	0.759	0.699
R2 (N2)	0.456	0.873	0.741	0.180

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
N1 corresponds to the total number of observations for which the outcome is not missing.
N2 corresponds to the total number of respondents who are not single or widowed.
R2 and F-test of the adjusted models are reported.
Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000
BKY (2006) Sharpened Q-Values of F-test treated + Non-compensable *treatment = 0: 1.000 , 1.000, 1.000, 1.000

Table 94: LATE Impact on ARB's Agency (Non-compensable interactions- male ARBs)

	Agency index	Relative Autonomy Index	Self-efficacy Scale	High autonomy over agricultural decisions
Treated (POST Unadj. N1)	0.493	0.951	0.311	0.199
	(0.287)*	(0.870)	(0.282)	(0.189)
Non-compensable x Treated	-0.668	-1.026	-0.626	-0.220
	(0.356)*	(1.049)	(0.389)	(0.221)
Treated (POST Adj. N1)	0.397	0.871	0.201	0.159
	(0.295)	(0.869)	(0.288)	(0.199)
Non-compensable x Treated	-0.530	-0.839	-0.539	-0.139
	(0.382)	(1.147)	(0.426)	(0.229)
Treated (POST Unadj. N2)	0.493	0.834	0.385	0.188
	(0.330)	(0.973)	(0.341)	(0.208)
Non-compensable x Treated	-0.454	-0.558	-0.491	-0.151
	(0.385)	(1.152)	(0.416)	(0.235)
Treated (POST Adj. N2)	0.414	0.837	0.256	0.158
	(0.323)	(0.942)	(0.322)	(0.213)
Non-compensable x Treated	-0.302	-0.321	-0.374	-0.087
	(0.376)	(1.192)	(0.424)	(0.229)
F-test B1 + B2 = 0 (N1)	0.590	0.963	0.260	0.876
F-test B1 + B2 = 0 (N2)	0.617	0.458	0.667	0.544
Control Endline Mean (N1)	0.15	0.65	4.98	0.76
Control Endline Mean (N2)	0.14	0.68	4.96	0.75
N1	338	338	338	338
N2	296	296	296	296
R2 (N1)	0.482	0.400	0.491	0.507
R2 (N2)	0.544	0.429	0.529	0.548

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$
N1 corresponds to the total number of observations for which the outcome is not missing.
N2 corresponds to the total number of respondents who are not single or widowed.
R2 and F-test of the adjusted models are reported.
Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 0.853 , 0.853, 0.853, 0.853
BKY (2006) Sharpened Q-Values of F-test treated + Non-compensable *treatment = 0: 1.000 , 1.000, 1.000, 1.000

Table 95: LATE Impact on Spousal Ownership (Non-compensable interactions, female spouses)

	Spouse reports name is on title	ARB reports spouse's name is on title	Spouse makes decisions because they are a title owner	ARB reports spouse makes decisions because they are a title owner
Treated (POST Adj. N1)	-0.146	-0.029	0.061	-0.007
	(0.106)	(0.122)	(0.058)	(0.016)
Non-compensable x Treated	-0.041	-0.028	-0.054	-0.007
	(0.155)	(0.156)	(0.058)	(0.033)
F-test B1 + B2 = 0	0.113	0.512	0.563	0.581
Control Endline Mean (N1)	0.06	0.06	0.02	0.02
N1	281	281	281	281
R^2	0.514	0.632	0.681	0.677

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * p<0.1 ** p<0.05; *** p<0.01
N1 corresponds to the total number of observations for which the outcome is not missing.
R2 and F-test of the adjusted models are reported.
Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.
Randomization strata is included in all specifications.
BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000
BKY (2006) Sharpened Q-Values of F-test treated + Non-compensable *treatment = 0: 0.827 , 0.827, 0.827, 0.827

Table 96: LATE Impact on ARB's Gender Views (Non-compensable interactions- female ARBs)

	Men should be the final decision-makers on parcels they own	Women should be the final decision-makers on parcels they own	Women should make decisions about their own income	Men should make decisions about their own income	It is okay if a woman does not work outside the household	It is okay if a man does not work outside the household
Treated (POST Unadj. N1)	-0.643	0.414	-0.571	-0.114	-0.114	0.000
	(0.630)	(0.534)	(0.496)	(0.507)	(0.639)	(0.000)
Non-compensable x Treated	0.895	0.238	1.083	0.077	-0.063	-0.133
	(0.763)	(0.734)	(0.637)*	(0.647)	(0.732)	(0.306)
Treated (POST Adj. N1)	-0.619	0.688	-0.517	-0.368	-0.312	0.124
	(0.578)	(0.577)	(0.404)	(0.498)	(0.714)	(0.228)
Non-compensable x Treated	0.904	-0.036	1.011	0.329	-0.020	-0.311
	(0.658)	(0.768)	(0.563)*	(0.624)	(0.833)	(0.373)
Treated (POST Unadj. N2)	-1.000	-0.500	0.000	0.500	0.500	0.000
	(1.024)	(0.886)	(0.000)	(0.512)	(0.886)	(0.000)
Non-compensable x Treated	2.167	2.000	1.333	-0.833	-1.000	-0.500
	(2.254)	(2.656)	(2.053)	(1.649)	(1.978)	(1.354)
Treated (POST Adj. N2)	-0.655	1.888	0.287	-0.951	-0.651	0.131
	(1.885)	(4.283)	(1.873)	(2.827)	(3.217)	(0.957)
Non-compensable x Treated	4.014	7.578	1.663	-3.108	-3.091	0.118
	(5.057)	(14.435)	(6.108)	(8.727)	(9.863)	(2.332)
F-test B1 + B2 = 0 (N1)	0.463	0.232	0.221	0.932	0.506	0.546
F-test B1 + B2 = 0 (N2)	0.607	0.589	0.802	0.712	0.757	0.938
Control Endline Mean (N1)	0.75	0.57	0.60	0.46	0.62	0.14
Control Endline Mean (N2)	0.71	0.55	0.57	0.50	0.66	0.14
N1	153	153	153	153	153	153
N2	110	110	110	110	110	110
R2 (N1)	0.729	0.661	0.848	0.766	0.677	0.767
R2 (N2)	0.666	-0.837	0.793	0.546	0.377	0.893

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

N2 corresponds to the total number of respondents who are not single or widowed.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

BKY (2006) Sharpened Q-Values of F-test treated + Non-compensable *treatment = 0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

Table 97: LATE Impact on ARB's Gender Views (Non-compensable interactions- male ARBs)

	Men should be the final decision-makers on parcels they own	Women should be the final decision-makers on parcels they own	Women should make decisions about their own income	Men should make decisions about their own income	It is okay if a woman does not work outside the household	It is okay if a man does not work outside the household
Treated (POST Unadj. N1)	-0.037	-0.036	-0.022	0.238	-0.110	-0.115
	(0.243)	(0.252)	(0.242)	(0.262)	(0.161)	(0.169)
Non-compensable x Treated	-0.122	-0.299	-0.009	-0.393	0.117	-0.040
	(0.282)	(0.311)	(0.291)	(0.324)	(0.213)	(0.223)
Treated (POST Adj. N1)	-0.107	-0.095	-0.082	0.184	-0.150	-0.145
	(0.252)	(0.265)	(0.259)	(0.280)	(0.159)	(0.172)
Non-compensable x Treated	-0.052	-0.326	0.060	-0.416	0.199	-0.007
	(0.298)	(0.340)	(0.326)	(0.344)	(0.225)	(0.232)
Treated (POST Unadj. N2)	0.045	0.032	-0.002	0.289	-0.111	-0.087
	(0.274)	(0.259)	(0.269)	(0.277)	(0.176)	(0.193)
Non-compensable x Treated	-0.241	-0.443	0.040	-0.346	0.195	-0.197
	(0.317)	(0.333)	(0.330)	(0.336)	(0.233)	(0.256)
Treated (POST Adj. N2)	-0.012	-0.026	-0.057	0.290	-0.140	-0.166
	(0.275)	(0.267)	(0.286)	(0.297)	(0.168)	(0.189)
Non-compensable x Treated	-0.162	-0.455	0.130	-0.427	0.262	-0.120
	(0.323)	(0.362)	(0.367)	(0.351)	(0.235)	(0.255)
F-test B1 + B2 = 0 (N1)	0.303	0.045	0.906	0.235	0.763	0.358
F-test B1 + B2 = 0 (N2)	0.307	0.052	0.740	0.474	0.502	0.136
Control Endline Mean (N1)	0.82	0.63	0.63	0.66	0.77	0.20
Control Endline Mean (N2)	0.81	0.67	0.65	0.65	0.79	0.19
N1	340	340	340	340	340	340
N2	297	297	297	297	297	297
R2 (N1)	0.522	0.470	0.482	0.443	0.513	0.464
R2 (N2)	0.523	0.500	0.484	0.475	0.541	0.484

OLS models with marginal effects. CLOA-clustered standard errors in parentheses. * $p<0.1$ ** $p<0.05$; *** $p<0.01$

N1 corresponds to the total number of observations for which the outcome is not missing.

N2 corresponds to the total number of respondents who are not single or widowed.

R2 and F-test of the adjusted models are reported.

Controls for the full sample include Gender, Age, Education, Marital status, and Enumerator gender.

Randomization strata is included in all specifications.

BKY (2006) Sharpened Q-Values of Impact (Adj. N1): 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

BKY (2006) Sharpened Q-Values of F-test treated + Non-compensable *treatment = 0: 1.000 , 1.000, 1.000, 1.000, 1.000, 1.000

Appendix A: Field notes and other information from formative work

Semi-structured interviews: Content analysis

Purpose

The purpose of these semi-structured interviews is to obtain qualitative information regarding property rights and agricultural investment in the context of "parcelized" titles. These interviews will help better inform the study's implementation plan and questionnaires so they can be more specifically tailored to the local context.

Introduction

The semi-structured interviewed were conducted by the Field Assistant for 6 weeks in November and December 2013 using lists of beneficiaries who had received individual CLOAs after having previously been awarded collective CLOAs. The interviews were conducted in 28 barangays of 13 municipalities in the province of Camarines Sur, and the data was collected through direct respondent interviews. See the "Semi-structued interviews_interview plan" document in the "LandPropertyRights_Semi-structured interviews" dropbox folder for a list of questions asked. Apart from the channel-specific questions listed below, clarifying questions included:

- Can you expand a little on this?
- Can you give me some examples?
- What about your fellow farmers / ARBs?
- Is there anything else you would like to add on this topic?

Reoccurring responses were coded under 4 categories:

- Tenure security
- Credit Access
- Investment
- Land Transfers

About 43% of ARBs interviewed stated they did not have individual CLOAs as stated in the administrative data and about 25% were unaware of ever having a collective CLOA, hindering our ability to conduct an analysis regarding the self-reported effects of parcelization and improved property rights.

Summary Statistics

Process

Response	Frequency	Trend by crop / mode?	Explanation	Implications for study	Survey questions
Unaware of collective CCLOA	25%	No	Possible reasons: 1) they were not the original ARB when the land was distributed, 2) they were not properly consulted when mother CLOA was mapped and distributed, 3) they don't understand the terminology (though explained in detail by FA)	Will need to figure out best way to ask these questions during field testing. We may want to include a question asking whether they were the original ARB when the land / collective CLOA was distributed (or whether they are a relative, newly settled farmer, etc.). There may be greater tenure insecurity if they were not the original awardee.	POWN_DOCS "What documentation of ownership do you have for this plot? IF THE TITLE IS WITH A DAR OFFICE, STILL SELECT THE APPROPRIATE TITLE." NEW QUESTION: POWN_OTILL "Was this plot initially awarded by the DAR to a previous tiller?"
No individual CLOA	43%	No	Possible reasons: 1) 36% of these ARBs reported they must fully pay for the land before receiving the individual title (some others received a copy and will be given the original when fully paid), 2) administrative reporting error, 3) it seems they report ARBs as having ICLOAs once registered with the LRA and not necessarily when distributed, 4) possible over reporting in order to meet targets	1. Possible heterogeneity of implementation strategy by municipality. Will want to request the intervention is implemented as uniformly as possible. 2. Will want to investigate reliability of reporting mechanism during the pilot.	Relevant for endline questions
Title demand	8%	No	Although the policy states the parcelization process should begin with a petition from the ARBs, this does not appear to be how it usually happens. Those that did request parcelization have not received titles (e.g. were told they must request as a group and split the cost (failed to do so), petitioned 14 years ago with no update, told they must fully pay for the land before it's parcelized).	There are concerns that demand for parcelization may contaminate the control group, though the lack of evidence here may indicate it might not be a big problem for the study. The only instances where there was demand for parcelization, the DAR did not follow through with the request. We have discussed collecting data on title demand during the baseline and stratifying the randomization on such an indicator to keep the sample balanced (and possibly limit the extent of contamination within the control).	TDEMAND "How important is it for you to obtain an individual CLOA?" TDEMAND_WHY "Why is it important?" TDEMAND_WHYNOT "Why is it not important?"

Interviews began asking about the process of acquiring individual CLOAs. In many cases, some of these questions could not be answered due to a lack of awareness of ever having a collective CLOA or not yet having an individual CLOA. Questions included:

- Can you tell me how you came to acquire an individual CLOA after having a collective CLOA?
- Was there any demand for individual titles among farmers within the collective CLOA?
- How long did the process take?
- How were you consulted during the process?

Tenure Security

Questions included:

- Main question: How secure was your ownership over your farm under the collective CLOA and then under individual CLOA?
- Are/were there any instances where you might lose your land?
- Have you ever had a dispute with someone over this land? If so, how was the dispute resolved? How long did it take?
- How long do you think you will own the land for?

Response	Frequency	Trend by crop / mode?	Explanation	Implications for study	Survey questions
Ability to pay	69%	No	Farmers often related their tenure security in terms of their ability to pay off the land within 30 years / whether they have begun making payments. Those that were late on payments / unconfident of their ability to fully pay felt it was more likely the DAR might confiscate their land.	Parcelization may increase tenure security as ARBs may then begin amortizing and paying land tax. However, there are reported cases of Land Bank encouraging ARBs under collective CLOAs to begin making payments (interest free). In such cases, parcelization would likely have a weaker effect here.	AMORT "How likely do you think it is that you can fully amortize your land within the 30-year mandated payment period after the land is resurveyed?" TS_GOVT "In your opinion, how likely is it that your parcel might be confiscated in whole or in part by the government?" NEW QUESTION: POWN_AMORT "Have you begun amortizing through Land Bank?" (if have CCLOA)
Title with name	18%	No	Having the title in hand with their name increased tenure security	If the intervention is implemented uniformly, then all treatment ARBs should have a title document that may increase their sense of security. Allowing some MAROs to continue withholding the document until the	POWN_DOCS "What documentation of ownership do you have for this plot? IF THE TITLE IS WITH A DAR OFFICE, STILL SELECT THE APPROPRIATE TITLE."

				land is paid could possibly dampen investment effects more than incentivizing farmers to pay (e.g. some mentioned they wouldn't pay bc they don't have a title), which could have policy implications.	POWN_DOCS "Do you have the original or a copy of the title on hand?" POWN_DOCNAM "Is the title in your name or a family member/relative's?"
Boundary dispute	25%	No	These ARBs reported either directly having a border dispute with another ARB or knowing of other farmer neighbors having such a dispute. The most common dispute involves an ARB moving the "monuments" that were placed to demarcate boundaries when the collective CLOA was issued. 3 farmers mentioned that they would not invest in their farm until the land was resurveyed for the iCLOA so the dispute could be resolved. However, it's important to note that some reported having such boundary disputes while having individual CLOAs. In fact, if the survey is done improperly or it goes ahead with unresolved disputes, it can actually reduce tenure security. These ARBs often have to pay for "relocation", or revalidation of their land, which can be costly.	This may likely be the most active channel where we see the titling program having an impact. It may impact investment positively or negatively.	"Tenure Security" module
Landowner threat gone	4%	No	Just 2 ARBs reported that their tenure security had increased due to a diminished threat from a former landowner. However, this was not due to parcelization but rather the landowner having died or moved away. Neither of these cases were under CA.	Tenure security gains appear to relate to threats from the government and farmer-neighbors moreso than from original landowners. Perhaps parcelization may have less of an impact on CA lands vis-à-vis reducing the threat from the original landowner than initially thought. This may be in part because these lands will have been distributed a minimum of 10 years ago, and such a threat has diminished with time.	TS_LOWNER "In your opinion, how likely is it that your parcel might be confiscated in whole or in part by the former landowner or his/her family?"
Original tenant	2%	No	1 ARB reported tenure security was unrelated to parcelization and that he was secure because he is the original tenant when the land was distributed.	Tenure insecurity may likely be greater for those who were not original tenants and names may not be on the title.	NEW QUESTION: POWN_TILL Was this plot initially awarded by the DAR to a previous tiller? "

Insurgency	4%	No	2 ARBs reported iCLOAs may not increase tenure security because the insurgents were under control and did not recognize these titles. They were encouraged not to pay off the land, which then increased the threat that the government may confiscate their land.	The impact of titling may actually have a weaker or negative effect in conflict-ridden areas such as this.	Have discussed gathering external data rather than including questions in survey
Length of tenure	6%	No	4 ARBs reported being secure in their tenure due to their length of tenure	Those owning the land for shorter periods may realize greater tenure security gains from titling	Consider adding plot-specific question re: years owned/farmed

Credit Access

Questions included:

- How do you pay for agricultural inputs?
- Has your access to credit changed with the issuance of an individual title?
- Can you use your title as collateral to acquire bank loans?
- Have you ever sought out credit from a formal banking institution/MFI?
- What prevents you from accessing credit?

Response	**Frequency**	**Trend by crop / mode?**	**Explanation**	**Implications for study**	**Survey questions**
CREDIT DEMAND					
Afraid to lose land	20%	No	These ARBs reported they would not use their titles as collateral because they are afraid the bank might foreclose on their land if they fail to pay.	Even if the farmers can use their titles as collateral, the demand for credit appears to be weak. May need to keep these responses in mind if we include a credit access component.	CREDREJECTNAPPLY "Why did you not apply?" CREDREJECTNCERTBARR "Why not?" (If "If you were certain that a commercial bank would approve your application, would you apply?" = No)
Use title as collateral	6%	No	Reported they use their titles as collateral. One ARB said he plans to once he received an iCLOA.	An impact via access to credit may likely be very small or nil, especially since the land must be fully paid to be used as collateral. However, the majority of respondents here	

				were under private lands and still amortizing. A minority owned public land.	
Harsh repayment schedule	18%	No	Repayment schedule (monthly or weekly) is too difficult to keep when income based on cropping cycle.		CREDREJECTNAPPLY "Why did you not apply?" CREDREJECTNCERTBARR "Why not?" (If "If you were certain that a commercial bank would approve your application, would you apply?" = No)
Can't repay/income fluctuations	16%	No	Reported their agricultural income was too vulnerable to external shocks, and they may likely be unable to repay their loans.	Potential role for crop insurance	CREDREJECTNAPPLY "Why did you not apply?" CREDREJECTNCERTBARR "Why not?" (If "If you were certain that a commercial bank would approve your application, would you apply?" = No)
Only for family emergencies	10%	No	Reported they would only use their titles as collateral during family emergencies (e.g. hospitalization/medicines), not to secure loans for agricultural investment		DEBPRODLOANUSE "What was the loan used for?"
High interest rate	14%	No	Reported they would not seek production loans because formal lending institutions' interest rates are too high		CREDREJECTNAPPLY "Why did you not apply?" CREDREJECTNCERTBARR "Why not?" (If "If you were certain that a commercial bank would approve your application, would you apply?" = No)
Lack of knowledge	10%	No	Reported they wouldn't know where to go to access a loan, what procedure to follow, whether they're qualified, or whether they can use their title as collateral.		Consider adding question asking how many banks/MFIs they know are in their area.
Not needed	10%	Yes (coconut)	Reported that credit is unnecessary because crop production does not require much capital / they already have sufficient funds	Might not see much investment in coconut itself.	CREDREJECTNCERTAIN "If you were certain that a commercial bank would approve your application, would you apply?" CREDREJECTNCERTBARR "Why not?"

Burdensome documentation	4%	No	Reported the documentation required is too burdensome; often prefer easy money from informal moneylenders. This is a common complaint received by MFI CARD and NATTCO.		CREDREJECTNAPPLY "Why did you not apply?" CREDREJECTNCERTBARR "Why not?" (If "If you were certain that a commercial bank would approve your application, would you apply?" = No)
CREDIT SUPPLY					
No collateral	12%	No	Reported they could not access credit due to lack of collateral		CREDREJECTNAPPLY "Why did you not apply?"
Already borrow	16%	No	Reported they already borrow from a bank/MFI (mostly MFIs)	Some existing demand for credit, though most do not use their titles as collateral. While most MFIs don't require collateral, some will accept it if the borrower it deemed particularly risky.	DEBPRODLOANYN "Do you or a member of your household have a production loan from a bank?" DEBOTHBANKYN "Do you or a household member have another type of loan from a bank?"
No agricultural production loan	4%	No	Reported that banks do not offer loans for agricultural production. One reported there used to be a program providing agricultural credit but most farmers failed to repay, so it ceased.		CREDREJECTNAPPLY "Why did you not apply?"
Loan denied	2%	No	Reported a previous loan application was denied		CREDREJECTYN "In the last 5 years, have you applied for a commercial bank loan and been rejected?"
Low loan amount	2%	No	Reported the amount loaned are too low		CREDHYPFAMAMT, CREDHYPLOANSZ, CREDHYPTRADERLOANAMT , CREDHYPFORMALAMT "Again, imagine you want to make a large investment in your farm today. What do you think is the largest amount that you could get in loans from (family, friends or neighbors/formal banking institutions/cooperatives/traders) ? Please add up the amount if you can borrow from multiple people."

Investment

Questions included:

- If you were to make a new investment(s) in your farm, what would it be?
- What are other important investments [state crop] farmers make to improve productivity and income?
- Why might you hesitate to invest more in your farm?
- Does having an individual CLOA rather than a collective CLOA affect your investment decisions?

Response	Frequency	Trend by crop / mode?	Explanation	Implications for study	Survey questions
Lack of knowledge	20%	No	Reported they didn't know any further investments they could make to improve their farm's productivity or a lack of knowledge on how to grow and market a new crop.	Areas where extension services are provided (e.g. ARCs) may correct this information problem.	TRAINING "Have you attended training on farm practices in the last five years?"
No investment needed	18%	No	Do not believe their farm needs any further investment. Many mentioned that coconut is not a very capital-intensive crop. Many had been provided free inputs from the Philippine Coconut Authority, which many times failed to realize the proposed productivity gains.	Even where a farmer may believe s/he has reached a ceiling on investment for a particular crop, there is always the option of cultivating a new crop.	ASP5 "What is the level of productivity you want to achieve?"
Equipment	10%	No	Reported they would buy equipment such as a water pump or hand tractor; in some instances these tools would be used to cultivate vacant land/farm a new crop.		Asset module
Expand cultivation	4%	No	Expand farm by cultivating a vacant lot.		Area tilled during baseline vs endline.
Increase inputs	6%	No	Would increase the amount of inputs applied to farm (e.g. fertilizer).	Fertilizer use appears to be the more popular answer here, which shouldn't be too difficult to measure.	I-O Allocation module
New crop	6%	No	Would plant a new crop; one reported he would plant a more profitable crop (corn) he sees his neighbors farming.	Easier to measure these investments vs. changes in inputs.	Endline Plot Roster
Too old	6%	No	Too old to make new investments; content with their current practices and productivity	May see heterogeneity in investment by age. Note the average age of an ARB is around 56.	ASP5 "What is the level of productivity you want to achieve?" AGE "How old are you?"

Cost of effort too high	4%	No	Reasons given include 1) not enough time, and 2) too tiring.		Accurately measured in Aspirations module?
Livestock	12%	No	Would invest in raising (more) livestock. One ARB referred to this investment as having more "stable" returns.		Assets module

Land Transfers

Questions asked:

- Can you tell me to what extent farmers sell or mortgage their land after the collective CLOA is subdivided?
- Why do these farmers sell or mortgage their land after receiving an individual title?
- What kind of contractual arrangements are made?
- How reliable are these contracts?

Summary:

While many farmers reported that fellow ARBs sell and mortgage their land, this mostly happens regardless of the type of title (or whether the farmers have a title at all). The only evidence of a possible gains from trade channel involves a case where one respondent discussed an ARB selling his land because he could not afford to pay the amortization that comes with the individual title. Considering ARBs have to fully pay for the land before they can sell or mortgage it, this is the more likely mechanism at play.

Appendix B: Sampling process

Selection of provinces

The first step of sample selection involved reviewing nationwide lists of collective CLOAs considered as priorities for subdivision provided by the DAR Central Office (DARCO). Provinces were evaluated for inclusion in the sample based on the following criteria:

1. **Large backlog of priority titles:** The DAR creates annual target lists of collective CLOAs for subdivision, from which IPA drew the study sample. Our site selection focused only on provinces with large backlogs of collective CLOAs for subdivision so that the evaluation's control group would not impede the DAR from achieving their annual targets. Any CLOAs randomized to the control group were then replaced with titles not yet targeted so we could maintain the control group without affecting the provincial targets for subdivision.
2. **Crop coverage:** The study focuses on landholdings where rice, corn, and coconut are planted, so the research team selected provinces where these crops are commonly farmed. The study focuses on these crops due to their 1) prevalence and importance to Philippine agriculture, 2) prevalence under collective titles, 3) relatively short cropping cycle, allowing us to detect impacts within the evaluation's timeframe, and 4) the high poverty incidence of smallholders that grow these crops.
3. **Peace and order issues:** The DAR suggested that the research team avoid selecting areas affected by ongoing conflict or major natural disasters (e.g. provinces where Typhoon Haiyan had destroyed agricultural lands and administrative records during sample selection) as it would be difficult to parcelize treatment titles within the evaluation timeframe.

Table 2: Priority collective CLOAs for subdivision (ha)

	2014			2019		
Region	**Workable**	**Problematic**	**Total**	**Workable**	**Problematic**	**Total**
CAR	17,643	2,868	20,511	9,538	3,201	12,738
I	6,821	0	6,821	2,182	1,627	3,809
II	37,051	338	37,389	20,342	2,703	23,045
III	12,765	980	13,745	11,280	185	11,466
IV-A	3,473	7,307	10,780	746	3,638	4,385
IV-B	13,431	1,413	14,844	6,957	632	7,589
V	33,260	13,006	46,265	2,266	28,488	30,754
VI	111,131	2,494	113,625	99,271	2,144	101,415
VII	22,185	5,372	27,557	12,667	3,752	16,419
VIII	113,223	9,264	122,488	89,728	28,205	117,933
IX	25,383	677	26,059	4,156	7,169	11,325
X	42,583	4,339	46,922	27,092	5,485	32,577

XI	46,718	345	47,063	21,859	928	22,786
XII	66,300	459	66,759	55,188	329	55,517
CARAGA	28,751	11,479	40,229	20,249	4,900	25,149
ARMM / BARMM	3,539	0	3,539	67,655	0	67,655
Total	584,257	60,338	644,596	373,984	93,386	544,562

Table 2 shows the balance of collective CLOAs by region in 2014 during the sampling stage and in 2019 when the study's endline survey started. The DAR prioritizes these titles, excluding landholdings where the ARBs have refused parcelization, farmer cooperatives and associations, lands distributed by the Voluntary Land Transfer mode of acquisition, and lands determined not to be alienable and disposable (i.e. they cannot be parcelized) (see Section 5.3.2). Workable titles are those the DAR deems that it can subdivide without major complications, and those labeled problematic are those where the barriers to parcelization are deemed high (e.g. ongoing conflict where the landholding is located). During this stage, we selected the following eleven provinces across five regions:

Region V: Camarines Sur and Albay
Region X: Bukidnon and Misamis Oriental
Region XI: Davao del Sur, Davao Occidental, and Davao Oriental
Region XII: Sarangani, Sultan Kudarat, and North Cotabato
Region XIII (CARAGA): Surigao del Sur

The five regions included in the study make up 34 percent (126,654 hectares) of workable collectively titled land that was remaining to be subdivided in 2019. Given the rate of subdivision in these regions during the past four years, it will take about nine more years to subdivide their workable titles. (i.e. just conduct and approve subdivision surveys). These figures do not consider lands which have not yet had their individual CLOAs registered and distributed, which may take even longer.

While Region VIII holds the highest balance of collective CLOAs, the DAR recommended to exclude the region from the study because the destruction wrought by Typhoon Haiyan in 2013 had significantly reduced operational capacities. We excluded Region VI due to the reportedly large number of hectares covered by large sugarcane plantations what would require significant time to parcelize. We then focused on the regions with the next highest balances of collective CLOAs: Regions V, X, XI, XII, and CARAGA.

After we narrowed down the list of regions and potential provinces, IPA held orientation workshops with the respective regional and provincial offices in order to better assess their eligibility and to gain support for the study. The provincial offices then provided updated information on their balance of prioritized collective CLOAs for subdivision. Following this process, we selected the following eleven provinces across five regions:

Region V: Camarines Sur and Albay
Region X: Bukidnon and Misamis Oriental
Region XI: Davao del Sur, Davao Occidental, and Davao Oriental
Region XII: Sarangani, Sultan Kudarat, and North Cotabato
Region XIII (CARAGA): Surigao del Sur

Once a provincial office agreed to support the study, the respective Provincial Agrarian Reform Officer (PARO) and Chief Agrarian Reform Program Officer (CARPO) signed an implementation plan detailing the nature of the cooperation between their office and IPA (see Appendix F). Other provinces within these regions were primarily excluded due to an insufficient number of qualified titles. For example, Masbate in Region V was excluded due to reported peace and order issues affecting many of its collective CLOAs.

Selection of collective titles

Once the study's provincial sites were selected, we worked with the DAR offices to select collect titles using the following sampling criteria:

1. **Subdivision status:** Only landholdings that had not begun the subdivision process yet were included. Moreover, we did not include any landholdings where the ARBs would have already been informed of plans to carry out a subdivision survey and thus anticipate parcelization. This stage was typically indicated as "No Request for Subdivision Survey" (RSS) in the DAR's field operation files.

2. **Willingness to parcelize:** The DAR does not parcelize any landholdings where any ARBs would rather remain under collective CLOAs. These landholdings were usually already identified and excluded from their priority lists.

3. **Registered over 10 years ago:** The CARP forbids ARBs to sell or lease their awarded lands for more than 10 years after distribution in an effort to prevent the reconsolidation of land among landowners. In order for us to investigate the access to credit and gains from trade channels, all sample CLOAs should have been distributed and registered over 10 years ago.
4. **CLOAs for priority:** The DAR prioritizes landholdings that are compensable by Land Bank of the Philippines. Under the instruction of the Secretary, we excluded lands that were acquired through Voluntary Land Transfer as this often entails the distribution of landholdings from one family member to other family members or relatives. These landholdings are not prioritized by the DAR.

5. **Less than 30 ARBs per title:** The study focuses on smallholder farms rather than large plantations. Thus, landholdings with more than 30 ARBs per title were excluded.

6. **Not problematic:** The DAR labels titles as problematic if there are any issues that are considered to hinder the parcelization process (e.g. ongoing legal cases of competing claims to the land). Since such issues are expected to significantly prolong the parcelization process, we exclude any titles that are considered by the DAR to be problematic. We also consider in this analysis "problematic" those CLOAs that are located in municipalities or barangays with peace and order issues.

7. **Alienable and disposable:** These are lands that the DAR can legally subdivide. At times, collective CLOAs lie within public[64] land that cannot be legally logged or farmed. Those titles cannot be subdivided since they cannot be privately owned or used for productive purposes. Thus, the study focuses only on alienable and disposable lands

[64] "Public land" is a commonly-used alternate term for non-compensable land.

since all titles should be eligible for parcelization. The provincial offices projected the coordinates of collective titles using the DENR's land use maps to certify whether the landholding was alienable and disposable.

IPA first narrowed down the provincial target lists based on criteria one through seven. Next, Municipal Agrarian Reform Program Officers (MARPOs) helped validate these lists to ensure all variables related to the qualification criteria were up to date. In many cases, titles listed as having no RSS proved to have already been subdivided; this occurred in approximately 30 percent of titles initially considered qualified and varied by province. Aside from information on subdivision status, MARPOs also provided information on towns or barangays with peace and order issues that would be risky for the DAR or IPA staff to visit for fieldwork and where the intervention would likely experience long delays.

In addition to IPA's examination of target lists and data gathered from meetings with MARPOs, the municipal DAR offices in the Region XI carried out an ARB-level validation of the titles. The MARPO validation led to the disqualification of 746 titles across four provinces, in addition to those that had been previously disqualified based on the target lists. The most common reasons for disqualification in this case were peace and order issues, titles with subdivision carried out or scheduled, and legal cases and land disputes.

The table below presents the number of titles among the sample provinces in each of the study's regions that were considered disqualified for the study based on the information presented in the target list (a breakdown by province can be found in Appendix L). It also includes titles that were dropped from the sample following validation from MARPOs that showed that the titles were in the process of subdivision or in areas considered problematic due to peace and order issues. Examination of the target lists led to approximately 85 percent of the titles on the target lists being disqualified, leaving 1,849 sample titles for the study**.** The most common reason for the disqualification of titles was that they were either already subdivided or in the midst of some stage of the subdivision process. Additionally, many titles were disqualified, particularly in Mindanao, for being considered problematic, mainly due to peace and order issues. Taken together, these two criteria explain 91 percent of disqualifications. During this stage, the provinces of Davao del Norte, Compostela Valley, and Davao City had no CLOAs in the target lists eligible for IPA's study.

Common reasons in the "other" category included CLOAs that lacked accurate geographic coordinates in their title documents (so-called "graphical titles"), CLOAs where the ARBs were known to not be tilling the land, and CLOAs that were known to be leased to large multinational corporations, a major reason for disqualification in Sarangani province in particular. CLOAs with inaccurate geographic coordinates were disqualified because reconstructing the accurate boundaries of the parcels requires a great deal of on-the-ground fieldwork and legal reconciliation of boundaries, a time-consuming process that would delay the subdivision process, perhaps indefinitely.

There were two sampling qualification criteria that were solely imposed by the study and not the DAR: titles that were beyond the 10-year land sale restriction and titles with less than 30 ARBs. Taken together, these cases represent about five percent of titles that were disqualified at this stage.

Table 3: Disqualified titles based on target list data							
Reason for disqualification	**Region V**	**Region X**	**Region XI**	**Region XII**	**CARAGA**	**Total**	**Percent of Total Disqualified Target Titles**
Below 10-year land sale restriction	59	121	197	32	1	410	4
VLT Mode of Acquisition	24	0	0	146	0	170	2
Problematic or with peace and order issues	282	253	269	1,420	161	2,385	23
More than 30 ARBs	35	18	54	11	1	119	1
Already Undergoing Subdivision	111	1,576	1,835	2,707	906	7,135	68
Other	0	6	196	119	0	321	3
Total	511	1,974	2,551	4,435	1,069	10,540	-

While all DAR-awarded titles were considered to be on alienable and disposable land at the time of awarding, changing land classifications mean that it is now necessary for the DENR to project a title's coordinates onto their updated map to determine whether the title is now located on timberlands Those titles found to be on timberlands are then unable to be subdivided, as they cannot be privately owned or used for productive purposes. While some provincial offices conduct projection after a Request for Survey Services, other offices delegate this task to the DENR during the subdivision process. IPA requested projection to be carried out on our potential sample tiles during the sampling stage in order to ensure that tiles randomized into the treatment group would be legally eligible for subdivision.

The results of the projection process are shown below. Projection was carried out prior to the start of the baseline survey in Region V and resulted in the elimination of about 60 percent of sample titles. In Regions XI and XII, IPA was told that projection was not necessary beforehand as all titles were considered to be on alienable and disposable land, although twelve titles in Region XI later turned out to be on timberlands.

Table 4: Disqualified titles during projection process				
	Reason for Disqualification			
	Fully within timberlands	Partially with timberlands	Already subdivided	Total
Region XI*	0	0	0	0
Region V	52	2	41	105
Region XII*	0	0	0	0
Region X[65]	20	14	34	68
Region XIII	14	0	0	14
Total	86	16	75	187

*Denotes regions where all titles were assumed to be on alienable and disposable land based on information from the DAR.

Titles that were eliminated during the projection stage were found to lie partially or entirely on timberlands, thus precluding subdivision. However, 40 percent of titles disqualified during this stage were also those found to have already been subdivided according to DENR records, despite being listed as still collective according to the DAR. This discrepancy can be explained in part by ARBs of these titles requesting a private firm to carry out the subdivision survey, meaning that the survey did not appear in DAR records. In addition, MARPOs in Region V simply provided additional feedback during this stage that several CLOAs had already been subdivided by the DAR. Note that the totals shown in Table 2 are separate from those listed in Tables 3 and 4 as being already subdivided, as the latter titles were only later found to be subdivided based on updated information from the DAR or interviews with ARBs.

Selection of ARBs

While records from the DAR and DENR could generally determine whether collective titles were potentially qualified for the study, it was still necessary to ascertain whether or not the ARBs of these titles were qualified for the study. In order to qualify, the ARB generally must be eligible to receive an individual CLOA. For this reason, in-person validation of the ARBs within potential sample CLOAs was conducted both by the DAR and by IPA staff. Collective CLOAs that had at least one eligible ARB could be included in the sample. ARBs were considered disqualified from the study for the following reasons:

1. **Deceased:** The ARBs originally listed on title documents are an ageing population, and many have since deceased after receiving their collective CLOA. Due to the difficulty of identifying the heir to the land and the long process necessary for transferring title ownership from ARBs to their heirs, deceased ARBs and their households were not considered qualified for the study.

[65] During projection in Region X, it became apparent that about 30 percent of the potential sample titles had missing or misplaced records, leading to further delays as the DENR searched for these records for projection.

2. **Sold parcel:** Selling DAR-awarded collective titles is not technically legal, though it occurs informally. Any ARBs that had sold their parcels were considered disqualified from the study, as they were not eligible to receive individual titles.

3. **Permanently migrated:** In order for ARBs to receive individual tiles, they (or their spouse) must attend an official assembly with other members of their collective CLOA in person and sign the new title document. Thus, ARBs who had moved away from the sample site and could not attend the assembly were considered disqualified.

4. **Abandoned or not tilling parcel:** ARBs who had abandoned their agricultural parcel and had no intention of tilling or managing it were excluded from the study. However, given the possibility that an individual title may allow ARBs to till land they had previously been forced to leave untilled due to a lack of money or lack of tenure security, ARBs who expressed interest in tilling their land in the future were included. In addition, ARBs that had their DAR-awarded parcels occupied by hostile parties, including former landowners, other ARBs, or militant groups, were not considered qualified.

5. **Land disputes:** Any ARBs reporting conflicts over their land with other parties that would likely result in lengthy court cases were considered disqualified since the DAR would be unlikely to parcelize the CLOA within the study's timeframe. We consulted with the DAR on a case-by-case basis regarding these land disputes.

6. **Parcel already subdivided:** Though provincial and municipal DAR offices were asked to validate lists of potential CLOAs to determine if any had already been subdivided, it was discovered during in-person validation that some titles had already been subdivided or were in the process of subdivision. This was sometimes due to inaccurate records in DAR offices and sometimes due to ARBs ordering private subdivision of their collective titles (rather than awaiting the official DAR-provided subdivision survey), in which case the DAR was not updated on the situation.

7. **ARBs missing or unavailable:** Some ARBs proved to be unable to be found or interviewed, either because they were not around in their households or because their households could not be identified. In the case of ARBs that were unavailable or not around in their homes, staff were instructed to follow a "three-strikes rule": they visited the house of the ARBs at least three times and attempted to set up an appointment or gather additional contact information each time. Less commonly, ARBs were unknown in the communities listed on the official DAR records. In these cases, staff asked knowledgeable people in the communities listed, and in adjacent communities, if they were aware of the ARBs or their family members.

8. **Other reasons:** Less common reasons for disqualification included peace and order issues in the ARB's barangay of residence or the area that their parcel was located, physically or mentally incapacitated respondents who could not be interviewed, and ARBs who stated they preferred to remain in collective CLOAs rather than receive individual titles. In the case of peace and order issues, occasionally conflicts and issues developed suddenly, leading the area of the ARB's residence unable to be visited. In twelve cases, the residences of the ARBs themselves were safe, but the area where their parcel was located was not, meaning that it was not possible for the ARB to visit the farm at the time of the interview or for survey teams to subdivide the land.

In Regions V and XI, municipal DAR staff conducted validation activities in accordance with the implementation plan (see Appendix F), while IPA staff assisted with validation in some areas. During the course of the survey, however, it was found that many of the validation reports were inaccurate, requiring re-validation of ARBs by IPA survey staff at the time of the baseline survey. To reduce the burden on the municipal offices while also expediting the validation process, the DAR and IPA agreed that IPA survey staff would conduct ground validation in Regions X, XII, XIII, and for additional titles in Region XI. Validation was conducted at the same time as the actual survey work, and ARBs found to be qualified for the study were interviewed immediately afterward.

Of 5,212 ARBs validated, 20 percent were found to be qualified for the study. As seen in the table below, more than half were disqualified because our staff were unable to carry out an interview, either because the ARB was deceased, had migrated, or was unavailable to be interviewed after three visits. An additional 15 percent were disqualified because IPA had discovered during the ARB interview that the collective title had already been subdivided.

Table 5 Disqualified ARBs during validation process

Reason for disqualification	Region V	Region X	Region XI	Region XII	Region XIII	Total	Percent of total disqualified
Deceased	50	246	333	207	27	863	21
Permanently Migrated	60	141	227	94	55	577	14
Title already subdivided	2	187	302	126	24	641	15
Sold DAR-awarded parcel	13	239	148	131	7	538	13
Unavailable (after three attempts)	10	245	257	294	18	824	20
Land Dispute	14	31	141	11	6	203	5
Peace and Order Issues	0	1	11	76	0	88	2
Other	22	91	209	116	9	447	11
Total	171	1,181	1,628	1,055	146	4,181	-

If at least one ARB was considered qualified, the respective CLOA was still qualified for the study. If no ARBs under a collectively titled landholding were qualified, then the CLOA was dropped from the sample. After on-the-ground validation of ARBs was complete, 34 percent of the 1,715 CLOAs included in this stage of the sampling process were validated as qualified. The single most common reason for disqualifying titles at this stage was due to the CLOA already having been subdivided.[66] Before randomization, IPA asked the DAR to validate the remaining sample titles one last time. An additional 81 titles were dropped during this stage, leaving us with a final sample of 475 CLOAs.

[66] This suggests that the DAR's records may be underreporting accomplishments with regard to the parcelization of collective CLOAs.

Table 6 Disqualification of titles during ARB validation							
Reason for disqualification	**Region V**	**Region X**	**Region XI**	**Region XII**	**Region XIII**	**Total**	**Percent of total disqualified**
ARBs deceased	1	15	42	30	0	88	8
ARBs sold parcel	3	53	23	21	0	100	9
ARBs permanently migrated	5	11	20	10	7	53	53
ARBs missing or unavailable	2	42	32	90	2	168	14
CLOA already subdivided	1	56	86	21	27	191	16
CLOA subdivided during baseline survey	0	0	90	49	0	139	12
ARBs disqualified for a variety of reasons	13	77	49	127	12	278	24
Other	5	45	54	31	7	142	12
Total	30	299	396	379	55	1,159	-

Overall, over 80 percent of the titles that were preliminarily considered qualified for the study according to administrative data, projection, and initial ARB-level field validation by MARPOs were disqualified during IPA's field validation or upon later re-validation by municipal DAR offices. 330 titles were ultimately found to have already been subdivided or be in the process of subdivision after they had been certified as not having been subdivided by municipal and provincial DAR offices. This led to a significant time-cost as a lengthy in-field, individual-level validation by IPA staff proved to be the only way to accurately determine whether ARBs and their CLOAs were qualified for the study.

The study sample of contains 475 eligible titles which were privately randomized by the Principal Researchers using a matched-pair randomization on a statistical computer software. Collective titles were matched on the following characteristics: 1) whether the titled landholding is on compensable or non-compensable land, 2) provincial location, 3) whether the title is within an Agrarian Reform Community (ARC) through which the DAR channels support services, and 4) the number of ARBs on the collective title qualified for the study.

Due to implementation delays, ARBs in the provinces of Bukidnon and Davao Occidental were not targeted to be interviewed at endline and are not part of the results presented in this report. The analysis sample of this reports contains 324 titles. Treatment and control plots are statistically balanced (Table 7) while there is some evidence indicating that control ARBs and their households are wealthier, more educated, and have more farming experience than treatment farmers. Our econometric specifications control for these imbalances.

Table 7: Plot-level Balance of Analysis Sample

Variable	Treatment	Control	Diff (Strata-Adjusted)	CLOA-clustered SE of Diff
Plot is within ARC	0.52	0.51	-0.033	0.024
Plot is non-compensable	0.58	0.60	0.009	0.017
Plot leased-out (entire/portion)	0.25	0.24	0.014	0.032
Number of years tilling plot	20.29	19.34	0.024	1.154
Plot distance to market	12.15	13.09	-1.491	1.08
Plot has irrigation	0.34	0.38	-0.009	0.039
Plot drains quickly	0.75	0.78	-0.016	0.036
Upland	0.52	0.56	-0.044	0.033
Slight slope	0.54	0.55	-0.005	0.038
Flat slope	0.33	0.34	-0.025	0.03
Steep slope	0.12	0.10	0.031	0.025
Perceived plot risk index	0.07	0.11	-0.149	0.096
Plot has had ownership conflicts in the past 2 years	0.05	0.05	0.017	0.019
Neighbor confiscation is very/somewhat likely	0.12	0.14	-0.026	0.023
Government confiscation is very/somewhat likely	0.32	0.31	0.02	0.039
Last owner confiscation is very/somewhat likely	0.10	0.08	0.023	0.022
Other's confiscations is very/somewhat likely	0.04	0.05	-0.014	0.016
Transfer to children is very/somewhat likely	0.91	0.89	0.009	0.023
Tenure Security Score	4.32	4.31	0.014	0.07

Table 8: ARB-level and Household-level Balance of Analysis Sample

Variable	Treatment	Control	Diff (Strata-Adjusted)	CLOA-clustered SE of Diff
Female	0.33	0.33	-0.014	0.036
Respondents age	54.79	53.11	1.419	1.156
Completed Middle School	0.66	0.72	-0.064	0.045
Completed High School	0.29	0.38	-0.121***	0.041
Years farming in total	41.42	38.88	2.792**	1.257
Years as a primary tiller	26.73	24.92	2.105*	1.23
# of Plots Owned by ARB	1.49	1.63	-0.099	0.076
# of Plots Tilled by ARB	1.20	1.36	-0.123*	0.068
Prefer to own 1 Ha alone than 3 Ha jointly with others	0.93	0.93	0.014	0.019
Do you worry about your future?	3.27	3.18	0.126	0.082
Do you feel stressed about your job or economic activity?	3.26	3.27	0.024	0.066
# of hh members	4.86	4.60	0.217	0.17
Log of total per-capita food expenditure	5.72	5.77	-0.104***	0.038
Log of total per-capita household income	7.53	7.69	-0.277**	0.124
Log of total per-capita household savings	-7.27	-5.62	-1.318	0.869
First component PCA - agricultural tools value	0.04	0.13	-0.14	0.16
First component PCA - livestock value	-0.03	0.11	-0.089	0.109
First component PCA - durable goods value	-0.03	0.20	-0.372***	0.14

Appendix C: Pre-analysis plan

Impact Evaluation of the Formalization of Land Property Rights in the Philippines

Hypotheses, Measurement and Pre-analysis plan

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Introduction

Private property rights are generally considered one of the key pillars of economic growth and development. Property rights over agricultural land in particular are central to policy making in developing countries given their potentially important role for agricultural productivity and investment, poverty and inequality. Economic theory suggests property rights may operate through several channels to increase investment, but despite the importance of this issue, limited empirical evidence exists on either the overall effect or the importance of the particular channels.

Many Agrarian Reform Beneficiaries (ARBs) who received land through the Comprehensive Agrarian Reform Program (CARP) received collectively-issued titles. The Government of the Philippines recognizes that these collective titles may constrain investment and financial market development and is implementing a program to subdivide the collective land and formalize the individual property rights, a process hereafter referred to as parcelization. This project evaluates the impact of the parcelization program using a cluster-randomized trial with the goal of understanding the impact of formal property rights on investment and the degree to which the lack of formal rights limits financial market development.

In particular, the evaluation will focus on understanding the constraints to investment in agriculture and the channels –- such as access to credit, security of tenure or more efficient land markets -- through which formal property rights may allow for increased investment. The key outcomes of interest are agricultural investment, output and profits; credit use and access to credit; land market efficiency and perceptions of security of property rights. The study will also examine how shifts in property rights may change intra-household bargaining and decision making on land.

Intervention

After the Marcos regime in the Philippines was toppled in 1986, the new administration of Corazon Aquino started an aggressive land reform program. The Comprehensive Agrarian Reform Program (CARP) was launched in 1988 and continues today. The program was meant to redistribute a vast area of land -- 9 million hectares -– from private owners and corporations as well as government to very small-scale farmers or landless rural people.

The redistribution progressed slowly at first. Then, under political pressure to show good progress, government officials started to redistribute land in bundles by awarding groups of farmers ”collective” land titles. This process accelerated the program and now more than 4 million hectares have been redistributed, with about 65% of that land awarded as collective land titles.

Recognizing the many problems of collective titles, the Department of Agrarian Reform (DAR) has begun subdividing collective titles and awarding individual farmers formal titles to their land. In this impact evaluation we evaluate this parcelization component of the Comprehensive Agrarian Reform Program, which targets those beneficiaries who were previously awarded collective titles. In addition to supporting the CARP’s overall goal of social justice, the Department of Agrarian Reform expects parcelization to increase investment and growth in the agricultural sector, fostering a more sustainable, inclusive growth and reduced reliance on food imports from abroad. The evaluation serves both as a policy evaluation to inform land policy in the Philippines, and as unique opportunity to explore, via a randomized control trial, the importance of private property rights to land for investment and growth in agriculture.

Theory

The lack of clear and formal property rights is a pervasive feature in the developing world. Indeed, many have argued that this lack of property rights is one of the key reasons for the underdevelopment of poor countries. Economic theory suggests three key mechanisms through which property rights can influence investment decisions (see, for example, Besley 1995):

- **Freedom from expropriation**: Having more secure rights may induce greater investment simply because the threat of expropriation of the fruits of that investment are lowered.

- **Access to credit**: Formal property rights may allow the owner to secure the necessary credit (using the land as collateral) to make optimal investments in the land.[67]

- **Gains from trade**: If land sale markets are not free and especially if land has been awarded through government land reform programs (as is the case for the participants in this study), it is likely that the land is not in the hands of the person most able to productively use the land. This can be because they lack the necessary skills or abilities, or they lack the capital or access to credit. Finally, land may be held at an economically inefficient scale. Freeing the land markets may therefore result in gains both through better resource allocation (in skills and capital) and in gains through scale economies.

The degree to which threats of expropriation, lack of access to credit and limitations on land sales and rentals act as constraints to agricultural investment depend in part on the strength of each constraint.

Aside from limiting agricultural investment, the lack of clear property rights for land can be a constraint in other dimensions that have direct consequences for welfare. This includes:

- Mobility constraints: Lack of property rights can be a constraint on mobility (e.g., moving to cities to look for work), causing both efficiency losses in the labor market and subsequent welfare losses.
- Psychological costs: Lack of property rights can take a direct toll on welfare through the psychological costs that come with anxiety and worry.
- Constraints on decision-making: Uncertain property rights can lead to landowners making decisions on their land that are not aligned with their own goals and values. The spouses of ARBs may also lack clarity on their rights to the land, and thus take a less active role in the decision-making process.

Experimental Design

The heart of the evaluation design is a cluster-randomized controlled trial that randomly selects the collective titles the DAR parcels out. The control group will not be parcelized until a year

[67] Note: while the impact evaluation was initially designed to measure impacts on access to credit as a mechanism, due to delays in project implementation, indicators for this hypotheses were not collected in the first endline because the timeline between implementation and endline were too short to reasonably expect impacts through this channel. If an additional endline is possible, the PAP will be amended to include the concrete measures of access to credit, but in this version, the remainder of the document does not indicate how access to credit will be specified.

after the treatment group receives the intervention, allowing sufficient time for farmers to make significant agricultural investment decisions before a follow-up survey is conducted.

Sample

The study sample will consist of 475 collective titles, evenly randomized to the intervention and control groups. They will be drawn from several target study areas and will consist in equal parts of initially public and private land. Provincial field sites will be selected where 1) there is a large outstanding balance of collective titles to be parcelized, 2) coconut, rice, and corn are the prevailing crops grown under collective titles, and 3) there are no major ongoing conflicts that may compromise the security of field staff or the activities related to the intervention. The crops under focus were selected based on their importance to Philippine agriculture, prevalence under collective titles, length of cropping cycle (and ability to detect impact within the evaluation's time frame), and poverty indices of smallholders that grow these crops.

Once the field sites are selected, the sampling frame will consist of collective titles listed among the annual targets for parcelization compiled by the respective provincial and municipal Department of Agrarian Reform (DAR) offices. The sample will be limited to those collective titles that the DAR deems "clean and complete"; that is, collective titles that, by the judgment of DAR ground staff, can be subdivided without major complications. For example, the sample excludes titles with known ongoing legal disputes, titles where the farmers refuse to participate in the subdivision process, and titles in areas with peace and order problems where violent conflict poses an obstacle to carrying out the intervention. This selection process is part of the DAR's regular policies and is not dictated by the evaluation team. Using these "clean" target titles will help prevent long delays in the intervention and allows for timely results.

From these target lists, the sample will be restricted to those collective titles that were issued over ten years ago. This criterion emerges from a land sale restriction where Agrarian Reform Beneficiaries (ARBs) cannot sell or lease their land until they have owned it for at least ten years. In order to properly investigate the access to credit (where ARBs can use their individual titles as collateral) and gains from trade channels, this law should no longer apply to the sample.

Randomization

A matched-pair randomization will be performed by the research team using computer software. Collective titles will be matched on the following characteristics: whether they are public and private land, provincial location, whether the title is within an Agrarian Reform Community (ARC) which provides access to considerable additional inputs and other resources, and the number of ARBs on the collective title qualified for the study.

Balancing tests

Variables used to test balance in the randomization include:

1. The size and number of plots held by farmers
2. Farmer characteristics (i.e. income, education, and agricultural experience)
3. Title demand
4. Reliance on agricultural traders for inputs

Statistical power

A power calculation determined that a sample size of 320 clusters with approximately 2 individuals each is sufficient to detect effect sizes of 0.31 SD with 90% power for a two-sided test. This calculation assumes Beta = 0.5, Rho = 0.2, and about 60% compliance. We are powered to detect similar changes in decision-making allocation and autonomy based on the spousal survey. Compliance for the first survey round is expected to be lower than ideal due to delays in the subdivision process in some provinces. Higher levels of compliance in a second follow-up survey would result in substantial gains in power but would require additional funding. Please refer to the attached power calculation sheet for details and discussion of alternative scenarios.

Hypotheses

We organize the hypotheses into families on the effect of the DAR parcelization program (DARPP). After each hypothesis we provide a ranking: * for primary; ** for secondary.

Family 1: Agricultural Investment and Output

Group A: Investment and Output

H1: DARPP increases agricultural investment*
H2: DARPP increases agricultural output*

Group B: Mechanisms of Increased Investment

H3: The effect of DARPP on increased investment/output can be (partially) explained by improved perceptions of tenure security*
H4: The effect of DARPP on increased investment/output can be (partially) explained by gains from trade*

Family 2: Tenure Security

H5: DARPP increases perceptions of tenure security*

Family 3: Gains from Trade

H6: DARPP leads to gains from trade*

Family 4: Household Welfare and Financial Position

H7: DARPP increases household food consumption**
H8: DARPP improves psychological wellbeing**

Family 5: Migration

H9: DARPP reduces bondage to land (increases ability to migrate to opportunity)**

Family 6: Aspirations

H10: DARPP increases aspirations to improve agricultural productivity**

H11: DARPP increases planned investment in the land**

Family 8: Intrahousehold bargaining and decision making

H12: DARPP changes the perceptions of ownership of spouses of agrarian reform beneficiaries**

H13: DARPP increases ARBs' participation in decision-making on their parcels**

H14: DARPP increases the participation in decision-making of the ARB's spouse**

H15: DARPP increases ARBs' agency in decision-making on their parcels*

H16: DARPP increases the agency in decision-making of the ARB's spouse**

H17: DARPP leads to more egalitarian agricultural decision-making between ARBs and their spouses*

Measurement

Data will be primarily collected through household interviews of Agrarian Reform Beneficiaries (ARBs) farming parcels of land within collectively titled lands. Two surveys will be conducted: a baseline before randomization and an endline to be conducted 1-1.5 years after the treatment group has received the intervention. A follow-up baseline spousal survey will be carried out with married ARBs and their spouses to capture additional outcomes in the decision-making process. The main survey and spousal survey will be measured simultaneously at endline. Due to funding constraints and delays in the subdivision process, our initial endline survey will be primarily measuring the impact of the subdivision survey.

The surveys will be conducted using pre-programmed electronic surveys administered on tablets. This computer-assisted interviewing allows for programmed consistency checks and skips, which will be very important in preventing data errors. It will also allow the rapid processing of data for further quality control, so any questionable data may be clarified by conducting call backs as soon as the day after the interview is conducted. The implementation of the baseline and endline surveys will be staggered so that the survey operations will be conducted in each field site consecutively.

Measurement will principally be done through baseline and follow-up surveys of:

1. Those in the main survey sample, i.e. individuals with claim to a plot in a collective title that is a target of the study (possibly randomly selected in case of large collective titles)).
    a. At baseline (main baseline survey)
    b. At follow-up (main follow-up survey)
2. Those individuals who till plots claimed by individuals in the main survey sample at baseline (i.e., baseline tenant survey).
3. Those individuals who till plots claimed by individuals in the main survey sample at follow-up (i.e. follow-up tenant survey).
4. Individuals who, by the time of the follow-up surveys, have acquired a plot that was included in the baseline surveys (follow-up new-owner survey).
5. Spouses of agrarian beneficiaries (i.e. principle owners of plots in collective titles)

In this manner we will be able to track both the target farmers and the plots claimed by the target farmers, having both baseline and follow-up data on each. This sampling strategy allows us to identify gains from trade (e.g. if the land is sold to a farmer with more skills or capital), a critical channel that would be unobserved if we only interviewed the original farmers.

Outcome Measures

Investment (H1)

Investment will be measured by considering both durable investments and the way the farmers use the land. In addition to measuring the impacts on each of the indicators defined below, we will calculate two average z-score measures of all of the below indicators using the methodology of Kling, Liebman, and Katz (2007). The first indicator will explore impacts on durable investments and combine indicators a, b and c below. The second indicator will explore impacts on the way that farmers use the land, and will combine indicators d, e, f, and g below. The primary focus of investment measures will be on the DAR-awarded parcel of interest. However, as a secondary outcome of interest, we will also look at these outcomes on parcels other than the POI, as farmers may shift their investments from one parcel to another.

Investment will be measured by considering durable investments, or fixed investments that yield utility over time. Indicators of durable investment include:

a. Number of trees planted per hectare[68]
b. Presence of physical infrastructure (Constructed as the first principal component of a pca of irri, fishpond, sheds—for this variable value of all sheds will be used unless the number of missing values is above 5%, in which case the number of structures will be used
c. Made an attempt to build, maintain, or improve physical infrastructures in the past 2 years (Dummy variable coded to 1 if either irri_invest or shed_invest are yes).

Investment will also be measured by considering the way farmers use the land. Indicators include:

d. Proportion of the parcel's area cultivated with ground crops.
e. Total number of hectares cultivated
f. Dummy variable taking the value of 1 if land is fallowed for productivity reasons (fallow=1 or untilledpor=2)
g. Dummy variable taking the value of 1 if all of the land is planted with either ground or tree crops (crop_parea=plotarea , or untilledpor=2,3,4,5,8)

When measuring the investment on the parcels that are not the parcel of interest, we will generate the investment indices for each parcel and then use the average of these indices for all parcels except the POI owned by the ARB's household as an outcome variable.

Output (H2)

Output will be measured through agricultural surveys as the log total value of all crops harvested during the past cropping year (including own-consumed production), before any

[68] While number of trees per hectare is our primary specification, if we find evidence of systematically different measurement error in the plot area linked with the treatment, we may consider number of trees in addition or instead of this measure.

value-added activities, divided by the number of hectares.[69] As with investment, the primary focus will be on output of the DAR-awarded parcel of interest, regardless of whether the current tiller is the ARB, a lessee, or a new owner. However, as a secondary outcome of interest, we will also look at output on parcels other than the POI, as farmers may shift their efforts from one parcel to another. As with our specification in H2, we will use the log aggregate output per hectare on all parcels that are not the POI as our outcome.

Tenure Security (H5)

At endline, the tenure security section was extended and revamped as we expect the intervention to have an immediate impact on these outcomes.
Tenure security will be measured through outcomes that can be classified into three main areas: 1) History of land disputes, 2) Farmers' perceptions of tenure security, and 3) Farmers' perceptions of government institutions in securing property rights.

Land dispute is an important determinant of tenure security. While parcelization seeks to improve tenure security and most plausibly reduce disputes, we cannot discard the possibility that land quarrels may have increased during the initial phase of the intervention. We ask about the number of land disputes in the last two years both at the community level (as reported by the ARB) and regarding the parcel of interest. We will construct two continuous outcomes using these variables to test the impact of the program on disputes over land.

Regarding disputes, for the parcel of interest, we also ask farmers who report having had a land conflict if someone had attempted to help settled the conflict: Barangay council, family, community leaders, and/or DAR official. From these questions we will generate binary indicators that will enable us to investigate the role of different entities, and particularly of government officials, in defending property rights.

We will capture the ARB's perception of tenure via the following questions:

1. How secure from eviction from your parcel of land do you feel?

2. How certain are you about your ability to restrict the access of others, apart from household members, to your parcel?

3. If you let your parcel fallow for a year, what do you think is the likelihood that your land might be encroached upon or confiscated by other farmers in your barangay?

4. In your opinion, how likely is it that your parcel might be confiscated in whole or in part by the government within the next 5 years?

5. In your opinion, how likely is it that your parcel might be confiscated in whole or in part by anyone else within the next 5 years?

[69] While value of output per hectare is our primary specification, if we find evidence of systematically different measurement error in the plot area linked with the treatment, we may consider value of output in addition or instead of this measure.

6. How worried are you that you could lose ownership of this property or of part of this property against your will in the next 5 years?

Answers to these questions come in the form of a score from a 5-point ordinal scale. We will test the impact of the intervention on two indices constructed from responses to the questions above. The first index will be a blunt raw sum of the individual score for each question, and the second will be constructed as the first component from a principal components analysis.[70]

To capture farmers' perceptions of government institutions in securing property rights we pose 3 hypothetical scenarios in which a neighbor, a government entity, and a private company are trying to evict the ARB from their parcel. For each hypothetical scenario, we separately ask how effective they think the Barangay Council and a Municipal entity would be in protecting them from eviction in case each entity gets involved. Answers to these questions come in the form of a score from a 5-point ordinal scale. To test the impact of the intervention on farmers perceptions of government institutions in securing land rights we will construct four indices, two for each type of institutions. For example, for the Barangay Council, the first index will be a blunt raw sum scores across the three hypothetical eviction scenarios, and the second will be constructed as the first component from a principal components analysis using the same scores three scores.

Gains from trade: Land rentals and sales (H6)

At baseline, the land within the collective title area is either tilled by the farmer or is informally rented out (we group free rentals (e.g. loans of land to family members) with the former group). At follow-up, there are four cases: 1) tilled by the farmer, 2a) rented to the same person as at baseline, 2b) rented to a different person than at baseline, and 3) land sold.

Tracking each plot this way will allow us to develop several measures:

1. Land sales: % of land sold at follow up
2. Rental rates: % of land rented at baseline and follow-up
3. Owner-operated: % of land farmed by the farmer claiming the land

Welfare (Family 4)

Direct measures of welfare are two:

1. Food consumption, measured through household food consumption in the past week. (H7)
2. Psychological health, measured through four self-reported measures, including: (H8)
    a. Anxiety of ARB: average of responses to items: anx_jobstress, anx_future, anx_encroach, anx_inheritance
    b. Anxiety of spouse: average of responses to items: anx_jobstress, anx_future, anx_encroach, anx_inheritance
    c. Life satisfaction of ARB: hp_ladderpresent
    d. Life satisfaction of spouse: hp_ladderpresent

[70] By using an index as our main outcome we also circumvent the problem of multiple hypothesis testing.

Migration (H9)

At baseline, we will collect detailed contact information that would help us track down respondents if they migrate out of their current area. If migration is low to moderate our key measure for hypothesis H12 will be migration rates, under the assumption that if migration rates are higher in the treatment group then that supports the hypothesis that the improved property rights reduced constraints to mobility. Migration rates will be calculated in two ways:

1) ARB has migrated
2) ARB has migrated or intends to migrate in the next year for economic reasons
3) Number of hh members who left the hh.

If migration is high we will consider developing an additional migrant survey and track down respondents. This, however, would be subject to additional funding from some source.

Aspirations (Family 6)

It is argued here that strengthening tenurial security will not only affect current economic decisions on the farm but also on the decision maker's aspirations. For instance, it is expected that after the intervention, farmers under the treatment group will have higher aspirations compared to the control group.

What we have measured is a quantitative indicator in terms of two questions: the highest production in the community and the level of production that the respondent aspire.

To measure respondents' productivity aspirations, we will measure the two following variables:

1. The log value of aspired output per hectare
2. The ratio of the aspired output per hectare to the perceived maximum output in the community

We will measure respondents' aspirations to make further investments in their parcels using the first principal component of a pca using the following variables:

1. Whether the ARB plans to invest in irrigation within the next five years (**asp_fut_land_inv_irrc** = 1)
2. Whether the ARB plans to build or upgrade warehouses, barns, or other buildings in the next five years (**asp_fut_land_inv_gran** = 1 and/or **asp_fut_land_inv_barn** = 1)
3. Whether the respondent plans to put new crops on the parcel in the next 5 years (**asp_fut_land_newcrop_nextcs** = 1 and/or **asp_fut_land_newcrop_5yrs** = 1)
4. Whether the ARB plans to plant trees grown for income on the parcel in the next 12 months (**asp_fut_land_inv_land_trees_12months** = 1)
5. Whether the ARB plans to leave the parcel fallow for productivity reasons in the next 5 years (**asp_fut_land_inv_fallow** = 1)

Perceptions of spousal ownership (H12)

Feelings of ownership of the spouses of ARBs (H12) will be measured with three outcomes:

1. The proportion of spouses who state that they have a name on the title of the parcel (**poititlename**)
2. Whether the spouse reports that they are a decision maker on the parcel of interest because they are the owner of the parcel or because their name is on the title for the parcel (**poidecprevailreason**)

3. Whether the ARB reports that their spouse is a decision maker on the parcel of interest because they are the owner of the parcel or because their name is on the title for the parcel (**poidecprevailreason**)

In addition to measuring them individually, these outcomes will be combined in a z-score index using the mean and standard deviation of the control group, according to the Kling, Liebman,,and Katz (2007) methodology.

Participation in decision making (H13 & H14)

We will measure the methods and outcomes of decision-making through the following modules, administered to both ARBs and their spouses:

1. Decision-making process: captures who respondents consider to be the decision-maker on matters relating the CARP-awarded parcel, including which household members are involved in decisions, the level of input respondents have in decisions, and the extent to which respondents feel they can make their own decisions.
2. Decision-making vignettes: describes 5 different models of decision-making, with varying levels of inclusiveness and participation.

Outcomes:

- **A. ARB's/Spouse's participation in decision-making (H13 & H14):** In addition to exploring each of the following measures individually, we will create a z-score index composed of these measures, given issues with multiple hypothesis testing:
  - **1.** Dummy variable for whether respondent considers themselves a decision-maker either alone or jointly with their spouse (**poimajordecision**)
  - **2.** Participation score drawn from the reported model of household decision-making (**agdecvigmostsim** & **agdecvigmember**), with the following ordinal scoring from least to most authority:
    - **a.** Score 0: Model 1, non-agentic actor
    - **b.** Score 1: Model 2, non-agentic actor
    - **c.** Score 2: Model 3, non-agentic actor
    - **d.** Score 3: Model 4, non-agentic actor
    - **e.** Score 4: Model 5, non-agentic actor
    - **f.** Score 5: Model 5, agentic actor
    - **g.** Score 6: Model 4, agentic actor
    - **h.** Score 7: Model 3, agentic actor
    - **i.** Score 8: Model 2, agentic actor
    - **j.** Score 9: Model 1, agentic actor
  - **3.** Dummy variable for whether respondent's opinion prevails in the case of disagreement (**poidisagreement**), scored as 1 if the respondent's opinion prevails or if both spouses' opinions can prevail
  - **4.** Ordinal score of the respondent's self-reported level of input on decisions on the parcel of interest (**poidecinput**), scored from 1 (least input) to 3 (most input)
- **B. Spousal equality in decision-making (H17):** This outcome will only be measured for households where both ARB and spouse are interviewed at the endline. Similar to outcome A, this will be measured with a z-score index composed of the following, in addition to measuring each of the indicators individually:
  - **1.** Dummy for whether the husband considers both spouses to be decision-makers on the parcel of interest (**poimajordecision**)
  - **2.** Dummy for whether the wife considers both spouses to be decision-makers on the parcel of interest

3. Equality score drawn from the husband's reported model of decision-making (**agdecvigmostsim)** ranging from 1 (Model 1, least equal) to 5 (Model 5, most equal)
4. Equality score as measured above using the wife's reported model of decision-making
5. The lowest score in the decision-making vignettes, whether it is reported by the husband or by the wife
6. Indicator for whether the husband reports that either spouse can make the final decision about the parcel of interest after a disagreement (**poidisagreement**)
7. Indicator for whether the wife reports that either spouse can make the final decision about the parcel of interest after a disagreement (**poidisagreement**)

Work on the results of the baseline survey has shown the traditional decision-making survey questions such as **poimajordecision** to be unreliable measures due to differing interpretations of sole and joint decisions. If, as expected, the models established in our decision-making vignettes module proves to be a more reliable measure, we may exclude the results of **poimajordecision** from our indices.

Agency (H15, H16)

Three sections of the spousal survey will measure the extent to which ARBs and their spouses feel empowered to make decisions on their land based on their goals and values. In addition to calculating impacts on each indicator individually, we will measure H15 and H16 using two standardized z-score indexes, one for the ARB and one for the spouse of ARB. Each index will be composed of the following sections:

1. The relative autonomy index (RAI) of the respondent when it comes to agricultural decisions (motivational autonomy module). The RAI will be constructed according to the methodology laid out on the WEAI website.
2. Ordinal self-efficacy score of reported self-efficacy with regards to agricultural decisions (**selfeff_farming**), scored from 6 (no confidence in all areas) to 30 (complete confidence in all areas).
3. Ordinal score of the respondent's level of autonomy over decisions on the parcel of interest (**poidecaut**), score from 1 (not at all) to 3 (to a large extent)

Analysis Specifications

Some of the analysis will take place at the plot-level, while others will take place at the ARB-level. Finally, the intra-household dynamics related to decision-making on the parcel will be considered separately.

The following hypotheses will be analyzed at the plot level for the DAR-awarded parcel of interest:

- Investment (H1)
- Output (H2)
- Gains from trade (H6)

The following ANCOVA estimation will be used for plot-level analysis with baseline characteristics available:

$$Y_{csjt} = \beta_0 + \beta_1 T_{csj} + \beta_2 Y_{csjt=0} + X_{csjt} + \lambda_s + \varepsilon$$

Where Y_{csjt} takes the value of one of the outcome variables specified in the previous section for parcel j in collective title c in strata s at time t, T_{csj} is an indicator for the treatment status of parcel j, X_{csjt} is a vector of control variables, and λ_s is a vector of strata fixed effects. Robust standard errors will be clustered at the collective CLOA level.

Controls for plot-level regressions include:

- Baseline area
- Baseline Distance or time to nearest market
- Baseline Indicator of having irrigation
- Baseline Indicator for whether it drains quickly (vs slowly)
- Baseline Indicator for whether it has a flat slope (vs slight or steep)
- Baseline indicator for whether it has a slight slope (vs flat or steep)
- Baseline indicator for whether it is an upland (vs lowland)
- Baseline index of perceived risk (typhoons, floods, drought, pests, and crop diseases)

Outcomes for non-POI parcels owned by the ARB's household, if any, will be measured with the following specification:

$$Y_{cspt} = \beta_0 + \beta_1 T_{cs} + \beta_2 Y_{cspt=0} + X_{csjt} + \lambda_s + \varepsilon$$

Where Y_{cspt} takes the value of the aggregate outcomes for all parcels owned by the ARB's household besides the POI.

Where baseline characteristics are not available, the following POST estimation will be used for plot-level analysis:

$$Y_{csjt} = \beta_0 + \beta_1 T_{csj} + X_{csjt} + \lambda_s + \varepsilon$$

All regressions will be run twice: once in a regression with no baseline controls (X_{csjt}), and once including all control variables.

The following hypotheses will be analyzed at the ARB level:

- Tenure security (H5)
- Welfare (H7 & H8)
- Migration (H9)
- Aspirations. (H10 & H11)

The following ANCOVA estimation will be used for ARB-level analysis with baseline characteristics available:

$$Y_{ijcst} = \beta_0 + \beta_1 T_{jcs} + \beta_2 Y_{ijcst=0} + X_{ijcst} + \lambda_s + \varepsilon$$

Where Y_{ijcst} is the outcome measure specified in the previous section of individual *i* in plot j of collective parcel c in strata s at time t, and the other variables are as specified above. As above, robust standard errors will be clustered at the collective CLOA level, as this was the unit of randomization.

Controls for analysis at the ARB-level include:

- Gender
- Age
- Baseline Education
- Baseline HH size
- Baseline # of years as primary tiller

Where baseline characteristics are not available, the following POST estimation will be used for individual-level analysis:

$$Y_{ijcst} = \beta_0 + \beta_1 T_{ijcs} + X_{ijcst} + \lambda_s + \varepsilon$$

As with the plot-level regressions, all regressions will be run once without controls and once with all controls included.

Testing H13-H16: Impact on household decision-making

We test the impact of treatment assignment on household decision-making by estimating the following regressions:

$$DI_{ihcst} = \beta_0 + \beta_1 T_{ihcs} + \beta_4 DI_{iht=0} + X_{ihct} + \lambda_s + \varepsilon$$
$$EI_{hcst} = \beta_0 + \beta_1 T_{hcs} + \beta_4 EI_{ht=0} + X_{cht} + \lambda_s + \varepsilon$$

Because of important gender norms about decision making, it is likely that the impacts may be moderated by the gender of the ARB and the gender of the respondent. As such, we should consider the following regressions with interaction terms:

$$DI_{ihcst} = \beta_0 + \beta_1 T_{ihcs} + \beta_2 F_i + \beta_3 T_{ihcs} * F_i + \beta_4 DI_{iht=0} + X_{ihct} + \lambda_s + \varepsilon$$
$$EI_{hcst} = \beta_0 + \beta_1 T_{hcs} + \beta_2 AF_{ih} + \beta_3 T_{hcs} * AF_{ih} + \beta_4 EI_{ht=0} + X_{cht} + \lambda_s + \varepsilon$$

Where:

- DI_{ihcst} is the decision-making index of ARB (H13) or spouse (H14) *i* in household *h* in collective parcel *c* in strata *s* at time *t*, as detailed in the measurement section
- EI_{hcst} is the household's equality index as detailed in the measurement section
- T_{scih} is the treatment status of the respondent
- F_i is an indicator variable for whether the respondent is female
- $DI_{iht=0}$ is the individual's decision-making index as measured in the baseline survey, as measured using a z-score index composed of the following variables:
    - Indicator for whether respondent considered themselves a decision maker on the parcel of interest (**poimajordecision**)

    - Indicator for whether respondent considered themselves as the final decision-maker on the parcel of interest (**poimajdecdis**)
    - Ordinal score of the respondent's self-reported level of input on decisions on the parcel of interest (**poidecinput**), scored from 1 (least input) to 3 (most input)
- AF_{ih} is an indicator variable for whether the ARB is female
- $EI_{ht=0}$ is the household's equality index as measured at baseline, composed of the following elements:
    - Indicator for whether the husband considers both spouses to be decision-makers on the parcel of interest (**poimajordecision**)
    - Indicator for whether the wife considers both spouses to be decision-makers on the parcel of interest
    - Ordinal variable for the level to which the husband states that the non-decision making spouse participates in decisions on the parcel of interest (**poimajdecinputfreq**)
    - Ordinal variable for the wife's response to the above question
    - Indicator for whether the wife states that both spouses participate in discussions about major decisions on the parcel of interest (**conversationmembers**)
    - Indicator for the husband's response to the above question
    - Indicator for whether the wife states that both she and her husband bring up and start discussions about major decisions on the parcel of interest about equally (**conversationstarter**)
    - Indicator for the husband's response to the above question
- X_{ciht} is a vector of control variables, including:
    - Province
    - Age of wife
    - Age difference between spouses
    - Husband's education
    - Difference in education between the spouses
    - Whether the ARB is female (included in the individual-level regressions only)
    - Marital status of the respondent

Testing H15: Impact on agency

We test the impact of treatment assignment on the agency of ARBs and spouses using the following specification:

$$A_{ihcst} = \beta_0 + \beta_1 T_{chs} + \beta_4 A_{it=0} + X_{ihct} + \lambda_s + \varepsilon_{scht}$$

Because impacts on agency may be sensitive to the gender of the ARB, we will also estimate this with interaction terms.

$$A_{ihcst} = \beta_0 + \beta_1 T_{chs} + \beta_2 F_i + \beta_3 T_{chs} * F_i + \beta_4 A_{it=0} + X_{ihct} + \lambda_s + \varepsilon_{scht}$$

Where:

- A_{ihcst} is the agency index of the respondent as detailed in the measurement section
- T_{sch} and F_i are indicators for treatment and gender as described above
- $A_{it=0}$ is a measure of the respondent's agency at baseline, measured using the respondent's RAI in the baseline spousal survey
- X_{ciht} is a vector of control variables

- λ_s represents strata fixed effects

Control variables will include:

- Province
- Age of wife
- Age difference between spouses
- Husband's education
- Difference in education between the spouses
- Whether the ARB is female (included in the individual-level regressions only)
- Marital status of the respondent

We will measure this with two separate regressions for ARBs and spouses of ARBs, and with a fully interacted regression including an indicator for ARB status.

Treatment of Multiple Hypothesis Testing

We do not consider the tests of the main hypotheses above to be subject to considerable multiple testing issues because of the clear hierarchy of the hypotheses and the fact that the main hypotheses are all centered on answering two overarching questions: (i) whether formal property rights increase agricultural investment and through what channels; and (ii) whether shifts in property rights changes intra-household decision making on land. The additional hypothesis are secondary outcomes. They will be reported as such and interpreted with the knowledge of the multiple hypothesis problem but without explicit correction.

Finally, in cases where multiple indicators will be used to measure an outcome of interest, we follow the methodology of Kling, Liebman, and Katz (2007), and create standardized z-score indices to group the multiple variables into a single indicator.[71] Cases in which individual variables are significant but not the standardized index will be treated with caution in the interpretation of the findings.

Subgroup analyses

The following subgroup analyses will be performed:

1. Testing differences of impact between public and private land acquisition. This analysis is of particular interest because those under public lands do not have to pay off their awarded plots (they are awarded at no cost to the farmer-beneficiary) before they can legally sell or lease them out. However, those under private lands must undergo a standard 30-year amortization schedule before they can sell their plots. Thus, we may find the credit access and gains from trade channels to be more active for public lands.
2. Testing differences of impact by major crop (i.e., rice, corn, and coconut).
3. Testing differences of impact by status within an Agrarian Reform Community through which support services are channeled.
4. Testing differences based on the gender of the ARB.

[71] This methodology involves: (1) converting all outcomes so that the sign of the effect of all variables in a family goes in the same direction, (2) calculating the z-score of each variable by subtracting the control group mean and dividing by the control standard deviation, and (3) taking an average of the z-scores in each family.

ITT and LATE:

As we expect some level of imperfect compliance, we will test both the intent-to-treat (ITT) and treatment-on-treated (LATE) effects of the intervention. For this follow-up survey, the intervention is considered specifically as the completion of the subdivision survey, which is primarily measured in the variable **survey_yn** in the endline questionnaire. As a robustness check, we will also measure the LATE effect using DAR's administrative records for whether or not subdivision survey was carried out, particularly if there are major discrepancies between DAR records and ARB's reports of subdivision surveys.

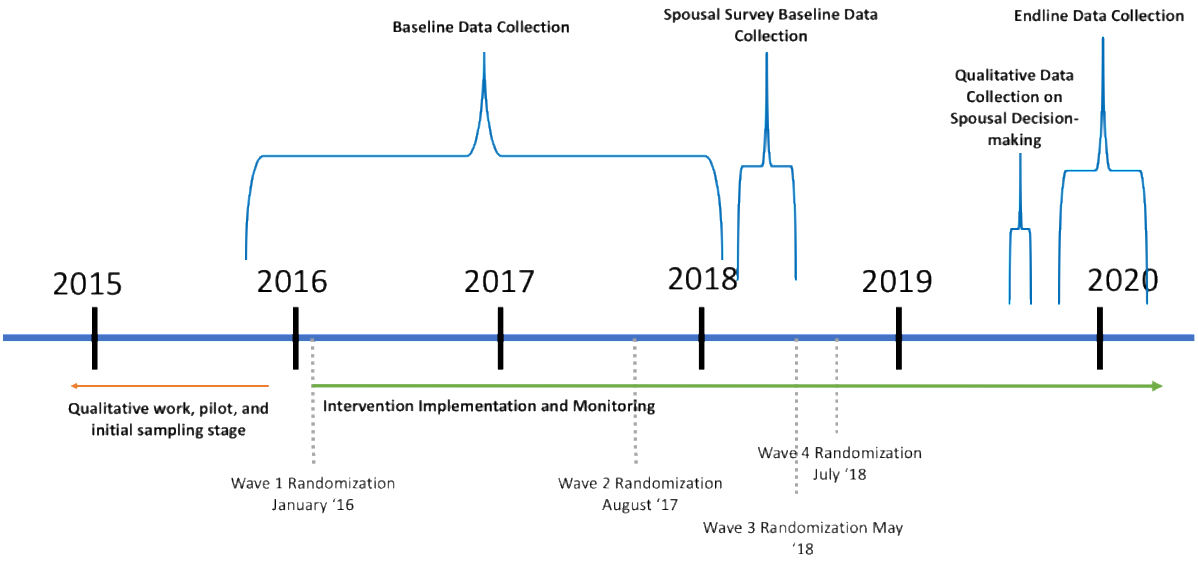
We will measure the LATE effect using the instrumental variable method, using ARBs' self-reported subdivision status as an instrument for the intervention.

Robustness

Missing data

No imputation of missing data will be performed. Examination of missing data by treatment status will be performed and if treatment status is significantly correlated with attrition or if the characteristics of attriters differ significantly by treatment status, Lee bounds will be used to test the robustness of the results to the missing data.

Timeline



The figure above depicts a timeline that includes the main activities of the project.

Works Cited

Besley, T. (1995). Property Rights and Investment Incentives: Theory and Evidence from Ghana. *The Journal of Political Economy*, 103(5), 903-937.

Bruhn, M., & McKenzie, D. (2009). In Pursuit of Balance: Randomization in Practice in Development Field Experiments. *American Economic Journal: Applied Economics, 1*(4), 200-232.

Kling, J.R., Liebman, J., and Katz, L. (2007). Experimental Analysis of Neighborhood Effects. *Econometrica,* 75(1), 83-11

Appendix D: Implementation and monitoring plan

IPA-DAR CARP Impact Evaluation
Implementation Plan

Introduction

In October 2015, the Department of Agrarian Reform (DAR) and Innovations for Poverty Action (IPA) signed a Memorandum of Understanding (MoU) to conduct a study investigating the impact of formal land property rights on agricultural investment, output, profit, and welfare through the context of the Comprehensive Agrarian Reform Program's (CARP) parcelization of collective titles. Since 2012, IPA has had several meetings with the DAR and began conducting a small pilot study to determine how the study can be feasibly implemented, maintaining the study's methodology of the randomized controlled trial while not imposing too many constraints on the DAR's regular processes.

Purpose

The purpose of this Implementation Plan is to outline the agreements made thus far between the DAR and IPA in the implementation of the study. While the MoU includes these agreements, this document elaborates more on the activities involved and their rationale, which has been informed by later discussions with the DAR and the pilot study. These activities include:

1. Validation of landholdings
2. Communicating the randomization results
3. Implementation and maintenance of randomization results
4. Monitoring progress of the parcelization process

See Annex II for a flow chart that shows how the study will interact with the DAR's regular parcelization process.

Agreements and Activities

Validation of the Study's Sample Landholdings

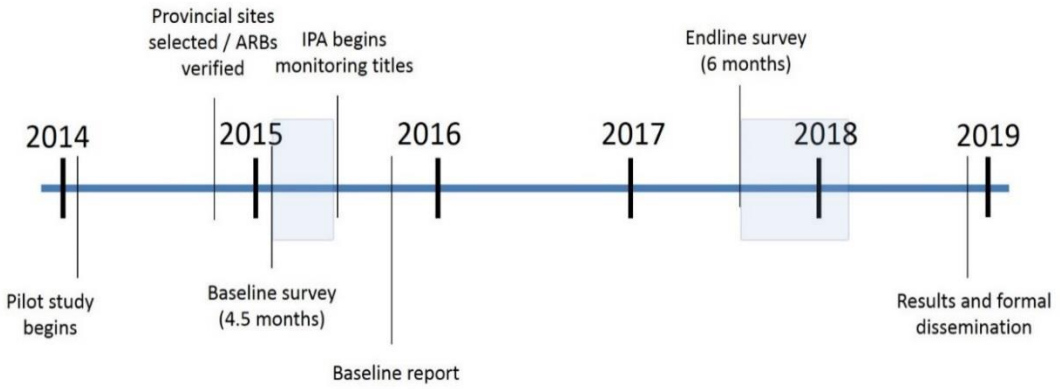
Under Article 2a, the Memorandum of Understanding states that the DAR agrees:
To verify all landholdings of interest and the Agrarian Reform Beneficiaries located within them before the baseline survey *to ensure all titles included as part of the study's sample are alienable and disposable and do not involve any major inclusion/exclusion cases or other legal matters or peace and order problems that would delay parcelization.*

The purpose of validating these landholdings is threefold:

1. **The research team must know who to interview for the baseline**
   Since the study is investigating the impact of formal titling (i.e. parcelization) on agricultural investment, the research team must interview those Agrarian Reform Beneficiaries (ARBs) who will be receiving the individual Certificate of Land Ownership Award (CLOA).
2. **To ensure the study's sample can receive the intervention (i.e. parcelization)**
   All landholdings within the study's sample must be alienable and disposable in order to be parcelized (i.e. there must be an initial projection conducted), and the ARBs must agree to have their landholding subdivided. If many sample titles cannot receive the intervention, this will inhibit the research team's ability to identify its impacts on the outcomes of interest.
3. **To provide results to the DAR as soon as possible to inform policymaking**
   In order to identify impacts, the research team will wait one year after the treatment group receives the intervention to conduct the endline survey and analyze the data. The longer the intervention takes, the longer it will take for the research team to produce timely results to the DAR. Thus, the study's sample should exclude any landholdings that have ongoing legal disputes, are subject to peace and order problems, or any other issues that would delay the parcelization process. Such landholdings will be identified during validation so they may be excluded from the study's sample ahead of the baseline survey.

   Moreover, proper validation of landholdings will help expedite the baseline survey activities. If ARBs have not been verified (e.g. deceased, migrated, etc.), IPA field staff will have to follow up with the respective Municipal Agrarian Reform Program Officer (MARPO), Provincial Agrarian Reform Program Officer (PARPO), and other relevant DAR staff and officials in order to identify who will receive the intervention and thus who to baseline. Such delays may inhibit the ability to produce more timely results and also increase field costs.

   Below is a tentative project timeline as of January 2015. This timeline assumes 4.5 months for the baseline survey and one year for the parcelization process to be complete (i.e. for the ARBs to receive their individual CLOAs). This timeline can be maintained, and even shortened, if all sample landholdings are properly validated so there are no major delays during the baseline survey or during parcelization.



As discussed during the meeting between IPA and Region XII on January 25, 2017, IPA will collaborate with the respective MARPOs and ARPTs to conduct on-the-ground validation of the ARBs under each landholding of interest. IPA will inform the DARPOs, Region XII office, and the DARCO of those titles that have been validated as "clean" for inclusion in the study. IPA requests that the DAR does not begin subdividing these landholdings until after the randomization results have been communicated.

Communication of Randomization Results

After the baseline activities have finished in a provincial field site, the research team will randomize the sample titles into treatment and control groups. These results will be communicated to the Department of Agrarian Reform Program Offices (DARPOs) through a memorandum from the Undersecretary directing that the treatment titles be prioritized for parcelization while parcelization be withheld from the control titles for at least one year after the treatment group receives its individual CLOAs.
The relevant staff at the DARPO will then tag the respective treatment and control titles in the Field Operations File 3 (FOF3) in the following way:

"*Subject of IPA's study under the* treatment group. *Prioritize for subdivision."*
"Subject of IPA's study under the control group*. Not for subdivision until one year after the treatment group receives individual CLOAs"*

The control titles will then be replaced with titles not yet tagged for a target year so that the DARPOs can still achieve their annual targets.

Moreover, all treatment group titles should be tagged under the current year (i.e. if it's 2015, they should be tagged as 2015 titles). This should be done so all treatment titles are funded to begin parcelization as soon as the randomization results are communicated by the IPA research team.
Note: If any treatment titles are not bid out within 2015, they should be tagged as 2016 titles to ensure they are subdivided in 2016.

3 steps to follow after randomization results are given:

1.) Tag the treatment and control titles in the FOF3 in accordance with randomization results.

2.) Replace control titles with titles not yet programmed for subdivision.

3.) Re-tag all treatment group titles under the current year, if necessary.

Implementation and Maintenance of Randomization Results

Treatment Group

Article 2c of the MoU states the DAR agrees to:

For those collective titles that are randomly selected to be in the treatment group, to help ensure the subdivision of these titles is expedited by prioritizing them over other landholdings at every stage of the process.

The parcelization of the treatment titles will be expedited by the DARPOs prioritizing their subdivision once the randomization results have been communicated. For example, during the module listing process, the DARPOs should include the treatment titles in module number one so they can be prioritized for bidding. After the subdivision has been initiated, there may be bottlenecks that occur during other stages of the process. The Undersecretary will issue a memorandum to the respective entities – the Department of Agrarian Reform Regional Office (DARRO), the Department of Environment and Natural Resources (DENR), and the Land Registration Authority (LRA) / Register of Deeds (RoD) – directing that the study's treatment titles be treated as a matter of priority over other titles.
As stated previously, expediting the parcelization of the treatment group can help ensure more timely results. In addition, the control group cannot be parcelized for at least one year after the treatment group receives its individual CLOAs. Thus, the faster the treatment group is parcelized, the sooner the control group titles can be parcelized as well.

The table below enumerates the steps of the parcelization process and the time required to complete these activities in an ideal scenario. If the sample titles are properly validated and the treatment group is prioritized for subdivision, it is hoped that the parcelization process can approximate this timeline, which is about **6 to 9 months** from validation to distribution of individual CLOAs.

PARCELIZATION TIMELINE		
Activity	**Responsible entity**	**Estimated time**
1. Projection and validation of landholdings/ARBs	DARPO/MARPO	1 – 1.5 months
2. Request for Survey Services (RSS) prepared and submitted	DARPO/MARPO	1-2 weeks

3.	Technical review and approval to conduct survey	DARRO	1 week
4.	Module listing/bidding/awarding survey	DARPO if < 90 hectares DARRO if > 90 hectares	1.5 months
5.	Pulong-pulong & survey segregation	DARMO/survey firm	1 day, conducted 90 days within awarding of contract
6.	Verification and approval of subdivision survey	DENR/LMS	45 days
7.	Deed of Partition/signatures	DARPO/DARMO	3 days for an average of 5 farmer-beneficiaries
8.	Registration of title	Register of Deeds	Undetermined. Delays due to PHILARIS system
9.	Distribution of individual titles	DARMO	1 week upon receipt of the titles

Control Group

Article 2d of the MoU states the DAR will:

For those collective titles that are randomly selected to be in the control group, they will be replaced by other titles not yet programmed for subdivision.

There are three stages that can help ensure the control group is maintained:

1. **Preparation of Request for Survey Services (RSS) documents**

   It is most important that the MARPOs do not begin preparing RSS for control titles, so the DARPOs should inform them of the titles in the control group not to be subdivided (though they should be de-listed from that target year and replaced with another title already). In order to maintain the study's methodology, the Undersecretary and BLTI Director Caymo have agreed that if the RSS emanates from the ARBs themselves, the following explanation can be provided:

   Due to limited resources for parcelization, the DAR is constrained from meeting all demand at once. Thus, the collective CLOAs have been randomly selected into particular target years as the fairest approach to meet this challenge. Your title has been randomly selected to be parcelized in 2017.

   The only exception where the MARPO may prepare RSS for a control title is if the ARBs are funding the segregation survey themselves.

2. **Submission of the RSS to the DARRO**

   If the MARPO ends up preparing a RSS for a title in the control group, the DARPO can withhold from submitting it to the DARRO for approval until one year after the treatment group receives its individual CLOAs

3. **DARRO approval to conduct survey**

As a last resort, the DARRO will be provided with a list of the study's control titles (in addition to the treatment titles to be prioritized). If a control title is submitted for approval, the DARRO can reject its approval on the grounds that it is a control title that should not be subdivided yet.

Monitoring progress of the parcelization process

The research team will monitor the progress of the sample's titles through regularly updated FOF3s. The DARPO will provide FOF3s that only include the sample's titles (both treatment and control), and these files will include the variable "statusdesc" that the DAR already uses to monitor progress (see Annex 2). Updated FOF3s will be e-mailed to the research team on a monthly basis at the very least. The DARPOs may also provide written updates on the status of parcelization in addition to the FOF3s when necessary.

The research team will use the FOF3s for the following purposes:

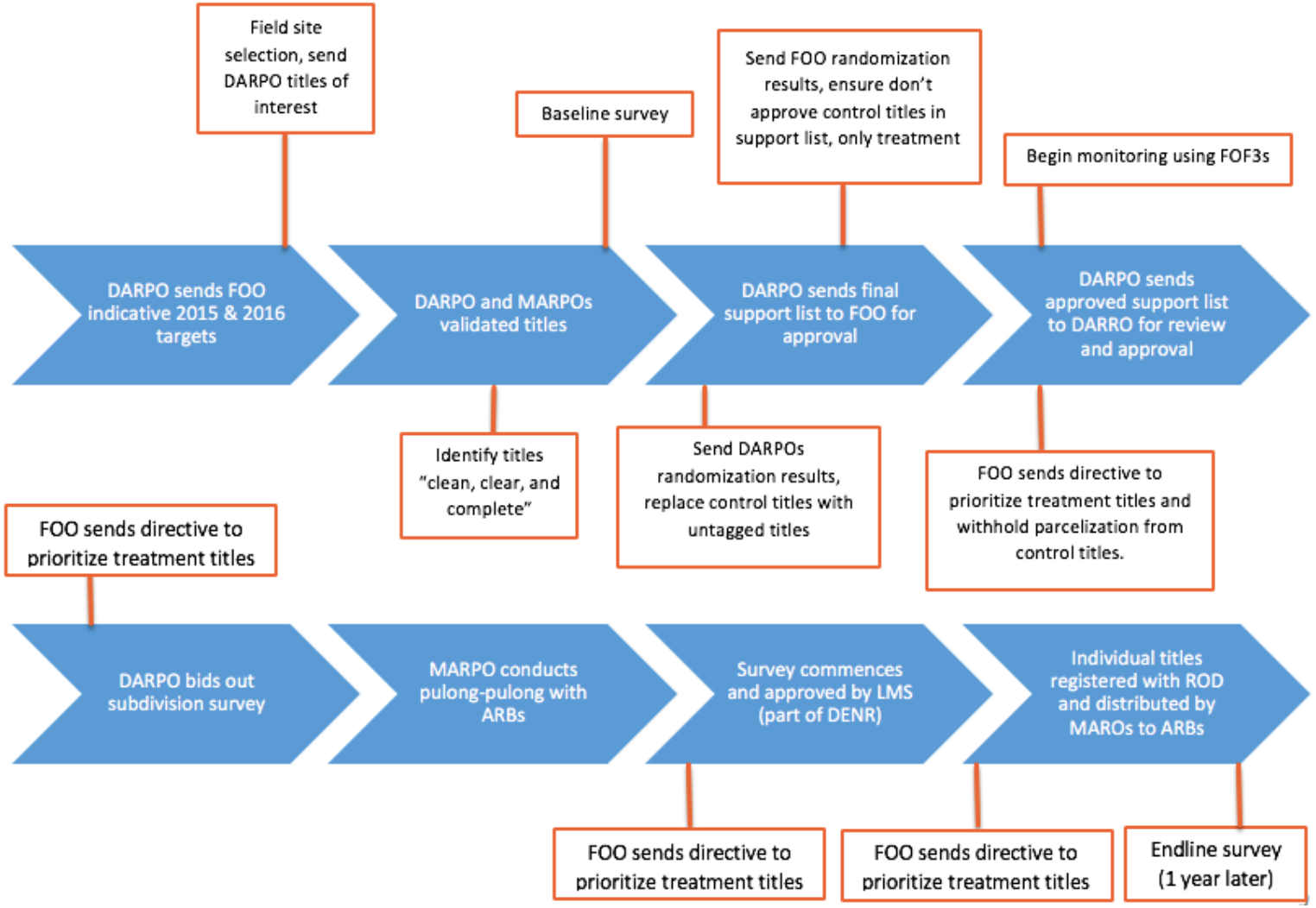
1. To know when the treatment group has received their individual CLOAs, which will inform the scheduling of the endline survey.
2. To flag any control titles that have a RSS
3. To flag any treatment titles that appear to have delays

I have read and agreed to the terms described in this Implementation Plan.

PARPO Department of Agrarian Reform	CARPO Department of Agrarian Reform

MARPO
Department of Agrarian Reform

Implementation Plan:



Appendix E: Attrition Results

Overall Attrition: Panel vs Attrit Plots

Variable	Attrit	Panel	Diff (Strata-Adjusted)	CLOA-clustered Standard Error of Diff
Plot leased-out (entire/portion)	0.216	0.249	-0.033	(0.062)
Number of years tilling plot	21.746	19.493	2.253	(2.203)
Plot distance to market	12.566	12.665	-0.099	(2.394)
Plot has irrigation	0.436	0.351	0.085	(0.063)
Plot drains quickly	0.754	0.766	-0.012	(0.052)
Upland	0.502	0.543	-0.041	(0.058)
Slight slope	0.578	0.544	0.034	(0.058)
Flat slope	0.317	0.342	-0.025	(0.046)
Steep slope	0.103	0.113	-0.01	(0.039)
Perceived plot risk index	0.133	0.086	0.047	(0.156)
Plot has had ownership conflicts	0.04	0.047	-0.007	(0.034)
Neighbor confiscation is very/somewhat likely	0.12	0.129	-0.009	(0.043)
Government confiscation is very/somewhat likely	0.279	0.323	-0.044	(0.070)
Last owner confiscation is very/somewhat likely	0.103	0.09	0.013	(0.043)
Other's confiscations is very/somewhat likely	0.046	0.044	0.002	(0.036)
Transfer to children is very/somewhat likely	0.865	0.904	-0.039	(0.046)
Tenure Security Score	4.3	4.319	-0.019	(0.114)
Female	0.434	0.307	0.127*	(0.075)
Respondents age	52.88	54.132	-1.252	(2.058)
Completed Middle School	0.736	0.685	0.051	(0.063)
Completed High School	0.425	0.317	0.108*	(0.063)
Years farming in total	36.512	40.813	-4.301*	(2.218)
Years as a primary tiller	22.585	26.426	-3.841*	(2.304)
# of Plots Owned by ARB	1.48	1.58	-0.1	(0.098)
# of Plots Tilled by ARB	1.265	1.281	-0.016	(0.099)
Prefer to own 1 Ha alone than 3 Ha jointly with others	0.914	0.933	-0.019	(0.028)
Do you worry about your future?	3.322	3.205	0.117	(0.163)
Do you feel stressed about your job or economic activity?	3.221	3.274	-0.053	(0.141)
# of hh members	4.436	4.781	-0.345	(0.304)
Log of total per-capita food expenditure	5.806	5.736	0.07	(0.081)
Log of total per-capita household income	8.092	8.018	0.074	(0.185)
Log of total per-capita household savings	2.515	2.605	-0.09	(0.458)

First component PCA - wealth variables quantity	0.326	0.08	0.246	(0.237)
Membership in credit coop	0.126	0.092	0.034	(0.039)
Do you regularly borrow from agricultural traders?	0.191	0.192	-0.001	(0.044)
Have you applied for a commercial bank loan in the last 2 years?	0.034	0.069	-0.035	(0.023)
Would a bank lend to you if you apply?	0.383	0.426	-0.043	(0.069)
Didn't apply to loan because not need loan	0.345	0.257	0.088	(0.148)
Didn't apply to loan because interest rate was too high	0.257	0.49	-0.233	(0.156)
Didn't apply to loan because don't want to put my land at risk	0.306	0.375	-0.069	(0.135)
Apply for bank loan if certain approval	0.244	0.321	-0.077	(0.114)
Barrier to demand for credit: interest rate is to high	0.197	0.231	-0.034	(0.139)
Barrier to demand for credit: don't want to take risk	0.789	0.772	0.017	(0.126)
Barrier to demand for credit: don't need loan	0.153	0.073	0.08	(0.122)
Do you or a member of your household have a production loan from a bank?	0.014	0.025	-0.011	(0.007)
Do you or a household member have another type of loan from a bank?	0.024	0.045	-0.021	(0.030)
Do you or a household member have a loan from a cooperative?	0.077	0.04	0.037	(0.030)
Do you or a household member have a loan from a MFI?	0.136	0.152	-0.016	(0.053)
Amount of loan from MFI	10561.1	11953.98	-1392.9	(4209.7)
Do you owe any money to agricultural traders??	0.145	0.175	-0.03	(0.056)
Amount of loan from agricultural traders	39603.5	13550.85	26052.6	(40298.7)
Do you owe any money to friends, family or neighbors?	0.132	0.112	0.02	(0.049)
Does your household owe any money to a sari-sari store?	0.248	0.264	-0.016	(0.057)
Amount of loan from sari-sari store	533.782	667.82	-134.	(197.3)
Does your household owe any money to a pawnshop?	0.06	0.028	0.032	(0.028)
Do you owe any money to informal money lenders?	0.049	0.014	0.035*	(0.021)

Note: Columns 1 and 2 report the Strata-adjusted baseline means for the Panel and Attrit (Non-panel) ARB/HH samples that were present at endline. Column 3 reports the difference between Columns 1 and 2. * $p<0.1$, ** $p<0.05$, *** $p<0.01$

Differential Attrition: Control vs Treatment ARB

Variable	Treatment	Control	Diff Among Those in Panel (Strata-Adjusted)
Female	0.31	0.312	-0.002
Respondents age	54.773	54.294	0.479
Completed Middle School	0.644	0.705	-0.061
Completed High School	0.248	0.365	-0.117**
Years farming in total	41.885	39.984	1.901
Years as a primary tiller	26.983	26.514	0.469
# of Plots Owned by ARB	1.493	1.574	-0.081
# of Plots Tilled by ARB	1.17	1.306	-0.136*
Prefer to own 1 Ha alone than 3 Ha jointly with others	0.94	0.914	0.026
Do you worry about your future?	3.351	3.125	0.226**
Do you feel stressed about your job or economic activity?	3.347	3.27	0.077
# of HH members	4.88	4.6	0.28
% ARB that have applied for a commercial bank loan	0.061	0.073	-0.012
% ARB didn't apply to loan because don't want land at risk	0.321	0.3	0.021
% ARB that didn't apply to loan because interest rate too high	0.546	0.426	0.12
% ARB didn't apply to loan because not need loan	0.26	0.322	-0.062
% ARB think a bank lend to you if you apply?	0.363	0.477	-0.114**
% ARB think barrier to demand for credit: don't need loan	0.072	0.043	0.029
% ARB think barrier to demand for credit: don't want risk	0.775	0.865	-0.09
% ARB think barrier to demand for credit: interest rate is to high	0.187	0.221	-0.034
% ARB that would apply for bank loan if certain approval	0.285	0.399	-0.114
% HH that owe money to a sari-sari store	0.302	0.197	0.105**
% HH that owe money to agricultural traders	0.143	0.163	-0.02
% HH that owe money to friends, family or neighbors	0.121	0.099	0.022
% HH that owe money to informal money lender	0.012	0.017	-0.005
% HH that owe money to a pawnshop?	0.024	0.03	-0.006
% HH that regularly borrow from agricultural traders	0.181	0.198	-0.017
% HH with another type of loan from a bank	0.038	0.033	0.005
% HH with loan from a cooperative	0.009	0.048	-0.039**
% HH with loan from MFI	0.149	0.169	-0.02
% HH with membership in credit coop	0.067	0.078	-0.011
% HH with production loan from a bank	0.027	0.03	-0.003
Amount of loan from agricultural traders	41071	2946.5	38124.3
Amount of loan from friends, family or neighbors	4286.4	21986	-17700

Amount of loan from MFI	23826	1326.8	22498.9
Amount of loan from sari-sari store	718.39	340.56	377.833
First component PCA - wealth variables quantity	-0.127	0.26	-0.387**
Log of total per-capita food expenditure	5.682	5.821	-0.139***
Log of total per-capita household income	7.876	8.11	-0.234**
Log of total per-capita household savings	2.213	2.756	-0.543*
Female ARB	0.32	0.35	-0.04
Decision-making z-score index for baseline levels (ARB)	0.29	0.20	0.16***
Decision-making z-score index for baseline levels (Spouse)	0.00	-0.08	0.13***
Makes decisions on POI	0.38	0.31	0.10***
Final decision-maker on POI	0.27	0.25	0.05
Is a conversation member in agricultural decisions	0.24	0.23	0.02
Can start conversations	0.38	0.33	0.07**
Relative autonomy index	0.51	0.70	-0.15
ARB reports that the spouse's name is on the title	0.07	0.04	0.03*
Spouse reports that their name is on the title	0.05	0.07	-0.04**
Spouse reports that they make decisions about the parcel because they own it	0.17	0.14	0.02
ARB reports that their spouse makes decisions about the parcel because they own	0.19	0.14	0.07***
Government confiscation is very/somewhat likely	0.318	0.314	0.004
Last owner confiscation is very/somewhat likely	0.105	0.09	0.015
Neighbor confiscation is very/somewhat likely	0.104	0.148	-0.044*
Transfer to children is very/somewhat likely	0.897	0.9	-0.003
Other's confiscations is very/somewhat likely	0.034	0.056	-0.022
Tenure Security Score	4.34	4.289	0.051
Plot has had ownership conflicts	0.053	0.046	0.007
Number of years tilling plot	19.268	20.491	-1.223
Perceived plot risk index	0.034	0.249	-0.215**
Plot distance to market	11.245	12.469	-1.224
Plot drains quickly	0.735	0.762	-0.027
Plot has irrigation	0.367	0.355	0.012
Plot leased-out (entire/portion)	0.269	0.245	0.024
Flat slope	0.345	0.33	0.015
Slight slope	0.532	0.573	-0.041
Steep slope	0.123	0.097	0.026
Upland	0.492	0.583	-0.091**

Note: Columns 1 and 2 report the Strata-adjusted baseline means for the control and treatment Plot samples that were present at endline. Column 3 reports the difference between Columns 1 and 2. * $p<0.1$, ** $p<0.05$, *** $p<0.01$