**Impacts of Land Registration and Cash Grants on Agricultural Investment and Trade: Evidence from Women Farmers in Uganda**

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| World Bank  Washington, DC, USA  jmontalvao@worldbank.org  mosullivan@worldbank.org | ***ABSTRACT***  This paper presents long-term results from a randomized control trial (RCT) in rural Uganda implemented by the World Bank Africa Gender Innovation Lab, in partnership with the Uganda's Ministry of Lands, Housing and Urban Development.  The trial tests the impacts of two interventions targeted to women farmers. The first intervention offered women and their husbands assistance with obtaining a freehold land title at no cost. The goal was to strenghten women's land rights. The second intervention offered women an unconditional cash grant. The goal was to relax women's credit constraints.  Preliminary results show that both interventions significantly increased long-term agricultural investment, the value of harvest produced and traded in the market by the households, and increased women's decision-making power vis-a-vis their husbands.  These findings indicate that tenure insecurity and credit constraints are important barriers hindering African women's participation in higher-value, agricultural trading. They also show that it is possible to alleviate these barriers through policy design, and that doing so can have important impacts on women's empowerment.  ***Keywords***  *Land Tenure Security, Gender Equality,  Freehold Titles,  Cash Grants, Women’s Empowerment, Agricultural Investment* |

# 1. Introduction

Women farmers in poor country contexts face multiple institutional and market distortions. One important institutional imperfection is weak property rights over land. In general, secure land rights are expected to improve the incentives individuals have to make efficient long-term productive investments. Therefore, it is not surprising that developing country governments are increasingly focused on reforming land rights.  It is possible however that land rights reforms alone in an environment with imperfect credit markets might not be as effective [Ghatak 2017, Bó and Finan 2016]. In fact, theoretical work by Besley *et al.* [2012] shows that very poor borrowers might become worse off if land rights reforms are not accompanied by an increase in the supply of credit. Understanding the complementary or substitutable role of improving land rights and relaxing credit constraints is important for policy reasons, given increasing policy attention to land rights institutional reforms.

Using a randomized control trial approach in rural Uganda, this paper tests the effectiveness of two interventions – separately and together – targeted to women farmers. The first intervention is land titling and is aimed at strengthening land rights. The second intervention is a cash grant and is aimed at relaxing liquidity constraints. Uganda is an appropriate setting to conduct this study since over 80% of its land is held under (non-registered) customary tenure and 90% of the population lives in rural areas. Furthermore, access to credit remains a major challenge in much of Uganda despite advances in its financial system, driven by the market-oriented policy reforms of the 1990s. According to the 2016/17 Uganda National Household Survey, just under 8% of individuals aged 18 years and above received a formal loan in the 12 months preceding the survey.

This study addresses the following research question: does relaxing liquidity constraints affect the impact of land titling on investment, productivity, and welfare? Economic theory predicts that secure property rights increase the incentives individuals have to invest in long-term productive activities through various channels [Besley 1995, Besley and Ghatak 2010], including a reduction in the risk of expropriation and an increase in the collateralizability of land. But to the extent that such new investments require upfront liquidity, these mechanisms will be muted in a setting with imperfect credit markets –  without an accompanying increase in credit supply.[[1]](#footnote-1) Despite enhanced tenure security, households could invest differently than they would under complete credit markets: in general, combining land titles with loans can offer households greater flexibility to determine their investment portfolios and thus enable a more efficient allocation of resources.[[2]](#footnote-2)

# 2. Target Population and Interventions

## 2.1. Target Population

The study’s target population comprises around 1,600 households across 378 rural villages in four districts in Western Uganda: Mbarara, Sheema, Buhweju, and Isingiro. Households in the sample have limited access to the two key treatments (land titling and credit/liquidity). All households own at least one undocumented parcel of land and only 8% of the households have access to formal credit. All households in the sample are engaged in agricultural activities. To the extent that the majority of the Uganda population is rural, untitled, and with limited access to credit, if scaled up the interventions could benefit 5 million households. The Government of Uganda is implementing a large-scale land titling program which will target 1 million households in rural areas.

The findings from our baseline data collection reveal that the majority of the sample cultivates food crops, and 95% of them cultivate bananas, but only half of the households in the sample cultivate cash crops such as coffee and sugarcane. More than 95% of sample households do not irrigate their land using irrigation methods. In terms of non-labor inputs, a little over half of the sample (42%) uses fertilizer (organic or inorganic) while only 10% of the sample uses pesticides. Most of the sample (97%) uses household labor on their parcel of land and only 44% use hired labor.

A key goal of the Land Titling intervention is to improve women’s land rights. To do so, both the financial and the informational incentives for titling were carefully designed to promote joint spousal titling. Specifically, the financial incentives were offered in two variations: unconditionally and conditional on the household agreeing to jointly title the land in the names of both spouses. The informational incentives were also offered in two variations: a “gender-silent” version focused on the general benefits of titling, and a “gender-informed” version focused on the benefits of joint titling to the family. Results indicate that more than 80% of the household chose to include the names of wives on the titles.

## 2.2. Interventions

This study test two interventions targeted to women farmers in Uganda. The first intervention (**Land Titling intervention**) was designed and carried out in partnership with the Uganda Ministry of Lands, Housing& Urban Development (MLHUD), provides households with financial and informational incentives designed to promote land registration and joint spousal titling. The financial incentives comprise fully subsidized freehold land titles, and the informational incentives include information on the benefits of titling through an innovative video documentary. The intervention includes four door-to-door visits. During the first visit, households are provided with information and offered the opportunity to title a parcel of land (randomly selected for households with multiple parcels). During the second visit, the parcel boundaries are defined in the presence of neighbors and local government officials, and households are assisted with the adjudication process. During the third visit, the core land demarcation and surveying activities take place. During the fourth and final visit, freehold land titles are delivered to the households after being processed by the Government of Uganda.

The second intervention (**Cash intervention**) disburses cash grants of approximately UGX 700,000 to women farmers. While the cash grants are unconditional, they are “labelled” for productive investment either in the farm (e.g. buying inputs and cultivating higher-value crops) or off-farm (e.g. starting or growing an off-farm business). We partnered with local banks to distribute the grants directly to women farmers. The cash grants are disbursed approximately 4-5 years after the implementation of the land titling intervention.

# 3. Research Design and Empirical Framework

## 3.1. Research Design

The study is a randomized controlled trial. We conduct a 2X2 experiment. Figure 1 outlines the design. The original sample comprises around 1,646 households spread across 378 villages, with an average number of 4-5 households per community. A two-step randomization is followed. The first stage takes place at the village level: villages (sample households therein) either receive an offer for a fully-subsidized land title or no offer. The village level randomization was stratified by parish. The second stage takes place at the household level within villages: sampled households either receive a cash grant offer (targeted to the wife) or no offer. The household level randomization will be stratified on village, take-up of land titling, farm size, and value of harvest.

The main source of data for the impact evaluation will be household surveys to collect detailed household and plot level data. Households were first interviewed in Feb-Mar 2017 (baseline) prior the interventions, and were interviewed again in Jul-Aug 2022 (endline) post interventions. The surveys were administered to the household head and his or her spouse.The main final outcomes of interest are agricultural investment and productivity, as well as investment in non-farm income generating activities and income.

## 3.2. Empirical Framework

We estimate the following OLS ANCOVA specification for the impact on outcome for household in community at endline:

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|  |

equals one if household is in a community assigned to receive land titles and zero otherwise. equals one for households assigned to receive a cash grant and zero otherwise. is a randomization strata fixed effect. is the outcome measured at baseline. is an error term clustered by community , the level of randomization of the Land Tilting intervention. The parameters of interest are , , and , which identify the standalone causal impact of land titles, the standalone causal impact of cash grants, and the complementary/substitutability between titles and cash.

# 4. Results

Tables 2-6 report treatment impacts on the household parcel randomly selected to potentially receive a land title. There are four main findings from these tables. First, we find no evidence that the titling intervention shifted the intra-household distribution of perceived ownership rights over the parcel (Table 2). This is despite the high titling take-up rates and most titles having been issued in women’s names.

Second, both interventions led to increased investment in non-labor inputs, tree planting, and cultivation of perennial crops (Tables 2-4): the interventions caused a 4 percentage points (pp) increase in probability of chemical usage, 5-6pp increase in the likelihood of tree planting, and an 11-12pp increase in the likelihood of perennial crops cultivation.

Third, both interventions increased value of harvested crops on the parcel and the amount of cash received from selling some of that harvest. Specifically, the interventions increased value of harvested by around USD 140-180, and income from crop selling by around USD 107-115.

Fourth, rather than complementing each other, the titling and cash interventions appear to have substituted each other. The coefficient on the interaction effect between the two treatments is negative and highly significant. We cannot reject the hypothesis that the standalone impact of the titling intervention is equal to that of the cash intervention.

Tables 7-11 examine whether the treatments had an impact on other parcels owned by the household (for those with multiple parcels). There are two main findings here. First, we find no evidence that the titling intervention crowded out investment on these other parcels. Hence, the observed increased investment on the selected parcel was not at the expense of non-selected parcels. Second, while less precisely estimated, we find that the cash intervention had a similar pattern of impacts on non-selected parcels to those observed on the selected parcel.

Finally, Table 12 reports treatment impacts on woman’s decision-making power within the households. We find that both treatments significantly increased woman’s say over main household expenditures. We also find significant improvements induced by the cash treatment in her say over how to spend her own and her household’s income.

**Part 1: Baseline Characteristics**

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| --- | --- | --- | --- | --- | --- |
| Table 1: Summary of household demographics (baseline data) | | | | | |
|  | mean | sd | min | max | count |
| Household size | 6.94 | 2.77 | 1.00 | 22.00 | 1509 |
| Num of male HH members | 3.40 | 1.81 | 0.00 | 13.00 | 1509 |
| Num of female HH members | 3.54 | 1.87 | 0.00 | 13.00 | 1509 |
| Num of children | 2.12 | 1.52 | 0.00 | 10.00 | 1509 |
| Num of adults | 2.64 | 1.61 | 0.00 | 11.00 | 1509 |
| Num of elderly | 0.33 | 0.64 | 0.00 | 3.00 | 1509 |
| polygamy HH (yes=1) | 0.14 | 0.35 | 0.00 | 1.00 | 1509 |
| Edu Attainment-husband [0-15] | 5.96 | 3.98 | 0.00 | 15.00 | 1328 |
| Edu Attainment-wife [0-15] | 4.66 | 3.57 | 0.00 | 15.00 | 1380 |
| No school-husband [yes=1] | 0.12 | 0.32 | 0.00 | 1.00 | 1509 |
| Completed primary school-husband [yes=1] | 0.58 | 0.49 | 0.00 | 1.00 | 1509 |
| Completed secondary school-husband [yes=1] | 0.18 | 0.38 | 0.00 | 1.00 | 1509 |
| Completed higher education-husband [yes=1] | 0.01 | 0.09 | 0.00 | 1.00 | 1509 |
| No school-wife [yes=1] | 0.21 | 0.41 | 0.00 | 1.00 | 1509 |
| Completed primary school-wife [yes=1] | 0.60 | 0.49 | 0.00 | 1.00 | 1509 |
| Completed secondary school-wife [yes=1] | 0.11 | 0.31 | 0.00 | 1.00 | 1509 |
| Completed higher education-wife [yes=1] | 0.00 | 0.03 | 0.00 | 1.00 | 1509 |
| Num of children attending school | 1.96 | 1.47 | 0.00 | 10.00 | 1509 |
| Observations | 1509 |  |  |  |  |

**Part 2: Treatment Impacts on Selected Parcels**

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| Table 2: Parcel Ownership | | | | | | |
| VARIABLES | Parcel was identified (yes=1) | Still owned (yes=1) | Is it family land(yes=1) | Owned by husband(yes=1) | Owned by wife(yes=1) | Owned by both husband and wife(yes=1) |
|  |  |  |  |  |  |  |
| Title | -0.006 | 0.039 | 0.021 | 0.037 | 0.002 | -0.050 |
|  | (0.009) | (0.026) | (0.041) | (0.038) | (0.020) | (0.041) |
| Cash | -0.016 | 0.053\*\* | -0.055 | 0.042 | 0.016 | -0.061 |
|  | (0.012) | (0.027) | (0.041) | (0.039) | (0.023) | (0.041) |
| Title X Cash | 0.017 | -0.035 | 0.050 | -0.044 | -0.033 | 0.089 |
|  | (0.017) | (0.034) | (0.054) | (0.054) | (0.032) | (0.057) |
|  |  |  |  |  |  |  |
| Observations | 1,404 | 1,378 | 1,247 | 1,247 | 1,247 | 1,247 |
| R-squared | 0.083 | 0.054 | 0.074 | 0.066 | 0.060 | 0.054 |
| Control Mean | 0.987 | 0.863 | 0.322 | 0.259 | 0.0667 | 0.663 |
| Control SD | 0.112 | 0.345 | 0.468 | 0.439 | 0.250 | 0.474 |
| P-value: Title = Cash | 0.408 | 0.539 | 0.0608 | 0.906 | 0.524 | 0.799 |
| Estimates: Title + TitleXCash = 0 | 0.0114 | 0.00452 | 0.0710 | -0.00726 | -0.0313 | 0.0382 |
| P-value: Title + TitleXCash = 0 | 0.348 | 0.836 | 0.0858 | 0.854 | 0.180 | 0.370 |
| Estimates: Cash + TitleXCash = 0 | 0.00163 | 0.0185 | -0.00517 | -0.00258 | -0.0172 | 0.0276 |
| P-value: Cash + TitleXCash = 0 | 0.879 | 0.363 | 0.881 | 0.946 | 0.396 | 0.486 |
| Note: OLS regression specifications include village fixed effects. Title and Cash are dummy variables equal to 1 if the household is targeted for the title and cash interventions, respectively, and 0 otherwise. SD stands for standard deviation. Robust standard errors clustered by village are in parentheses, \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent critical level. | | | | | | |

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| Table 3: Investment on Structures, Conservation, and Tree Planting | | | | | |
| VARIABLES | Structures /buildings | Man-made water structure | Used soil conservation methods | Planted trees (last 12 months) |
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|  |  |  |  |  |
| Title | 0.026 | 0.006 | 0.028 | 0.061\*\*\* |
|  | (0.038) | (0.029) | (0.038) | (0.021) |
| Cash | 0.034 | 0.012 | 0.014 | 0.049\*\* |
|  | (0.043) | (0.029) | (0.038) | (0.022) |
| Title X Cash | -0.001 | -0.045 | 0.022 | -0.104\*\*\* |
|  | (0.056) | (0.039) | (0.053) | (0.030) |
|  |  |  |  |  |
| Observations | 1,401 | 1,401 | 1,401 | 1,401 |
| R-squared | 0.067 | 0.111 | 0.095 | 0.078 |
| Control Mean | 0.503 | 0.158 | 0.361 | 0.0633 |
| Control SD | 0.501 | 0.366 | 0.481 | 0.244 |
| P-value: Title = Cash | 0.848 | 0.847 | 0.704 | 0.596 |
| Estimates: Title + TitleXCash = 0 | 0.0253 | -0.0386 | 0.0501 | -0.0426 |
| P-value: Title + TitleXCash = 0 | 0.510 | 0.177 | 0.191 | 0.0823 |
| Estimates: Cash + TitleXCash = 0 | 0.0328 | -0.0330 | 0.0356 | -0.0552 |
| P-value: Cash + TitleXCash = 0 | 0.372 | 0.202 | 0.324 | 0.00599 |
| Note: OLS regression specifications include village fixed effects. Title and Cash are dummy variables equal to 1 if the household is targeted for the title and cash interventions, respectively, and 0 otherwise. SD stands for standard deviation. Robust standard errors clustered by village are in parentheses, \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent critical level. | | | | | |

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| Table 4: Investment on Labor and Non-Labor Inputs | | | | | | | | | |
| VARIABLES | Use of non-labor input | | | Labor input | | | | | Parcel size (Acres) |
|  |  |  | Number |  | Cost of non-HH labor (USD) | |  |
| Organic fertilizer | Inorganic fertilizer | Pesticides/herbicides/fungicides | HH members | Non-HH labor |  | Winsorize | HIS |
|  |  |  |  |  |  |  |  |  |  |
| Title | 0.040 | 0.010 | 0.040\*\* | -0.060 | 0.019 | 12.330 | 12.330 | 0.152 | 0.131 |
|  | (0.037) | (0.013) | (0.019) | (0.120) | (0.120) | (8.446) | (8.446) | (0.142) | (0.120) |
| Cash | 0.011 | 0.037\*\* | 0.039\* | 0.202 | 0.083 | 13.456 | 13.456 | 0.196 | 0.185\* |
|  | (0.039) | (0.015) | (0.023) | (0.132) | (0.128) | (8.509) | (8.509) | (0.147) | (0.098) |
| Title X Cash | 0.029 | -0.030 | -0.032 | -0.036 | 0.177 | -9.655 | -9.655 | 0.011 | 0.127 |
|  | (0.054) | (0.021) | (0.029) | (0.170) | (0.184) | (12.328) | (12.328) | (0.211) | (0.283) |
|  |  |  |  |  |  |  |  |  |  |
| Observations | 1,401 | 1,401 | 1,401 | 1,401 | 1,401 | 1,401 | 1,401 | 1,401 | 1,401 |
| R-squared | 0.080 | 0.087 | 0.090 | 0.078 | 0.048 | 0.087 | 0.087 | 0.059 | 0.053 |
| Control Mean | 0.297 | 0.0253 | 0.0538 | 1.665 | 0.652 | 18.16 | 18.16 | 0.881 | 0.676 |
| Control SD | 0.458 | 0.157 | 0.226 | 1.637 | 1.631 | 83.62 | 83.62 | 1.777 | 0.887 |
| P-value: Title = Cash | 0.433 | 0.108 | 0.967 | 0.0253 | 0.599 | 0.891 | 0.891 | 0.767 | 0.636 |
| Estimates: Title + TitleXCash = 0 | 0.0691 | -0.0199 | 0.00843 | -0.0959 | 0.196 | 2.675 | 2.675 | 0.163 | 0.258 |
| P-value: Title + TitleXCash = 0 | 0.0711 | 0.251 | 0.726 | 0.423 | 0.161 | 0.755 | 0.755 | 0.286 | 0.369 |
| Estimates: Cash + TitleXCash = 0 | 0.0402 | 0.00705 | 0.00744 | 0.166 | 0.260 | 3.801 | 3.801 | 0.207 | 0.312 |
| P-value: Cash + TitleXCash = 0 | 0.260 | 0.627 | 0.679 | 0.126 | 0.0520 | 0.662 | 0.662 | 0.181 | 0.283 |
| Note: OLS regression specifications include village fixed effects. Title and Cash are dummy variables equal to 1 if the household is targeted for the title and cash interventions, respectively, and 0 otherwise. SD stands for standard deviation. Robust standard errors clustered by village are in parentheses, \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent critical level. | | | | | | | | | |

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| Table 5: Crop Choices | | | | | | | | | | | | | | | | |
|  | Primary Season (Jan-Jun, 2022) | | | | | | | | Secondary Season (July-Dec, 2021) | | | | | | | |
| VARIABLES | # of crops | Cereal | Legumes | Vegetables | Fruits | Spices | Perennial | Other crops | # of crops | Cereal | Legumes | Vegetables | Fruits | Spices | Perennial | Other crops |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Title | 0.109 | 0.034\* | -0.019 | -0.007 | -0.026 | 0.007\* | 0.118\*\*\* | -0.002 | 0.121 | -0.003 | 0.011 | 0.007 | -0.021 | 0.007 | 0.137\*\*\* | 0.004 |
|  | (0.099) | (0.019) | (0.036) | (0.021) | (0.038) | (0.004) | (0.032) | (0.006) | (0.111) | (0.034) | (0.045) | (0.023) | (0.036) | (0.006) | (0.045) | (0.003) |
| Cash | 0.269\*\* | 0.021 | 0.032 | 0.007 | 0.001 | 0.003 | 0.114\*\*\* | 0.007 | 0.214\* | -0.018 | 0.053 | 0.020 | -0.036 | 0.006 | 0.121\*\* | -0.000 |
|  | (0.128) | (0.020) | (0.037) | (0.023) | (0.042) | (0.003) | (0.035) | (0.009) | (0.118) | (0.032) | (0.048) | (0.024) | (0.042) | (0.005) | (0.047) | (0.000) |
| Title X Cash | -0.136 | -0.018 | 0.027 | 0.001 | 0.019 | -0.006 | -0.119\*\* | -0.009 | -0.238 | 0.020 | -0.081 | -0.047 | 0.011 | -0.006 | -0.169\*\* | 0.000 |
|  | (0.164) | (0.030) | (0.052) | (0.030) | (0.055) | (0.006) | (0.049) | (0.010) | (0.152) | (0.045) | (0.062) | (0.030) | (0.055) | (0.008) | (0.066) | (0.005) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Observations | 1,401 | 1,401 | 1,401 | 1,401 | 1,401 | 1,401 | 1,401 | 1,401 | 884 | 884 | 884 | 884 | 884 | 884 | 884 | 884 |
| R-squared | 0.085 | 0.109 | 0.092 | 0.071 | 0.062 | 0.063 | 0.163 | 0.096 | 0.109 | 0.156 | 0.124 | 0.095 | 0.159 | 0.105 | 0.219 | 0.079 |
| Control Mean | 1.399 | 0.0538 | 0.291 | 0.0791 | 0.620 | 0.000 | 0.187 | 0.00633 | 1.657 | 0.121 | 0.222 | 0.0505 | 0.869 | 0.000 | 0.247 | 0.000 |
| Control SD | 1.302 | 0.226 | 0.455 | 0.270 | 0.486 | 0.000 | 0.390 | 0.0794 | 1.024 | 0.327 | 0.417 | 0.220 | 0.339 | 0.000 | 0.433 | 0.000 |
| P-value: Title = Cash | 0.179 | 0.512 | 0.157 | 0.491 | 0.479 | 0.379 | 0.895 | 0.209 | 0.473 | 0.627 | 0.379 | 0.606 | 0.703 | 0.887 | 0.741 | 0.140 |
| Estimates: Title + TitleXCash = 0 | -0.0267 | 0.0153 | 0.00795 | -0.00612 | -0.007 | 0.000896 | -0.0003 | -0.0108 | -0.117 | 0.0169 | -0.0708 | -0.0402 | -0.015 | 0.000647 | -0.0316 | 0.00420 |
| P-value: Title + TitleXCash = 0 | 0.832 | 0.463 | 0.831 | 0.755 | 0.845 | 0.755 | 0.993 | 0.137 | 0.343 | 0.582 | 0.113 | 0.0889 | 0.793 | 0.874 | 0.500 | 0.388 |
| Estimates: Cash + TitleXCash = 0 | 0.133 | 0.00267 | 0.0583 | 0.00769 | 0.0200 | -0.00303 | -0.00505 | -0.0016 | -0.024 | 0.00131 | -0.0287 | -0.0275 | -0.025 | -0.0002 | -0.0477 | -0.00008 |
| P-value: Cash + TitleXCash = 0 | 0.198 | 0.904 | 0.0882 | 0.699 | 0.589 | 0.548 | 0.881 | 0.729 | 0.808 | 0.967 | 0.468 | 0.131 | 0.483 | 0.976 | 0.300 | 0.988 |
| Note: OLS regression specifications include village fixed effects. Title and Cash are dummy variables equal to 1 if the household is targeted for the title and cash interventions, respectively, and 0 otherwise. SD stands for standard deviation. Robust standard errors clustered by village are in parentheses, \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent critical level. | | | | | | | | | | | | | | | | |

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| Table 6: Value Harvested and Income from Selling Crops | | | | | | | | | | | | | | |
|  | Primary Season (Jan-Jun, 2022) | | | | | | | Secondary Season (July-Dec, 2021) | | | | | | |
| VARIABLES | Harvest [USD] | Harvest [USD] (winsorize) | Harvest [USD] (IHS) | Sold crop(yes=1) | Crop sale [USD] | Crop sale [USD] (winsorize) | Crop sale [USD] (IHS) | Harvest [USD] | Harvest [USD] (winsorize) | Harvest [USD] (IHS) | Sold crop(yes=1) | Crop sale [USD] | Crop sale [USD] (winsorize) | Crop sale [USD] (IHS) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Title | -2,412.916 | 131.888\*\*\* | 0.226 | 0.022 | 147.816\*\* | 115.468\*\*\* | 0.244 | 58.798 | 14.064 | -0.068 | -0.014 | 104.541\*\* | 83.835\*\* | 0.083 |
|  | (2,532.433) | (50.679) | (0.263) | (0.038) | (66.295) | (41.749) | (0.244) | (75.111) | (55.440) | (0.318) | (0.048) | (47.949) | (39.549) | (0.288) |
| Cash | -2,085.572 | 177.710\*\*\* | 0.597\*\* | 0.096\*\* | 136.356\*\* | 107.536\*\* | 0.564\*\* | 110.353 | 58.948 | 0.214 | 0.041 | 88.329\* | 69.986\* | 0.305 |
|  | (2,443.700) | (66.263) | (0.282) | (0.041) | (66.052) | (48.594) | (0.268) | (88.300) | (69.245) | (0.382) | (0.055) | (51.749) | (40.946) | (0.350) |
| Title X Cash | 2,205.989 | -140.634 | -0.140 | -0.008 | -182.287\* | -127.612\* | -0.145 | 195.340 | 127.707 | 0.506 | 0.065 | -149.075\* | -111.890\* | 0.188 |
|  | (2,524.039) | (97.377) | (0.380) | (0.055) | (104.207) | (73.358) | (0.362) | (156.180) | (103.441) | (0.483) | (0.069) | (79.861) | (60.950) | (0.441) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Observations | 1,401 | 1,401 | 1,401 | 1,401 | 1,401 | 1,401 | 1,401 | 884 | 884 | 884 | 866 | 884 | 884 | 884 |
| R-squared | 0.030 | 0.086 | 0.089 | 0.089 | 0.083 | 0.079 | 0.088 | 0.094 | 0.132 | 0.105 | 0.102 | 0.141 | 0.120 | 0.101 |
| Control Mean | 2704 | 291.4 | 3.306 | 0.506 | 208.4 | 197.9 | 3.009 | 345.8 | 340.9 | 3.893 | 0.610 | 163.7 | 159.5 | 3.358 |
| Control SD | 42909 | 504 | 3.409 | 0.501 | 467.3 | 396.2 | 3.115 | 537.5 | 518.4 | 3.305 | 0.489 | 302.7 | 283.1 | 2.928 |
| P-value: Title = Cash | 0.419 | 0.506 | 0.190 | 0.0708 | 0.881 | 0.878 | 0.221 | 0.551 | 0.482 | 0.397 | 0.265 | 0.779 | 0.757 | 0.468 |
| Estimates: Title + TitleXCash = 0 | -206.9 | -8.745 | 0.0854 | 0.0137 | -34.47 | -12.14 | 0.0995 | 254.1 | 141.8 | 0.438 | 0.0505 | -44.53 | -28.05 | 0.271 |
| P-value: Title + TitleXCash = 0 | 0.595 | 0.913 | 0.763 | 0.736 | 0.632 | 0.829 | 0.704 | 0.0931 | 0.0853 | 0.190 | 0.290 | 0.408 | 0.496 | 0.372 |
| Estimates: Cash + TitleXCash = 0 | 120.4 | 37.08 | 0.456 | 0.0875 | -45.93 | -20.08 | 0.420 | 305.7 | 186.7 | 0.720 | 0.106 | -60.75 | -41.90 | 0.494 |
| P-value: Cash + TitleXCash = 0 | 0.508 | 0.606 | 0.0840 | 0.0208 | 0.561 | 0.710 | 0.0897 | 0.0283 | 0.0156 | 0.0123 | 0.0108 | 0.327 | 0.355 | 0.0592 |
| Note: OLS regression specifications include village fixed effects. Title and Cash are dummy variables equal to 1 if the household is targeted for the title and cash interventions, respectively, and 0 otherwise. SD stands for standard deviation. Robust standard errors clustered by village are in parentheses, \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent critical level. | | | | | | | | | | | | | | |

**Part 3: Treatment Impacts on Non-Selected Parcels**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Table 7: Parcel Ownership | | | | | | |
| VARIABLES | Parcel was identified (yes=1) | Still owned (yes=1) | Is it family land(yes=1) | Owned by husband(yes=1) | Owned by wife(yes=1) | Owned by both husband and wife(yes=1) |
|  |  |  |  |  |  |  |
| Title | -0.016 | -0.015 | -0.020 | 0.014 | 0.024 | -0.018 |
|  | (0.012) | (0.033) | (0.046) | (0.043) | (0.022) | (0.045) |
| Cash | -0.014 | 0.021 | -0.075\* | 0.044 | 0.033 | -0.065 |
|  | (0.011) | (0.034) | (0.045) | (0.039) | (0.025) | (0.043) |
| Title X Cash | 0.029\* | 0.019 | 0.140\*\* | -0.055 | -0.046 | 0.094 |
|  | (0.016) | (0.046) | (0.062) | (0.058) | (0.034) | (0.063) |
|  |  |  |  |  |  |  |
| Observations | 1,272 | 1,247 | 1,031 | 1,031 | 1,031 | 1,031 |
| R-squared | 0.076 | 0.112 | 0.101 | 0.088 | 0.075 | 0.086 |
| Control Mean | 0.986 | 0.826 | 0.395 | 0.282 | 0.0630 | 0.685 |
| Control SD | 0.116 | 0.379 | 0.490 | 0.451 | 0.244 | 0.466 |
| P-value: Title = Cash | 0.894 | 0.273 | 0.227 | 0.493 | 0.724 | 0.294 |
| Estimates: Title + TitleXCash = 0 | 0.0131 | 0.00387 | 0.120 | -0.0412 | -0.0211 | 0.0757 |
| P-value: Title + TitleXCash = 0 | 0.225 | 0.896 | 0.0111 | 0.335 | 0.396 | 0.0856 |
| Estimates: Cash + TitleXCash = 0 | 0.0149 | 0.0394 | 0.0651 | -0.0112 | -0.0125 | 0.0284 |
| P-value: Cash + TitleXCash = 0 | 0.205 | 0.215 | 0.127 | 0.794 | 0.617 | 0.528 |
| Note: OLS regression specifications include village fixed effects. Title and Cash are dummy variables equal to 1 if the household is targeted for the title and cash interventions, respectively, and 0 otherwise. SD stands for standard deviation. Robust standard errors clustered by village are in parentheses, \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent critical level. | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Table 8: Investment on Structures, Conservation, and Tree Planting | | | | |
| VARIABLES | Parcel has structures /buildings | Man-made water structure | Used soil conservation | Planted trees (last 12 months) |
|  |  |
|  |  |  |  |  |
| Title | -0.062 | -0.023 | 0.056 | 0.019 |
|  | (0.039) | (0.030) | (0.039) | (0.025) |
| Cash | -0.038 | -0.016 | 0.028 | 0.012 |
|  | (0.040) | (0.030) | (0.040) | (0.028) |
| Title X Cash | 0.055 | 0.007 | -0.026 | 0.006 |
|  | (0.055) | (0.040) | (0.054) | (0.037) |
|  |  |  |  |  |
| Observations | 1,363 | 1,363 | 1,363 | 1,363 |
| R-squared | 0.068 | 0.093 | 0.088 | 0.082 |
| Control Mean | 0.595 | 0.204 | 0.430 | 0.110 |
| Control SD | 0.492 | 0.404 | 0.496 | 0.313 |
| P-value: Title = Cash | 0.521 | 0.808 | 0.483 | 0.792 |
| Estimates: Title + TitleXCash = 0 | -0.00678 | -0.0166 | 0.0299 | 0.0250 |
| P-value: Title + TitleXCash = 0 | 0.862 | 0.551 | 0.460 | 0.343 |
| Estimates: Cash + TitleXCash = 0 | 0.0177 | -0.00953 | 0.00148 | 0.0181 |
| P-value: Cash + TitleXCash = 0 | 0.626 | 0.718 | 0.968 | 0.471 |
| Note: OLS regression specifications include village fixed effects. Title and Cash are dummy variables equal to 1 if the household is targeted for the title and cash interventions, respectively, and 0 otherwise. SD stands for standard deviation. Robust standard errors clustered by village are in parentheses, \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent critical level. | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table 9: Investment on Labor and Non-Labor Inputs | | | | | | | | | |
| VARIABLES | Use of non-labor input | |  | Labor input | | | | | Parcel size (Acres) |
|  |  |  |  | Number |  | Cost of non-HH labor (USD) | |  |
|  | Organic fertilizer | Inorganic fertilizer | Pesticides/herbicides/fungicides | HH members | Non-HH labor |  | Winsorize | HIS |
|  |  |  |  |  |  |  |  |  |  |
| Title | -0.001 | 0.005 | -0.001 | -0.088 | 0.071 | 83.238\*\* | 34.403\*\* | 0.256 | -3.898 |
|  | (0.044) | (0.018) | (0.030) | (0.106) | (0.207) | (41.879) | (14.676) | (0.191) | (3.294) |
| Cash | 0.042 | 0.006 | 0.021 | -0.033 | 0.072 | 62.572\* | 30.513\*\* | 0.534\*\*\* | -3.232 |
|  | (0.046) | (0.020) | (0.032) | (0.102) | (0.188) | (32.229) | (13.826) | (0.170) | (3.302) |
| Title X Cash | 0.012 | 0.013 | 0.047 | 0.231 | 0.177 | -103.865\*\* | -41.851\* | -0.416 | 3.736 |
|  | (0.060) | (0.028) | (0.046) | (0.151) | (0.259) | (44.776) | (21.366) | (0.270) | (3.357) |
|  |  |  |  |  |  |  |  |  |  |
| Observations | 1,170 | 1,170 | 1,170 | 1,170 | 1,170 | 1,376 | 1,376 | 1,376 | 1,376 |
| R-squared | 0.101 | 0.084 | 0.106 | 0.081 | 0.069 | 0.126 | 0.094 | 0.085 | 0.048 |
| Control Mean | 0.413 | 0.0502 | 0.143 | 2.046 | 1.002 | 40.41 | 32.41 | 1.263 | 5.200 |
| Control SD | 0.493 | 0.219 | 0.351 | 1.290 | 2.193 | 195 | 113.3 | 2.100 | 57.71 |
| P-value: Title = Cash | 0.306 | 0.962 | 0.462 | 0.600 | 0.999 | 0.660 | 0.812 | 0.149 | 0.398 |
| Estimates: Title + TitleXCash = 0 | 0.0109 | 0.0187 | 0.0464 | 0.143 | 0.248 | -20.63 | -7.447 | -0.161 | -0.162 |
| P-value: Title + TitleXCash = 0 | 0.803 | 0.321 | 0.166 | 0.236 | 0.168 | 0.557 | 0.602 | 0.391 | 0.835 |
| Estimates: Cash + TitleXCash = 0 | 0.0536 | 0.0196 | 0.0682 | 0.198 | 0.249 | -41.29 | -11.34 | 0.117 | 0.503 |
| P-value: Cash + TitleXCash = 0 | 0.168 | 0.339 | 0.0333 | 0.0816 | 0.181 | 0.151 | 0.477 | 0.574 | 0.179 |
| Note: OLS regression specifications include village fixed effects. Title and Cash are dummy variables equal to 1 if the household is targeted for the title and cash interventions, respectively, and 0 otherwise. SD stands for standard deviation. Robust standard errors clustered by village are in parentheses, \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent critical level. | | | | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table 10: Crop Choices | | | | | | | | | | | | | | | | |
|  | Primary Season (Jan-Jun, 2022) | | | | | | | | Secondary Season (July-December, 2021) | | | | | | | |
| VARIABLES | # of crops | Cereal | Legumes | Vegetables | Fruits | Spices | Perennial | Other crops | # of crops | Cereal | Legumes | Vegetables | Fruits | Spices | Perennial | Other crops |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Title | -0.083 | -0.033 | 0.009 | -0.010 | 0.011 | -0.002 | -0.062 | -0.011 | -0.002 | 0.021 | 0.020 | 0.034 | -0.005 | -0.006 | -0.008 | 0.004 |
|  | (0.184) | (0.029) | (0.043) | (0.028) | (0.038) | (0.005) | (0.040) | (0.012) | (0.038) | (0.047) | (0.024) | (0.039) | (0.006) | (0.049) | (0.008) | (0.003) |
| Cash | 0.355\* | 0.045 | 0.007 | 0.014 | 0.005 | 0.000 | -0.060 | 0.005 | 0.040 | 0.038 | 0.026 | 0.010 | -0.006 | -0.021 | -0.006 | -0.000 |
|  | (0.197) | (0.032) | (0.044) | (0.034) | (0.038) | (0.007) | (0.038) | (0.013) | (0.037) | (0.046) | (0.024) | (0.039) | (0.006) | (0.045) | (0.006) | (0.000) |
| Title X Cash | -0.084 | -0.007 | 0.026 | 0.001 | 0.044 | -0.001 | 0.078 | 0.008 | -0.015 | -0.052 | -0.044 | 0.001 | 0.005 | 0.000 | 0.029\*\* | 0.000 |
|  | (0.262) | (0.042) | (0.058) | (0.042) | (0.052) | (0.006) | (0.055) | (0.017) | (0.051) | (0.064) | (0.033) | (0.052) | (0.005) | (0.061) | (0.014) | (0.005) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Observations | 1,376 | 1,170 | 1,170 | 1,170 | 1,170 | 1,170 | 1,170 | 1,170 | 906 | 906 | 906 | 906 | 906 | 906 | 906 | 884 |
| R-squared | 0.083 | 0.128 | 0.119 | 0.076 | 0.138 | 0.069 | 0.194 | 0.073 | 0.164 | 0.105 | 0.101 | 0.199 | 0.023 | 0.229 | 0.111 | 0.079 |
| Control Mean | 2.466 | 0.143 | 0.552 | 0.154 | 0.734 | 0.00386 | 0.402 | 0.0193 | 0.194 | 0.299 | 0.0597 | 0.786 | 0.00498 | 0.373 | 0.00498 | 0.000 |
| Control SD | 2.371 | 0.351 | 0.498 | 0.362 | 0.443 | 0.0621 | 0.491 | 0.138 | 0.396 | 0.459 | 0.238 | 0.411 | 0.0705 | 0.485 | 0.0705 | 0.000 |
| P-value: Title = Cash | 0.00926 | 0.00688 | 0.959 | 0.413 | 0.871 | 0.381 | 0.961 | 0.0966 | 0.319 | 0.695 | 0.816 | 0.500 | 0.946 | 0.751 | 0.818 | 0.140 |
| Estimates: Title + TitleXCash = 0 | -0.168 | -0.0398 | 0.0359 | -0.00878 | 0.0551 | -0.00265 | 0.0161 | -0.00314 | -0.0174 | -0.0313 | -0.0237 | 0.0351 | -0.000672 | -0.00620 | 0.0208 | 0.00420 |
| P-value: Title + TitleXCash = 0 | 0.339 | 0.188 | 0.376 | 0.775 | 0.131 | 0.296 | 0.695 | 0.812 | 0.686 | 0.460 | 0.296 | 0.340 | 0.525 | 0.891 | 0.0234 | 0.388 |
| Estimates: Cash + TitleXCash = 0 | 0.271 | 0.0380 | 0.0337 | 0.0148 | 0.0493 | -0.000433 | 0.0180 | 0.0131 | 0.0245 | -0.0142 | -0.0182 | 0.0105 | -0.000718 | -0.0211 | 0.0221 | -0.000078 |
| P-value: Cash + TitleXCash = 0 | 0.103 | 0.179 | 0.396 | 0.586 | 0.155 | 0.387 | 0.634 | 0.208 | 0.502 | 0.747 | 0.415 | 0.751 | 0.387 | 0.600 | 0.0607 | 0.988 |
| Note: OLS regression specifications include village fixed effects. Title and Cash are dummy variables equal to 1 if the household is targeted for the title and cash interventions, respectively, and 0 otherwise. SD stands for standard deviation. Robust standard errors clustered by village are in parentheses, \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent critical level. | | | | | | | | | | | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table 11: Value Harvested and Income from Selling Crops | | | | | | | | | | | | | | |
|  | Primary Season (Jan-Jun, 2022) | | | | | | | Secondary Season (July-December, 2021) | | | | | | |
| VARIABLES | Harvest [USD] | Harvest [USD] (winsorize) | Harvest [USD] (IHS) | Sold crop(yes=1) | Crop sale [USD] | Crop sale [USD] (winsorize) | Crop sale [USD] (IHS) | Harvest [USD] | Harvest [USD] (winsorize) | Harvest [USD] (IHS) | Sold crop(yes=1) | Crop sale [USD] | Crop sale [USD] (winsorize) | Crop sale [USD] (IHS) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Title | 476.604 | 35.273 | 0.056 | -0.013 | -27.225 | 18.152 | 0.093 | 239.883 | -39.018 | 0.185 | 0.038 | 37.794 | 30.856 | 0.147 |
|  | (495.732) | (84.069) | (0.267) | (0.034) | (124.211) | (82.620) | (0.254) | (421.098) | (71.359) | (0.276) | (0.048) | (82.044) | (50.135) | (0.253) |
| Cash | 1,533.008 | 261.973\*\* | 0.477 | 0.001 | 8.899 | 82.486 | 0.384 | 250.319 | 14.512 | 0.619\*\* | 0.084\* | -15.973 | 3.554 | 0.539\*\* |
|  | (1,101.418) | (122.202) | (0.295) | (0.037) | (136.794) | (101.860) | (0.277) | (446.491) | (79.417) | (0.288) | (0.050) | (77.838) | (46.894) | (0.258) |
| Title X Cash | -1,656.258 | -202.485 | -0.353 | 0.030 | -57.712 | -101.589 | -0.272 | -610.145 | 40.838 | -0.412 | -0.102 | -48.810 | -42.312 | -0.350 |
|  | (1,127.052) | (151.336) | (0.402) | (0.052) | (168.754) | (130.946) | (0.379) | (593.569) | (103.494) | (0.394) | (0.068) | (105.431) | (66.789) | (0.358) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Observations | 1,376 | 1,376 | 1,376 | 1,170 | 1,376 | 1,376 | 1,376 | 1,376 | 1,376 | 1,376 | 891 | 1,376 | 1,376 | 1,376 |
| R-squared | 0.076 | 0.066 | 0.093 | 0.105 | 0.053 | 0.069 | 0.092 | 0.031 | 0.078 | 0.074 | 0.093 | 0.065 | 0.077 | 0.076 |
| Control Mean | 625 | 560.9 | 4.344 | 0.764 | 575.5 | 489.7 | 4.034 | 517.9 | 401.7 | 2.762 | 0.649 | 272.6 | 229.1 | 2.492 |
| Control SD | 1467 | 916.6 | 3.454 | 0.425 | 1756 | 1036 | 3.296 | 2432 | 1076 | 3.462 | 0.478 | 1056 | 630.9 | 3.159 |
| P-value: Title = Cash | 0.201 | 0.0438 | 0.134 | 0.704 | 0.773 | 0.520 | 0.278 | 0.987 | 0.419 | 0.132 | 0.315 | 0.532 | 0.591 | 0.140 |
| Estimates: Title + TitleXCash = 0 | -1180 | -167.2 | -0.297 | 0.0165 | -84.94 | -83.44 | -0.179 | -370.3 | 1.820 | -0.228 | -0.0640 | -11.02 | -11.46 | -0.203 |
| P-value: Title + TitleXCash = 0 | 0.147 | 0.148 | 0.308 | 0.659 | 0.444 | 0.389 | 0.518 | 0.456 | 0.980 | 0.444 | 0.186 | 0.870 | 0.793 | 0.456 |
| Estimates: Cash + TitleXCash = 0 | -123.3 | 59.49 | 0.124 | 0.0301 | -48.81 | -19.10 | 0.112 | -359.8 | 55.35 | 0.207 | -0.0179 | -64.78 | -38.76 | 0.189 |
| P-value: Cash + TitleXCash = 0 | 0.584 | 0.492 | 0.644 | 0.410 | 0.628 | 0.812 | 0.660 | 0.388 | 0.394 | 0.431 | 0.700 | 0.378 | 0.408 | 0.434 |
| Note: OLS regression specifications include village fixed effects. Title and Cash are dummy variables equal to 1 if the household is targeted for the title and cash interventions, respectively, and 0 otherwise. SD stands for standard deviation. Robust standard errors clustered by village are in parentheses, \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent critical level. | | | | | | | | | | | | | | |

**Part 4: Treatment Impacts on Women’s Empowerment**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Table 12: Wife reports to have a say on the following decisions | | | | | |
| VARIABLES | Major HH Exp | HH Income | Own Income | Child Edu | Childbearing |
|  |  |  |  |  |  |
| Title | 0.076\*\* | 0.043 | 0.027 | -0.014 | -0.028 |
|  | (0.031) | (0.030) | (0.029) | (0.026) | (0.025) |
| Cash | 0.077\*\* | 0.066\*\* | 0.060\* | 0.012 | 0.021 |
|  | (0.035) | (0.031) | (0.031) | (0.024) | (0.023) |
| Title X Cash | -0.117\*\* | -0.121\*\*\* | -0.073\* | 0.015 | 0.016 |
|  | (0.046) | (0.043) | (0.041) | (0.036) | (0.034) |
|  |  |  |  |  |  |
| Observations | 1,380 | 1,380 | 1,380 | 1,380 | 1,380 |
| R-squared | 0.074 | 0.088 | 0.088 | 0.084 | 0.079 |
| Control Mean | 0.756 | 0.782 | 0.808 | 0.865 | 0.894 |
| Control SD | 0.430 | 0.414 | 0.395 | 0.342 | 0.308 |
| P-value: Title = Cash | 0.972 | 0.463 | 0.254 | 0.343 | 0.0381 |
| Estimates: Title + TitleXCash = 0 | -0.0409 | -0.0776 | -0.0461 | 0.00101 | -0.0125 |
| P-value: Title + TitleXCash = 0 | 0.211 | 0.0199 | 0.133 | 0.969 | 0.600 |
| Estimates: Cash + TitleXCash = 0 | -0.0398 | -0.0545 | -0.0123 | 0.0269 | 0.0372 |
| P-value: Cash + TitleXCash = 0 | 0.183 | 0.0757 | 0.647 | 0.329 | 0.146 |
| Note: OLS regression specifications include village fixed effects. Title and Cash are dummy variables equal to 1 if the household is targeted for the title and cash interventions, respectively, and 0 otherwise. SD stands for standard deviation. Robust standard errors clustered by village are in parentheses, \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent critical level. | | | | | |

1. For example, banks might remain reluctant to provide credit to poor households despite the improved collateralizability of land due to inefficient and slow judicial systems when trying to settle default issues in court. [↑](#footnote-ref-1)
2. If households face binding credit constraints, their investment opportunities remain limited despite secure land rights (e.g., they could invest in land fallowing, which does not require upfront liquidity). The availability of credit, however, opens up new investment opportunities. For example, it allows households to invest in farm inputs that require some upfront liquidity (e.g., hired labor, fertilizer, pesticides). It also allows for investments in costly non-farm income generating activities (e.g., setting up a petty trade or even migrating to an urban location), which might contribute to a resource allocation away from agriculture toward services and industry.    [↑](#footnote-ref-2)