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**Direct and Spillover Effects of Land Rights Formalization in Africa**

**A case study of the Second-Level Land Certification (SLLC) in Ethiopia**

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## ABSTRACT

The study investigates the overall impacts of a second level land certification (SLLC) program in Ethiopia using a three-wave panel data set 3092 households collected in 2013, 2015 and 2018. The fact that the first-round survey was administered just before the SLLC program was launched in 2013/14 provides a unique opportunity to evaluate the impacts of the program using data before and after the program was launched. After controlling for potential selection bias, overall results show no evidence of diminishing returns to the first level land certification (FLLC) as SLLC program participation shows no statistically significant effect on household perceived tenure security. A more gender disaggregated investigation indicates a relatively favorable outcome on married women's perceived tenure security compared to their male counterparts. Empirical results also reveal a market stimulant effect of the SLLC program on land rental market participation with a more *direct* effect on beneficiary households' likelihood of renting out land (becoming a landlord) and a spillover benefit to non-beneficiary households' likelihood of renting-in land (becoming a tenant). Finally, our analysis shows a negative and statistically significant impact on access to and/or control over land by women and youth. Such evidence demands the need for future designing and implementation of similar programs to integrate a more gender and age sensitive parameters so that program outcomes remain desirable/favorable for such vulnerable groups.

**Keywords:** gender, land registration/certification, tenure security, land market, Ethiopia

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# 1. INTRODUCTION

The economies of most African countries are quite dependent on agriculture, which for many makes up a major share of the gross domestic product, employment, and export earnings. Even if land seems inexhaustible resource for agriculture, increasing population growth and market development are creating escalating demand and competition for land in Africa (Jayne et al., 2019). In such conditions, customary tenure systems can adjust to fit the changing economic, social, political, cultural, and environmental context or be eroded and become ineffectual due to such changes (Cotula and Neves 2007).

Absent or weak systems of property rights are recognized as a major reason for low economic growth and slow development in developing countries (De Soto 2000). In the 1980s, among the assumptions held regarding customary land tenure systems was that they did not provide sufficient security to landholders to ensure agricultural investment for more productive use of the land and that they prevented the emergence of land markets (Firmin-Sellers 1995). After independence, many African countries undertook land reforms to compensate for inequalities under colonial land ownership patterns and associated regressive land use policies. These reforms included improving land administration and enhancing tenure security to boost the performance of the agricultural sector and to accelerate overall economic development. Other reforms during the immediate post-independence period included land redistribution and registration (Sikor and Muller 2009).

The conceptual motivation for land titling and registration efforts lies in property rights theory. Population growth and greater market integration provides increased incentives for more intensive use of land. Returns on investments that enable more intensive use of land increase. Safeguarding the financial returns on those investments in the land for those that made them requires secure property rights and effective land administration. These institutional components translate the economic opportunities inherent in the land resource into economic growth and welfare improvement (Deininger 2003). Land registration is associated with issuing formal titles, either in the form of individual land titles or community-based land registration (Quan and Toulmin 2004). The objectives of land registration and certification programs are to enhance investment and agricultural productivity by guaranteeing more secure tenure and through improving access to credit by better enabling the use of land as collateral on loans (Byamugisha 2013).

Since the late-1990s, Ethiopia has implemented one of the largest, fastest, and inexpensive land registration and certification reforms in Africa. Evidence shows positive impacts of this land reform on investment, land productivity, and land rental market activities. Encouraged by these positive impacts, the government together with development partners implemented another round of land registration and certification which involved Global Positioning System (GPS) measurement and computer registration of land parcels. This second level land certification (SLLC) is expected to replace the registration approach used in the first round effort, which involved the use of general field boundary markings in combination with the memory of neighbors to identify land parcel borders.

The perceived added value of SLLC is considered to be dependent on the length of time since the first stage of land certification, as the basis for the general boundaries used, such as rivers and other water courses, trees, etc., and the living witnesses of location of parcel borders are expected to deteriorate through time. Moreover, agricultural potential, population pressure, and the relative local degree of urbanization may contribute to greater demand for more secure property rights, which is to be achieved via the SLLC effort. The fact that the first-level land certification program in the country was a one-shot, large-scale project, without any major follow-up to update any changes in holding status, households that since have experienced any redistribution in their land holdings

through inheritance or for administrative reasons are also expected to have higher demand for SLLC.

The study uses three rounds of a panel survey dataset – the International Food Policy Research Institute (IFPRI) Feed the Future (FtF) survey – which covers 4,023 households in Tigray, Amhara, Oromia, and Southern Nations, Nationalities, and Peoples' (SNNP) regions, to evaluate the impact of the SLLC program on key outcomes, including, but not limited to, gender-differentiated perceived tenure security of households, sustainable land management land rental market activity, and land rights of women and youth. Moreover, a gender-disaggregated supplemental dataset of 1,984 households is used to examine the impact of the SLLC program on investments in land, women's land rights, land tenure security, and legal knowledge and awareness. The gender disaggregated analysis incorporates both intra-household and inter-household differences of the impact of SLLC on the outcome variables. To account for potential endogeneity concerns and resultant biased estimates, a propensity score matching method was adopted to identify comparable beneficiary and non-beneficiary households. .

After controlling for potential selection bias and endogeneity, we found no evidence to support the hypothesis about the potential diminishing returns to the first level land certificates in the country. This is mainly so since the overall results show that having a Second Level Land Certificate (SLLC) does not significantly affect households' perceived tenure security regardless of the source of tenure risk (private and/or collective tenure risk) while positive and significant effect is witnessed on households increased land rental market activity. A more gender-disaggregated results (using also data from female spouses), however, shows a positive and statistically significant effect of the program on tenure security (both private and collective) of married women while also having a positive effect in reducing private tenure risks for female heads (single/divorced and/or widows). Similarly, the positive effect the program has on land market activity is more driven by female head of households joining the supply side of the market. Results also show that the LIFT modality of SLLC service provision has a positive indirect effect on likelihood of land renting in (becoming a tenant) while a negative spillover effect of overall perceived tenure security of non-beneficiary households. In the case of the later, perhaps, vindicating the systematic approach the LIFT model has adopted in avoiding potential adverse effects on households that will be left out of such programs.

Overall, results also show a robust negative effect the SLLC program on women and youth land rights with more constrained access to and/or control over land for those (youth and women) who resides among households with SLLC than those without SLLC. Such finding reinforces the need for careful designing and implementation of such land right protection/formalization programs (such as the SLLC) to account for gender and age sensitive parameters so that program outcomes are tailored towards protecting land rights of vulnerable groups.

The paper is organized as follows. Section two reviews the theoretical foundation for land registration and empirical evidence on the impacts of land certification programs. Section three discusses land administration in Ethiopia and the evolution of second stage land certification in the country. Section four presents the data and methodology for the empirical analysis. A presentation and discussion of the results from the descriptive and econometrics analyses are presented in section five. Finally, conclusions and recommendations are made in the last section.

## 2. LITERATURE REVIEW ON THE IMPACTS OF LAND TITLING AND REGISTRATION PROGRAMS

Theoretically, land titling and registration is translated into economic benefits through three main channels.

- First, legally documented ownership of land reduces risks of losing land in ownership disputes and enhances tenure security. This will increase the incentive for landholders to undertake investments to increase the productivity of the land.
- Second, land registration can contribute to increased productivity by enabling farmers to use their land as collateral to obtain credit from formal financial institutions in order to finance the purchase of agricultural inputs and or to make investments in land improvements.
- Third, a secured land title reduces uncertainty in land market transactions and facilitates the transfer of land from less productive user to more productive users, which helps to increase productivity (Feder and Nishio 1999; Binswanger et al. 1993; Deininger 2003).

However, the practicality of these effects depends on specific economic, institutional and social factors within a country.

The impact of land registration can be assessed based on its effect on, for example, levels of investment, access to credit, and the land rights of vulnerable groups, such as women, migrants, and the poor. However, empirical findings show mixed results on the benefits of land titling program in different countries. Land certification and registration programs resulted in positive effects on long-term land-related investments in Ethiopia (Deininger et al. 2008; Deininger et al. 2011; Holden et al. 2009) and in Benin (Goldstein et al. 2015). In Ethiopia, land certification increased tenure security, land rental market participation (Deininger et al. 2011; Holden et al. 2011), land productivity (Melesse and Bulte 2015; Bezabih et al. 2016; Holden et al. 2009), and improved household welfare in terms of child nutrition, specifically for female heads (Ghebru and Holden 2013).<sup>1</sup> Ali et al. (2014) found that land tenure regularization in Rwanda improved access to land for married women, increased investment and maintenance in soil conservation for female-headed households, and led to a decline in land market activity.

Fort (2008) found in Peru that formalization of land rights had different effects on investment depending on a farmer's level of tenure security prior to the land titling program – the effect of land titling on investment was found to be higher for farmers with weaker levels of tenure security than for farmers with a stronger level of tenure security before formalization of land rights. Do and Iyer (2008) found rural land titling programs in Vietnam to have a positive effect on long-term investment and non-farm labor activity, but had insignificant effects on credit access and land market activity. Jacoby and Minten (2007) in Madagascar found titling to have no significant effect on land specific investment and only a small effect on land productivity and land values.

Insignificant effects of land titling on access to credit were observed in Peru (Field and Torero 2006) and Uganda (Petracco and Pender 2009). Access to credit might not be improved even if farmers have title for their land simply due to a limited supply of formal credit, higher transaction costs, and extended requirements related to applying for credit (Quan and Toulmin 2004; Ali et al. 2014).

Other evidence shows that the perceived tenure security of landholders increased at certain stages of land titling registration without completing the full land titling process. Even though land

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<sup>1</sup> Except for Deininger et al. 2008, other studies that assess the impact of land certification in Ethiopia take data from Amhara (Deininger et al. 2011; Melesse and Bulte 2015; Bezabih et al. 2016) and Tigray regions (Holden et al. 2009; Holden et al. 2011; Ghebru and Holden 2013).

titling in Cameroon did not meet the intended objectives of increasing investment or access to credit, rural farmers and local land administration officials adapted the program to better fit their immediate local needs. Notably, the boundary markings placed on a parcel through the process of land registration was found to enhance the tenure security of farmers, whereas, local bureaucrats used the program to register underdeveloped land (Firmin-Sellers 1999). Similarly, Payne et al.(2009) found that starting a land titling process was sufficient to increase perceived tenure security for many households involved with Senegal's land tenure regularization program.

Land titling registration in Africa may result in the theoretically expected outcomes in situations where the customary tenure system does not exist, in areas where it is difficult to resolve land disputes through local institutions, and in areas where there is higher competition for land due to higher value of land, particularly in urban and peri-urban areas (Cotula et al. 2004, Quan and Toulmin 2004). A systematic review of the literature showed that efforts made towards securing land rights in Africa generally show weaker results compared to similar efforts in Latin America and Asia (Lawry et al. 2014). Suggested as possible causes for the weak linkage are underestimating the contribution of customary land tenure systems to farmers' tenure security, lower levels of household income constraining investments in agriculture even with land titling, and a general lack of complementary public investments, such as in infrastructure, the provision of inputs, market access, and training for farmers.

Based on the experience of countries in Africa which undertook land title registration programs, these efforts generally have not assured security and certainty in land rights when land ownership has then been under dispute. Beyond land registration, recognition of land rights by the community, the availability of institutions to enforce land rights, the duration of land rights, and clear definition of land rights and boundary demarcation of land are essential elements for security and certainty of land tenure (Abdulai and Antwi 2005). Moreover, the insecurity of 'informal' customary rights is over-estimated (Williamson and Kerekes 2011) – efforts to secure property rights through formal means cannot be effective without considering informal customary land tenure practices in a society.

## **3. BACKGROUND AND CONTEXT**

### **3.1. Land administration in Ethiopia**

In Ethiopia, land policy is embedded in the constitution. Article 40(3) of the 1995 Federal Democratic Republic of Ethiopia (FDRE) constitution declares that land ownership rights are exclusively vested in the state and its people and prohibits sale or exchange of land. At federal level, the 2005 revised FDRE Rural Land Administration and Use Proclamation (RLAUP) set the general principles to administer rural lands. Regional governments are responsible to administer land under their jurisdiction in line with the Federal proclamation. Among the nine regional states of Ethiopia, six – Tigray, Amhara, Oromia, SNNP, Benishangul Gumuz, and Afar – adopted their own RLAUPs. Even though, regional governments are given authority to administer land, in Afar and Somali regions, in particular, clan chiefs are responsible for allocating land for housing and grazing, enforcing land rights, and resolving disputes (Ambaye 2015). However, these types of customary land tenure systems are not incorporated in the legal system.

Urban land in Ethiopia is governed by the FDRE Urban Lands Lease Holding Proclamation No.721/2011 (ULLHP).<sup>2</sup> According to the federal ULLHP, lease is the only means to access land in urban areas. Land lease rights are transferred from the government to citizens through auction and allotment (land lease transfer without auction). This mode of land transfer is criticized as being beneficial to the rich who are better able to pay the highest bid price, excluding the poor from accessing land (Ambaye 2015). Similar to the rural land proclamation, several regional governments adopted their own ULLHP to administer urban lands under their jurisdiction.

To realize economic transformation, since 2010/11 the Government of Ethiopia has been implementing five-year Growth and Transformation Plans in two phases. In the second phase, as part of achieving a Plan target to improve rural land administration, the government planned to undertake SLLC over 28.6 million parcels of farmland in 359 woredas, covering 7.2 million households. Preparing a national rural land use master plan and land administration and utilization master plans for each region are other targets set by the government to improve rural land administration.

### **3.2. Second level land certification (SLLC) in Ethiopia**

Rural land registration and certification efforts in Ethiopia date back to 1998. These started in Tigray, followed by Amhara and Oromia in 2002, and SNNP region in 2004. The FDRE Rural Land Administration and Land Use Proclamation (2005) allows the registration of rural land and the provision of land holding certificate to any landholder with details on land size, land use type, level of fertility, and borders of a land parcel. The first phase of rural land certification, also known as First Level Land Certification, covered around 9.5 million households in Amhara, Oromia, SNNP and Tigray regions (MoA 2018). However, first stage certificates did not provide detailed spatial information of plots due to a lack of individual plot-level mapping. In addition, the absence of computerized land registration made it difficult to update land records following transactions, such as transfers, and to access land information (Bezu and Holden 2014).

Considering the limitations of the first level land certification efforts, the government of Ethiopia implemented several SLLC programs in collaboration with different donors. In general, the programs aim to improve agricultural investment and farmers productivity through securing land rights, improving land administration, and optimizing land use.

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<sup>2</sup> The FDRE Constitution has no statements specifically about allocation of urban land

**Table 3.1: Progress of second level land certification (SLLC) in Ethiopia**

Program	Donor	Budget	Period	Regions Covered	Number of certificates issued
Ethiopia Land Tenure Administration Program (ELTAP)	USAID	\$5.75 million	2005-2008	Amhara, Oromia, SNNP, and Tigray	394,662 parcels
Ethiopia Land Administration Program (ELAP)	USAID	\$5.0 million	2008-2013	Amhara, Oromia, SNNP, and Tigray	192,184 parcels
Responsible and Innovative Land Administration (REILA)	Finland	€12.8 million	2011-2017	Benishangul-Gumuz and Amhara *	153,155 parcels (up to May 2017)
Sustainable Land Management Program II (SLMP II)	World Bank	\$9.28 million	2014-2018	Amhara, Oromia, Tigray, SNNP, and Gambella	378,298 households and 20,394 communal lands (up to Sept. 2018)
Land Investment for Transformation (LIFT)	DFID	€72.7 million	2013-2020	Amhara, Oromia, SNNP, and Tigray	9,320,881 parcels

Sources: MoA 2018; USAID 2016; World Bank 2018; Eversmann 2018.

Note: SNNP = Southern Nations, Nationalities, and Peoples' region.

\* With additional trial woredas in Tigray, Oromia, and SNNP regions

Table 1 summarizes the progress of SLLC programs in Ethiopia in terms of donors involved, cost, area coverage, and status of land certification. SLLC efforts began with the support of the United States Agency for International Development (USAID) through the Ethiopia Land Tenure Administration Program (ELTAP) and the Ethiopia Land Administration Program (ELAP). SLLC programs that followed included the Responsible and Innovative Land Administration (REILA) program, supported by Finland; the Sustainable Land Management Program II of the World Bank; and the Land Investment for Transformation (LIFT) program, supported by the Department for International Development (DFID) of the government of the United Kingdom. According to the Ministry of Agriculture (2018), by end-2018, SLLC certificates had been issued for over 14.5 million land parcels to 4.84 million landholders in Amhara, Oromia, Tigray, SNNP, Benishangul-Gumuz, and Gambella regions. Of these landholders, 29 percent were female.

### 3.3. The Land Investment for Transformation (LIFT) program in Ethiopia

The LIFT program aims to improve incomes of the rural poor and to enhance economic growth through SLLC and improved rural land administration. The program works in collaboration with the government of Ethiopia to enhance the land tenure security of farmers in order to boost productivity and investment in agriculture (LIFT 2014). The program was initiated in 2013 with a total program budget of £72.7 million and was planned to be in operation through 2020. The program operates in four regions, Tigray, Amhara, Oromia, and SNNP. The Ministry of Agriculture's Rural Land Administration and Use Directorate is the government agency responsible for program implementation, working with DAI Europe.

The core components of the program focus on second-stage rural land certification, improved land administration, cross-cutting policy support, and rural land sector development. The issuance of land certificates under the LIFT SLLC program involves awareness creation through public meetings within communities about the benefits of SLLC and the process involved – land surveying, demarcation, and registration. The rural land sector development component of the program has four major intervention areas: improving the functioning of the rural land rental markets, increasing access to credit, enhancing agricultural practices to improve access to input and output markets, and addressing key land policy and institutional issues (LIFT 2014). The program is expected to support SLLC through the issuance of land certificates for 14 million parcels to 6.1 million households and the implementation of a rural land administration system in 140 woredas.<sup>3</sup> In addition, the program targets to increase land rental agreements by 13 percent,

<sup>3</sup> In 39 woredas in Amhara, 54 in Oromia, 34 in SNNP, and 13 in Tigray.

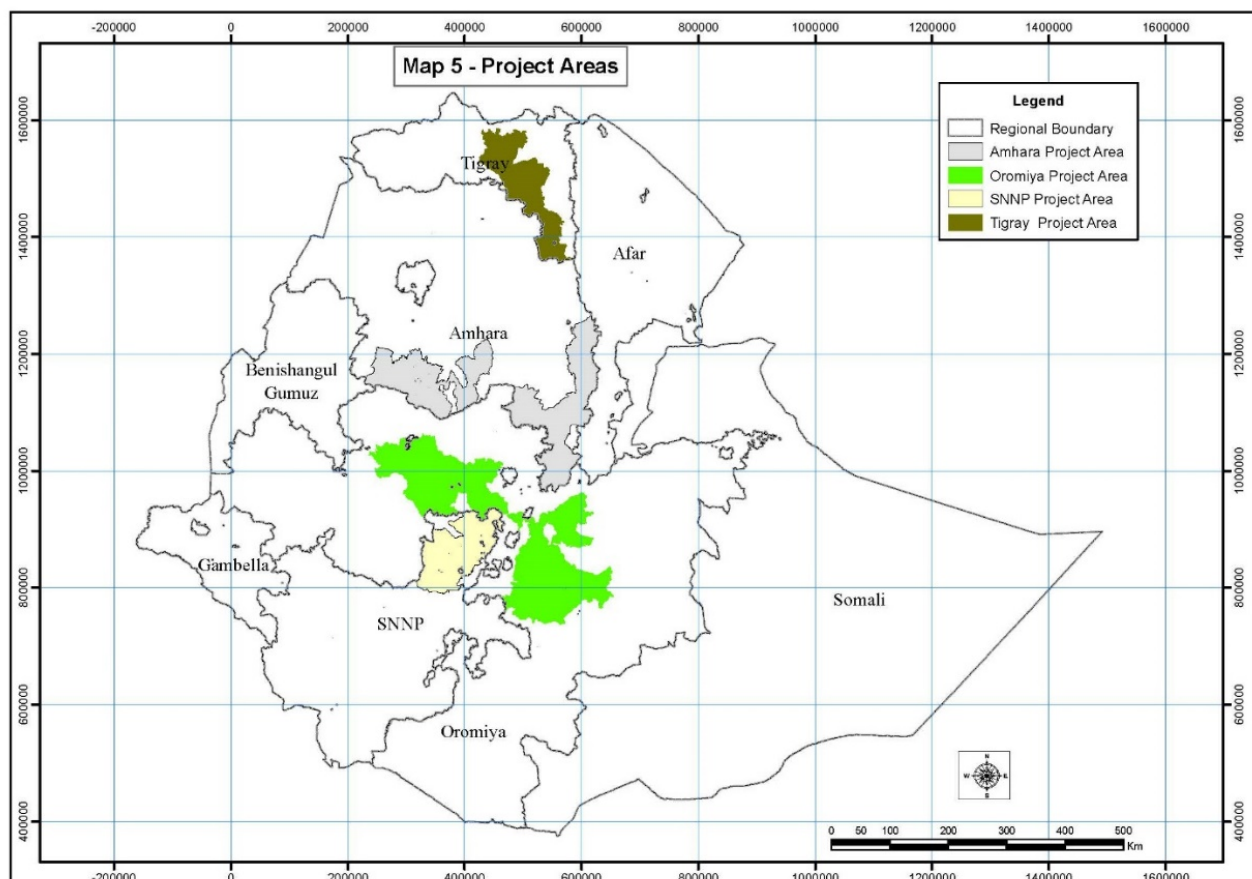
to reduce the percentage of household involved in land disputes from 21.1 percent to 15 percent, and to increase the income of 1.36 million farmers at least by 20.5 percent (LIFT 2014).

**LIFT Project area and selection criteria.** It was envisaged that the LIFT program would be implemented in 140 purposively selected woredas in Tigray, Amhara, Oromia, and SNNP regions, the four major regions in the country. The selection criteria includes:

- Equity between regions;
- Availability of aerial photography;
- Economy and effectiveness in implementation;
- Meeting priorities of the government of Ethiopia
- Access to markets – travel time to cities of 50,000 population or over in less than 5 hours;
- Natural resource endowments;
- Suitable rainfall and soil for crop and fodder production;
- Potential for development of small-scale irrigation facilities; and
- Willingness and commitment of community to participate (LIFT 2014).

The resulting spatial distribution of the LIFT program areas is shown in Figure 3.1.

**Figure 3.1: Land Investment for Transformation (LIFT) program intervention areas**



Source: LIFT Report 2014

As a result of the purposive woreda selection, a program evaluation design based on randomizing access to the LIFT program at the woreda level is not feasible. It also implies that a regression discontinuity design (RDD) at the woreda, kebele, or enumeration area level is not feasible given that there is not a single strict metric that determines eligibility.

## 4. DATA AND METHOD

### 4.1. Data

This study is primarily based on analysis of three-wave panel survey dataset, collected by IFPRI in collaboration with Central Statistical Agency (CSA) of the government of Ethiopia. The survey rounds were conducted in 2013, 2015, and 2018 with sample of households from Tigray, Amhara, Oromia, and SNNP regions. The baseline survey of 2013 covered 3,345 households from 54 woredas in rural Ethiopia, out of which 20 were LIFT-SLLC program woredas (zone of influence – ZOI); 13 Non-LIFT SLLC woredas; and 21 were from non-intervention woredas. With the availability of such data on the SLLC service providers, we are not only able to investigate the overall potential impacts of the SLLC program but also, by comparing the LIFT with non-LIFT outcomes, examine the extent to which modalities of program implementation affects program outcomes. In addition to household characteristics, the survey collected individual and parcel level information from the sample households. The data was disaggregated for analysis by location (region, woreda, and kebeles), gender, age group, and economic activities. The distribution by key baseline survey characteristics of sampled households is indicated in Table 4.1. The fact that the baseline survey in 2013 was conducted just before the launch of the LIF- SLLC program, these data provide a unique opportunity to evaluate the impacts of the program using detailed data from both before and after the program was launched.

Household, community (kebele) and woreda questionnaires were used in the survey rounds. The household questionnaire contains modules to obtain detailed information on access to and control over agricultural land, land certification, land tenure security, access to land administration related information and legal literacy, agricultural investment, and access to credit, together with various aspects of household livelihoods.

**Table 4.1: Distribution of sample by treatment status before and after matching (PSM)**

	Before PSM (matching)			After PSM (matching)		
	Total	Treatment	Control	Total	Treatment	Control
Number of regions included	4	4	4	4	4	4
Number of households	3092	1214	1878	2505	1247	1258
Number of parcels	6466	2688	3777	5392	2800	2592
Number of individuals	15685	6015	9671	12669	6178	6491
Number of male heads interviewed	1193	662	531	1092	693	399
Number of female heads interviewed	419	272	147	392	285	107
Number of spouse interviewed	888	518	370	825	543	282

Source: Source: Authors' computation using IFPRI's Feed the Future (FtF) Endline Survey (2018) and FtF supplemental survey (2019) Note: SNNP = Southern Nations, Nationalities, and Peoples' region; PSM: Propensity score matching.

While the availability of such baseline data enable us to conduct the impact evaluation with before and after data, the 3-wave panel survey lack depth in key program outcome variables related to the SLLC (such as potential program effect on tenure security, women land rights, legal literacy, etc). As a result, a supplemental gender-disaggregated land tenure survey was conducted in 2019 by revisiting 3092 of the 3345 sampled households from all the districts included the FtF endline survey (see Table 4.1 above). Under the supplemental survey (which was conducted right after the endline survey was completed), comprehensive land tenure modules (including questions on access to land, legal literacy/knowledge on land issues, land rental market activities, investment on land, etc.) were administered not only to the principal male and female in the household (1193 and 419 respondents, respectively, as shown in Table 4.1,) but also to 888 female spouses of the 1193 males heads included in our sample. This dataset enables a closer analysis of gendered

aspects of the impact of the SLLC program not only at household level (inter-household dimensions), but also within a household (intra-household aspects). A conventional gender analysis, which compares households headed by men with those headed by women, does not permit examination of within-household gender differences. Thus, as shown in Table 4.2, the gender disaggregated data from the 2019 supplemental survey was crucial in determining the extent to which women benefited from the LIFT SLLC program inclusive of all types of women, whether the head of household (single/divorced/widowed etc) or married women (the spouse of a head of household).

**Table 4.2: Supplemental survey respondents, by sex and position in household**

Demographic status	Respondent's gender		Total
	Male	Female	
Head (principal)	1193	419	1612
Spouse		888	888
<b>Total</b>	<b>1193</b>	<b>1307</b>	<b>2500</b>

An orange double-headed arrow labeled "Inter-household dimension" connects the "Head (principal)" row (Male: 1193, Female: 419) and the "Spouse" row (Female: 888). A green arrow labeled "Intra-household dimension" points from the "Spouse" row (Female: 888) towards the "Head (principal)" row (Male: 1193).

Source: Authors' computation using IFPRI's Feed the Future (FiF) Endline Survey (2018) and FiF supplemental survey (2019)

It is expected that results from this study will feed into the design of a national agenda on how to improve land governance in Ethiopia and inform ongoing debates on the relevance, timeliness, and sustainability of the financially and technically demanding SSLC process. In part, this will be done by testing for any signs of diminishing returns from the first-stage land certification or increasing demand for SSLC. It should be highlighted that more than 20 years has elapsed since first-stage land certification was implemented – the first-stage process was launched in Tigray in 1998, five years ahead of the start of program implementation in Amhara and eight years before the start of the program in Oromia and SNNP.

## 4.2. Empirical method

While such unique supplemental survey data enriches the dimension of the analysis by investigating the differential impacts of the program (looking at inter-household but intra-household aspects), the key methodological challenge with relying on such cross-sectional data was the potential endogeneity concerns over some of the outcome variables such as tenure security, land market, and land investments either due to reverse-causality and/or program targeting criteria by service providers. Consequently, this may result in a bias in our estimates (either overestimating or underestimating the impacts of the SLLC). For example, households that already feel more secure in their rights to the land they hold may be reluctant to apply for or acquire SLLC. The inclusion of such households in our analytical sample, if examined without recognition of this characteristic of theirs, would contribute to analytical results that underestimate the impact of SLLC on tenure security. Similarly, households that are more connected, educated, or knowledgeable are more likely to know about SLLC and, therefore, more likely to apply for and acquire SLLC certificates. However, failure to account for these characteristics may result in an overestimation of the effect of SLLC on, say, sustainable land management (investment in soil and water conservation on the land parcel) because such educated households are also more likely to be knowledgeable of the benefits of such practices.

Table 4.3 below shows that the endogeneity concern related with using the cross-sectional data (endline as well as the supplemental survey data) is a valid concern as treatment and control households show significant differences in a host of households and parcel level characteristics. Treatment households (compared to control) features more female headed, older, with smaller family size and farm sizes. It also shows that treatment households are predominantly with modern roof housing/properties and better access to electricity – not surprising given the LIFT program used “high agricultural potential” as one key program targeting/selection criteria (LIFT, 2014).

**Table 4.3: Distribution of sample respondents for the land tenure module – by gender and demographic status of respondents**

Variables	All		Has Second level land certificate (SLLC)	
	Obs.	Mean	No	Yes
<b>Household demography</b>				
Male head	3092	0.710	0.731	0.703*
Head read and writes	3092	0.388	0.378	0.396
Head’s age	3092	47.934	47.203	49.02***
Household size	3092	5.068	5.155	4.954**
<b>Education, occupation, and endowment</b>				
No formal education	3092	0.719	0.689	0.742***
Engaged in non-farm activities	3054	0.076	0.071	0.090*
Total farm size(ha)	3092	1.462	1.604	1.336***
<b>Housing condition</b>				
Dwelling has modern roof <sup>4</sup>	2907	0.492	0.412	0.621***
Dwelling has modern floor <sup>5</sup>	2907	0.044	0.045	0.035
Dwelling has modern wall <sup>6</sup>	2907	0.045	0.031	0.068***
Have access to electricity	2907	0.213	0.199	0.261***

Source: Authors’ computation using FtF baseline Survey (2013)

\*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%.

Hence, to account for such potential selection bias issues (either due to self-selection or program targeting), we adopted a Propensity Score Matching (PSM) method to identify treatment and control households that are comparable by their observable household and parcel characteristics at baseline before the SLLC program was operational. The FtF baseline data (2013) was used to calculate propensity scores for each household in order to construct from our sample comparable groups of both treatment (SLLC participant) and control (non-participant) sample households. As a result, the final dataset used was reduced to 2505 households (1247 treatment/beneficiary and 1258 control/non-beneficiary) that satisfied both the balancing and common support properties of the PSM approach. Key features of the post-matching (post-PSM) sample distributions are presented in Table 4.1.

Using the matched sub-sample of treatment and control households, the following binary model was used for regression analysis:

$$Y_i = \beta_0 + \beta_1 T_i + \beta_2 T_i G_i + \beta_3 L_w + \beta_4 T_i L_w + \beta_5 H H_i + \beta_6 P A_i + \beta_7 C C_i + \varepsilon_i$$

where,  $Y_i$  represents outcome variables for household  $i$ .  $T$  is the treatment variable which takes a value 1 if the household received a SLLC certificate at least for one parcel, and 0, otherwise. The coefficient  $\beta_1$  shows the effect of SLLC on the outcome variables. In addition to the main treatment

<sup>4</sup> Dwelling roof made of metal sheet

<sup>5</sup> Dwelling floor made of cement/tile/bricks/wood

<sup>6</sup> Dwelling exterior wall made of cement/tile/bricks

effect, an interaction variable between treatment ( $T$ ) and gender ( $G$ ) is constructed to determine the effect of the program across gender. The LIFT program has unique features compared to other programs that implement/deliver the second level land certification program in the country. In addition to the land registration and certification process, the LIFT program also complements the delivery of second level land certification program with other treatment packages such as formalization of the land rental market and administrative interventions to enhance the function of land information system (land service delivery) in each treatment districts. Packaging the land certification with such complementary services makes the program unique due to potential (positive) spillover benefits to households which are located beyond the programs' sphere of influence (treatment area). Hence, to account for potential spillover effects the program on control households that resides in close proximity to the LIFT treatment (beneficiary) districts, we included right hand side variable "L" – an indicator variable with the value of 1 if a household resides inside or within 5km walking distance to a LIFT zone of influence (treatment district). . Moreover, an interaction term between  $T$  and  $L$  is constructed to identify the marginal effect (value-added) of SLLC certification under the LIFT program (a more complete package – i.e., SLLC with other LIFT treatment packages) compared to the rest (just the SLLC only).. The gender analysis considers both inter-household differences between male and female-headed households, and intra-household differences between male heads and female spouse.  $HH_i$ ,  $PA_i$  and  $CC_i$  represent vectors of household, parcel, and community (kebele) level characteristics, respectively.

The outcome variables include investment on land, land tenure insecurity, land-related legal knowledge and awareness women's land rights, and youth land rights. These outcome variables are defined as follows. All are dummy (0/1) variables. The expected direction of the impact of the SLLC program on the outcome variable is indicated in parentheses.

- **Investment on land (+)** – 1 if the household made investments on at least one of their land parcels.
- **Land tenure insecurity (–)**
  - **Private tenure risk** – 1 if the respondent perceived that he/she is likely to lose land ownership or use rights due to a private land dispute (divorce, inheritance, border, etc).
  - **Public tenure risk** – 1 if the respondent perceived that he/she is likely to lose land ownership or use rights due to land expropriation or land being required for use by a private investor.
- **Legal knowledge and awareness (+)** – 1 if the respondent has knowledge and awareness on land-related legal issues.
- **Land rental market activity(+):**
  - **Become a landlord** - 1 if the household has just rented/sharecropped out land (become a landlord) at endline but was autarky baseline
  - **Become a tenant** - 1 if the household has just rented/sharecropped in land (become a tenant) at endline but was autarky at baseline
  - **Changed a land rental market status** - 1 if the household has just rented/sharecropped in or out land (become a tenant or landlord) at endline but was autarky at baseline
- **Women's land rights (+/-)** – 1 if the household has at least one female member with the right to own, sell, give, or rent land, or has the right to contribute to the purchase of land.
- **Youth land rights (+/-)** – 1 if the household has at least one youth member (25 to 34 years of age ) with the right to own, sell, bequeath, or rent land, or has the right to contribute to the purchase of land.

## 5. DESCRIPTIVE ANALYSIS

Parcel-level data was collected on 6466 parcels. Results from FtF endline survey show that land certificates had been issued for 39 percent of the parcels (Table 5.1). Tigray has the highest proportion of parcels as well as households with SLLC followed by SNNP. Overall, fifty percent of the certificates were issued in the name of both the husband and the wife with little variation across regions.

**Table 5.1: Sample distribution by status of second stage land certification as of 2018**

Variables	All	Tigray	Amhara	Oromia	SNNP
Households with SLLC for at least one parcel	46.2	60.1	41.5	40.2	39.4
Number of households	2505	621	878	536	470
Parcel registered under second stage (%)	38.9	75.32	39.96	17.39	52.39
Parcel registered by head's name only (%)	37.8	39.7	30.1	45.1	43.6
Parcel registered by spouse's name (%)	5.0	8.3	2.4	4.5	3.8
Parcel registered under head and spouse (%)	50.4	51.3	57.8	47.7	49.9
Number of parcels	6466	1918	2259	1557	732

Source: Authors' computation from FtF Endline Survey (2018)

Table 5.2 shows land ownership or use rights and land management behavior within a household, with means comparison between the control and treated group. The proportion of households that reported that the spouse has the right to bequeath land is significantly higher in the treatment group than in the control group (2.4 percent). However, the proportion of households that have joint decision-making rights (head and spouse) on agricultural land – specifically, to sell, give, or rent land – is lower in the treatment group than in the control group. Regarding the control households, we do not see any significant variation across households in intervention and non-intervention woredas except for whether the head has a right to bequeath land and for joint ownership of land.

**Table 5.2: Intra-household land ownership/use rights by land certification status**

Variables	All		2018 endline survey	
	Obs	Mean	Control	Treatment
Head has the right to bequeath land	2505	0.276	0.266	0.276
Spouse has the right to bequeath land	2505	0.033	0.024	0.040**
Head and spouse jointly have the right to bequeath land	2505	0.637	0.661	0.644
Spouse has the right to make decision on agricultural land	2505	0.060	0.066	0.053
Head and spouse jointly have the right to made decision on agricultural land	2505	0.666	0.690	0.654**

Source: Authors' computation using FtF Endline Survey (2018) and the 2019 FtF supplemental survey  
 \*\*\* is <=1%, \*\* is 5% and \* is 10% level of significance.

Table 5.3 presents the mean values of key outcome variables of interest by household treatment status. Indicative of the overall impact the SLLC program, the descriptive result shows that, overall, there are stark differences (statistically significant) when program beneficiary households are compared to non-beneficiary households. However, protection of land rights of vulnerable groups such as youth and women seem to be more undermined among households who received SLLC compared to those without SLLC. This is consistent with the notion that land registration and certification programs may not always provide a desirable outcome for land rights of vulnerable groups such as youth and women (Ghebru, 2019). However, such results are not conclusive/robust enough since they take no account of other factors that might have affected such

outcomes. Regression (econometric) results reported in section 6 further investigates this by controlling for other factors that might have influenced such outcomes.

**Table 5.3 Outcome variables by Treatment status**

Variables	Total			Sig. test
	All	Treatment	Control	
<b>Investment</b>				
Soil and water conservation investment/maintenance	0.462	0.545	0.428	***
<b>Land rental market activity</b>				
Become a landlord	0.172	0.194	0.158	**
Become a tenant	0.205	0.202	0.218	*
<b>Tenure security</b>				
Private tenure risk	0.334	0.315	0.361	*
Collective tenure risk	0.414	0.373	0.453	**
<b>land rights of women and youth (25-34)</b>				
Youth has access to/control over land	0.425	0.387	0.485	***
Female has access to/control overland	0.841	0.827	0.864	*
<b>Access to information</b>				
Access to land related legal advice	0.557	0.583	0.499	***
Access to SLLC related legal advice	0.427	0.450	0.375	***
<b>Legal literacy</b>				
Land related legal knowledge and awareness	0.927	0.928	0.936	
SLLC related legal knowledge and awareness	0.598	0.655	0.508	***
<b>Observations</b>	<b>2,505</b>	<b>1,247</b>	<b>1,258</b>	

Source: Authors' computation using FtF Endline Survey (2018) and the 2019 FtF supplemental survey  
 \*\*\* is <=1%, \*\* is 5% and \* is 10% level of significance.

As described in section 4, the unique approach (modality of service provision) by the LIFT program packaging the SLLC with complementary administrative and policy reforms is worth investigating by comparing key outcomes for beneficiary households under the LIFT modality versus just receiving SLLC (no complementary package) by other service providers. Our data was found to be suitable as 1 in 3 beneficiary households constitute those who received SLLC via the LIFT program (together with complementary packages) while the remaining 2/3 of households received just the SLLC. Table 5.3 below reports descriptive results on potential value-added benefits of the LIFT program compared to other similar programs. Results show that, overall, the LIFT package seems to show good value for money (more value added) especially on matter of tenure security and likelihood of renting out land. More interestingly, the negative implications SLLC programs have on women access to/control over land as reported in Table 5.2 seems to be reversed in favor of more women land rights when beneficiary households under the LIFT package are compared to non-LIFT beneficiary households – not surprising, perhaps, given the proper focus on joint-land certification under the LIFT program.

**Table 5.4 Outcome variables by program exposure of treatment households (value-added hypothesis)**

Variables	All	value added hypothesis Treatment		Sig. test
		LIFT	Non-LIFT	
<b>Investment</b>				
Soil and water conservation investment/maintenance	0.545	0.541	0.528	
<b>Land rental market activity</b>				
Become a landlord	0.194	0.212	0.111	***
Become a tenant	0.202	0.198	0.205	
Change in land rental market status				
<b>Tenure security</b>				
Private tenure risk	0.315	0.262	0.367	***
Collective tenure risk	0.373	0.358	0.446	**
<b>land rights of women and youth (25-34)</b>				
Youth has access to/control over land	0.387	0.404	0.428	
Female has access to/control overland	0.827	0.842	0.804	*
<b>Access to information</b>				
Access to land related legal advice	0.583	0.509	0.467	
Access to SLLC related legal advice	0.450	0.423	0.302	***
<b>Legal literacy</b>				
Land related legal knowledge and awareness	0.928	0.881	0.950	
SLLC related legal knowledge and awareness	0.655	0.674	0.596	*
<b>Observations</b>	<b>1,247</b>	<b>457</b>	<b>790</b>	

Source: Authors' computation using FtF Endline Survey (2018) and the 2019 FtF supplemental survey  
 \*\*\* is <=1%, \*\* is 5% and \* is 10% level of significance.

Other dimension investigated in this study is also to assess the potential spillover (large-scale) benefits the LIFT intervention might have on households not directly benefited from the program (control households with no SLLC). This is more crucial given the LIFT approach (unlike other similar programs) aims for more systemic changes by packaging the issuance of certificates with legal literacy programs, formalization of land rental market activities, administrative reforms by modernizing the land information systems as well as regulatory reforms (LIFT, 2014). Hence, it is likely that households might indirectly benefit from the program even if they were not program beneficiaries (issued with SLLC). This is importantly so due to the potential spillover benefits these other complementary services (such as legal literacy, administrative and regulatory reforms) might have beyond the program sphere of influence. For this, we focus on non-beneficiary (control households with no SLLC) and compare those who resides inside or within 5-kilometer buffer of the LIFT zone of influence (LIFT treatment district).

**Table 5.5 Outcome variables by program exposure of control households (spillover benefit hypothesis)**

Variables	Spillover hypothesis			
	ALL	Control		Sig. test
		LIFT	Non-LIFT	
<b>Investment</b>				
Soil and water conservation investment/maintenance	0.428	0.436	0.428	
<b>Land rental market activity</b>				
Become a landlord	0.158	0.157	0.158	
Become a tenant	0.218	0.223	0.146	**
Change in land rental market status				
<b>Tenure security</b>				
Private tenure risk	0.361	0.179	0.348	***
Collective tenure risk	0.453	0.412	0.461	
<b>land rights of women and youth (25-34)</b>				
Youth has access to/control over land	0.485	0.597	0.507	
Female has access to/control overland	0.864	0.771	0.844	
<b>Access to information</b>				
Access to land related legal advice	0.499	0.501	0.420	**
Access to SLLC related legal advice	0.375	0.375	0.255	**
<b>Legal literacy</b>				
Land related legal knowledge and awareness	0.936	0.855	0.947	**
SLLC related legal knowledge and awareness	0.508	0.425	0.539	*
<b>Observations</b>	<b>1,258</b>	<b>402</b>	<b>856</b>	

Source: Authors' computation using FtF Endline Survey (2018) and the 2019 FtF supplemental survey  
 \*\*\* is <=1%, \*\* is 5% and \* is 10% level of significance.

Results in Table 5.5 show that, unlike the value-added benefits that favors the supply side of the land rental market, likelihood of renting/sharecropping in land is significantly enhanced for non-beneficiary households who resides in or around the LIFT treatment districts (with LIFT program exposure) compared to those none exposed households. Similar results also show potential spillover effects of LIFT program on likelihood of land related disputes and legal literacy while no significant difference exists on spillover effects on land investment and women/youth land rights. However, it is worth noting that such results are with caveats since they take no account of other factors that might have affected such outcomes. After controlling for potential selection bias (due to self-selection and/or program targeting), sections 6 below discusses regression results (econometric estimates) with further investigation on the direct benefits of the SLLC program and the potential value-added and spillover benefits associated with the LIFT modality of intervention.

## 6. ECONOMETRIC ANALYSES

### 6.1. Perceived tenure security

Following the program theory of change, first, we investigated to potential effects of the SLLC on household perceived tenure insecurity differentiated by the source of tenure risk, namely: private tenure risk (fear of losing land associated divorce, inheritance, boundary related issues) and collective tenure risk (fear of losing land due to expropriation and/or eviction by private investor). Adopting the definition used by the sustainable development goal (SDG) indicators on land (SDG indicator 1.4.2), perception-based definitions are used as a proxy for measuring tenure insecurity. As a result, due to the perception nature of these proxy variables, we analyzed the potential gender differential effects on tenure security of the SLLC by using not only the conventional approach of comparing principal male with principal female responses but also a pooled dataset which includes responses from female spouses.

**Table 6.1: Probit estimates on the impact of SLLC program on land tenure insecurity (marginal effects)**

Explanatory variables	Using conventional data (Inter-household effect)		Pooled data including Spouse data (intra-household effect)	
	Private tenure risk	Collective tenure risk	Private tenure risk	Collective tenure risk
	ME/se		ME/se	ME/se
<b>Treatment</b>	0.025 (0.04)	0.034 (0.04)	0.052* (0.03)	0.047 (0.03)
<b>Treatment*Female head</b>	-0.056* (0.04)	-0.047 (0.05)	-0.064* (0.04)	-0.01 (0.05)
<b>Treatment*Female spouse</b>			-0.074** (0.03)	-0.072** (0.03)
<b>LIFT</b>	0.166*** (0.06)	0.106* (0.06)	0.114** (0.05)	0.141*** (0.05)
<b>LIFT*Treatment</b>	-0.049 (0.08)	-0.01 (0.08)	-0.016 (0.06)	-0.027 (0.06)
<b>Prob &gt; chi2</b>	0.0000	0.0000	0.0000	0.0000
<b>Number of Obs.</b>	1915	1915	2119	2119

Source: FtF Endline Survey (2018) and FtF supplemental survey (2018/19)

Figures in parentheses are standard errors; \*\*\*\* significant at 0.1%; \*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%

Note: All regressions include variables on parcel, household and community characteristics. Regression results with detailed coefficients and signs of all variables included are presented in Appendix Table A1.

First two columns in Table 6.1 below presents summary estimation from the binary regression Model using the conventional approach while the last two columns represent results using the pooled data including female spouse responses. Such approach enables us to measure the gender differential tenure security effects of SLLC by interacting the Treatment variable with respondent being a female head (inter-household dimension) as well as respondent being a female spouse (intra-household dimension). Rejecting the hypothesis about the potential diminishing returns to the first level land certificates in the country, overall results show that having a Second Level Land Certificate (SLLC) does not significantly affect households' perceived tenure security regardless of the source of tenure risk (private and/or collective tenure risk). This is perhaps expected given the well-documented success the FLLC had in the country in boosting households perceived tenure security (Holden et al, 2009; Holden et al 2011; Ghebru and Holden 2009; Ali et al , 2007). The gender-disaggregated results (using also data from female spouses), however shows a positive and statistically significant effect of SLLC on tenure security (both private and

collective) of married women while also having a positive effect in reducing private tenure risks for female heads (single/divorced and/or widows). The positive and statistically significant coefficient on “Treatment” variable for the private tenure risk indicates that having SLLC negatively affects men’s perceived risk of private tenure security. The fact that the SLLC is predominantly administered by issuing joint land certificates to heads and spouses could explain the extra sense of security married women feel with SLLC and also perhaps why men feel the contrary compared to the status quo (no joint use rights). Residing in or around the LIFT intervention area without directly benefiting from the program is associated with more tenure insecurity. This is shown by the consistent negative and statistically significant coefficients of the variable “LIFT” under each model specifications. Such result is indicative of the potential adverse effects associated with sporadic land titling/certification programs as those who are left behind (no certificate issued) might feel more secure under the status quo of no land certification (Byamugisha, 2016) Though receiving SLLC via the LIFT program is associated with a lower perceived tenure risk, we found no significant effect of the value-added benefit on perceived tenure security from the LIFT modality compared to other similar programs.

## **6.2. Land rights of women and youth**

Table 6.2 presents results on the potential (positive or negative) unintended effects the SLLC program might have on land rights of vulnerable groups looking at the implications of having SLLC on bundle of rights for women and youth within the age bracket of 25-34 (bundle of rights such as rights to make business decisions, bequeath or managed outputs of a given parcel). The variable of interest here, i.e., land rights of women and youth, is defined as an indicator variable with the value 1 if at least one adult women (above the age of 15) and youth (age 25-34), respectively, is indicated by the head/spouse as having the right to make decision or bequeath or manage outputs of at least one parcel that belongs to the household.

Results show, regardless of the definition for land rights bundle used, a robust negative effect of SLLC on women as well as youth access to or control over land. The results supports the notion that, unless such land right protection/formalization programs are designed to account for gender-sensitive dimensions and carefully tailored to protect land rights of vulnerable groups, they may not always guarantee a desired/favorable outcome when it comes to land rights of such groups (such as women and youth). This is mainly so since such tenure regularization/formalization/individualization in the form of a title/certificate may mean more exclusive/exclusionary rights to title/certificate holders unless otherwise carefully designed to protect intra-household interests/rights.

The more gender-differentiated result, however, shows that SLLC has a positive/favorable outcome on women’s land rights of households headed by women while the negative effect on youth’s access to and/or control over land remains even for these households headed by women. In the case of the later, perhaps, having a land certificate is playing a positive role in avoiding the residual claimant situation for women under the status quo (undocumented land rights mean women can only claim rights to their land via their male lineage or eldest sons) (Ghebru and Lambretch 2017; Meinzen-Dick et al (2018).

**Table 6.2: Probit estimates on the impact of SLLC program on female and youth land rights (marginal effects)**

Explanatory variables	Women land rights				Youth (25-34 years of age) land rights			
	Female made business decision	Female bequeath land	Female manages output	Female overall land rights	Youth made business decision	Youth be-queath land	Youth manage output	Youth land rights
<b>Treatment</b>	-0.036 (0.02)	-0.128*** (0.03)	-0.084** (0.03)	-0.039** (0.02)	-0.057* (0.03)	-0.04 (0.03)	-0.070** (0.03)	-0.049* (0.03)
<b>Treatment*Female head</b>	0.299*** (0.06)	0.609*** (0.07)	0.404*** (0.07)	0.177*** (0.04)	-0.048 (0.05)	-0.134*** (0.05)	-0.079* (0.05)	-0.078* (0.05)
<b>LIFT</b>	-0.116*** (0.04)	-0.041 (0.05)	-0.048 (0.05)	-0.053 (0.03)	0.016 (0.05)	-0.046 (0.04)	0.028 (0.05)	0.072 (0.05)
<b>LIFT*Treatment</b>	0.058 (0.05)	0.052 (0.07)	-0.023 (0.06)	-0.01 (0.04)	-0.122* (0.07)	0.082 (0.05)	-0.002 (0.06)	-0.056 (0.06)
<b>Prob &gt; chi2</b>	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
<b>Number of Obs.</b>	1937	1843	1917	1947	1921	1907	1929	1947

Source: FtF Endline Survey (2018) and FtF Supplemental Survey (2018/19)

Figures in parentheses are standard errors; \*\*\*\* significant at 0.1%; \*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%

Note: All regressions include variables on parcel, household and community characteristics. Regression results with detailed coefficients and signs of all variables included are presented in Appendix Table A2.

In addition to direct negative effects of having SLLC on women and youth land rights, the negative and statistically significant coefficients of the variables “LIFT” and “LIFT\*Treatment” under the “female has made a business decision” and “a youth member has made a business decision” models, respectively, reveal that such adverse effect seems more peculiar to the LIFT intervention and also trickle down to those who does not necessarily have SLLC but resides in or around the LIFT intervention areas.

### 6.3. Land related investment and land rental market activity

As described in sections 4 and 5, in addition to the issuance of SLLC, formalization/facilitation of land rental markets is one of the core interventions for the major SLLC program in the country (the LIFT program). Table 6.3 below dedicates regression estimates for impact the SLLC might have on land rental market activity. It is worth noting that the likelihood of being a tenant and/or a landlord is more likely to be susceptible to self-selection bias as such decision to rent in and/or rent out land is more likely to have been triggered by other conditioning factors and is also more likely to have been triggered (decided) before program exposure (before any major SLLC intervention is implemented – i.e., before 2013). To account for such potential self-selection bias issues, we investigated the potential impact of SLLC on land rental market functioning by using “likelihood of becoming a tenant and/or a landlord” as a proxy rather than simply looking at whether or not a given household is a tenant and/or a landlord. Hence, we used a binary variable with the value 1 if a household just rented in land during the midline (2015) or endline(2018) but not at baseline (become a tenant) and zero otherwise. Similarly, if a household just rented out land during midline (2015) or endline (2018) but not at baseline, the variable “become a landlord” takes the value 1 and zero otherwise. An overall market entry effect of SLLC is also investigated using the variable

“rental market status change” which indicates whether or not a household has changed their status to a landlord or tenant after autarky position during baseline

**Table 6.3: Probit estimates on the impact of SLLC program on land investment and land market activity (marginal effects)**

Explanatory variables	Soil and water conservation investment or maintenance ME/se	Land rental market activity		
		Become a landlord ME/se	Become a tenant ME/se	land rental status change ME/se
<b>Treatment</b>	0.128**** (0.03)	0.053** (0.02)	0.016 (0.02)	0.054*** (0.02)
<b>Treatment*Female head</b>	-0.119*** (0.04)	0.091*** (0.02)	-0.084** (0.04)	0.031 (0.03)
<b>LIFT</b>	-0.026 (0.04)	-0.017 (0.02)	0.052** (0.02)	0.059** (0.03)
<b>LIFT*Treatment</b>	0.041 (0.05)	0.080* (0.04)	-0.03 (0.03)	0.074** (0.04)
<b>Prob &gt; chi2</b>	0.0000	0.0000	0.0000	0.0000
<b>Number of Obs.</b>	2272	2251	2251	2251

Source: FtF Endline Survey (2018) and FtF Supplemental Survey (2018/19)

Figures in parentheses are standard errors; \*\*\*\* significant at 0.1%; \*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%

Note: All regressions include variables on parcel, household and community characteristics. Regression results with detailed coefficients and signs of all variables included are presented in Appendix Table A3.

The positive and significant effect (as shown in Table 6.3 below) on the variable “land rental status change” reveals an overall positive effect having a SLLC has on households’ participation in the land rental market. This is consistent with the findings of earlier studies that documented similar positive effects of the FLLC program has on land rental market activity. The more disaggregated analysis also reveals that such market stimulant effect of the SLLC is more pronounced via the supply side of the tenancy market (becoming a landlord) as the demand side (becoming a tenant) remains positive but not statistically significant. In contrast to this direct program effects, the positive and statistically significant coefficient of the variable “LIFT” under “become a tenant” model shows the potential spillover benefit of the LIFT program on households likelihood of renting in land (becoming a tenant) for those who are not direct beneficiaries of the program (since the variable LIFT indicates if the household resides within a 5 kilometer buffer of the LIFT program zone of influence or district). Such results vindicate the extra resources dedicated by the LIFT intervention (model) in complementing (packaging) the SLLC program with formalization of land rental markets as such effort seems to have stimulant effect on land rental market participation of not only the direct beneficiaries but also the likelihood of those who resides in or around the LIFT intervention area.

Consistent with earlier studies on the impact of the first level land certificates (Hoden et al, 2009; Deininger et al, 2011), results also show an overall positive effect of the SLLC on land related investment. However, the coefficient for the interactive term “Treatment\*Female head” indicates that female headed households with SLLC are less likely to engage in investment and/or maintenance of sustainable land management practices compared to households without SLLC. One caveat for such counterintuitive result is the potential reverse causality (endogeneity issues) between our outcome variable (investment) and land certificates. The fact that such investment activities are more labor-intensive and female headed-households are often associated with labor

constraints could explain why such reverse causality issue is more revealed in the case of female heads than otherwise.

#### 6.4. Land-related legal literacy and access to land (administrative) information

Finally, we also investigated SLLC impact on household access to land service information and overall legal literacy related to land. Similar to the perception based land tenure security proxy variables used in this study, the access to information and issues of legal literacy were investigated with a more disaggregated gender analysis which takes into account the intra-household dimensions (by incorporating the data from female spouses to the conventional approach of just using the principal male and female responses). Table 6.4 below presents the binary regression estimates for the impact of the SLLC program disaggregated by gender.

**Table 6.4: Estimates on the impact of SLLC program on legal literacy and access to land information (marginal effects)**

Explanatory variables	Using conventional data (Inter-household effect)		Pooled data including Spouse data (intra-household effect)	
	Access to land related legal information	Land related legal knowledge and awareness	Access to land related legal information	Land related legal knowledge and awareness
	<b>ME/se</b>	<b>ME/se</b>	<b>ME/se</b>	<b>ME/se</b>
<b>Treatment</b>	0.041** (0.02)	-0.05 (0.03)	0.015 (0.03)	0.080*** (0.02)
<b>Treatment*Female head</b>	-0.060*** (0.02)	-0.148*** (0.04)	-0.117*** (0.04)	-0.073*** (0.03)
<b>Treatment*Female spouse</b>			-0.252*** (0.03)	-0.108*** (0.02)
<b>LIFT</b>	-0.062** (0.03)	-0.136*** (0.05)	-0.183*** (0.05)	-0.095*** (0.03)
<b>LIFT*Treatment</b>	0.04 (0.03)	0.051 (0.06)	0.069 (0.06)	0.012 (0.03)
<b>Prob &gt; chi2</b>	0.0000	0.0000	0.0000	0.0000
<b>Number of Obs.</b>	1936		2123	

Source: FtF Endline Survey (2018) and FtF Supplemental Survey (2018/19)

Figures in parentheses are standard errors; \*\*\*\* significant at 0.1%; \*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%

Note: All regressions include variables on parcel, household and community characteristics. Regression results with detailed coefficients and signs of all variables included are presented in Appendix Table A4.

Overall, results show that households that received a SLLC certificate are more likely to have awareness and knowledge about land-related laws and regulations. However, consistent with the adverse effect witnessed on women’s land rights, results from Table 6.4 shows a contrasting gender effect the SLLC program has on access to land related information and overall legal literacy comparing men and women (married and unmarried). Regardless of their social status (married or unmarried/widow/divorce, etc), women in households with SLLC are reported to have lower legal literacy and/or more constrained access to land related legal information. This is despite the positive and statistically significant effect of having SLLC on overall legal literacy. Such findings indicate the disparity in access to information and/or legal literacy among men and women. In addition to such contrasting direct effect of the SLLC, similar negative (spillover) effect on access to land related legal information and legal literacy is also witnessed among households who are not necessarily direct beneficiaries but those who resides in or around the LIFT intervention program. This is shown from the consistently negative and significant coefficient of the “LIFT” variable which indicates that the likelihood of having better awareness and knowledge about land-related laws

and procedures is lower for non-beneficiary households that reside in LIFT program wordas On the other hand, though it remains to have a positive coefficient across all the model specifications, we found no significant evidence on the extra value-added benefit the LIFT program might have on legal literacy and access to information of beneficiary households.

## 7. CONCLUSIONS

The study examines the impact of SLLC program in Ethiopia using a three-wave panel survey dataset, collected by IFPRI in collaboration with Central Statistical Agency (CSA) of the government of Ethiopia; ii) a supplemental gender-disaggregated land tenure survey that consists of comprehensive land tenure modules administered not only to the principal male and female in the household but also to female spouses in the sampled households. The panel survey rounds were conducted in 2013, 2015, and 2018 with sample of households from Tigray, Amhara, Oromia, and SNNP regions. The baseline survey of 2013 covered 3,345 households from 54 woredas in rural Ethiopia, out of which 20 were LIFT-SLLC program woredas (zone of influence – ZOI); 13 Non-LIFT SLLC woredas; and 21 were from non-intervention woredas. With the availability of such data on the SLLC service providers, we are not only able to investigate the overall potential impacts of the SLLC program but also, by comparing the LIFT with non-LIFT outcomes, examine the extent to which modalities of program implementation affects program outcomes. The fact that the baseline survey in 2013 was conducted just before the launch of the LIF- SLLC program, these data provide a unique opportunity to evaluate the impacts of the program using detailed data from before and after the program was launched.

After controlling for potential selection bias and endogeneity, we found no evidence to support the hypothesis about the potential diminishing returns to the first level land certificates in the country. This is mainly so since the overall results show that having a Second Level Land Certificate (SLLC) does not significantly affect households' perceived tenure security regardless of the source of tenure risk (private and/or collective tenure risk). This is perhaps expected given the well-documented success the FLLC had in the country in boosting households perceived tenure security (Holden et al, 2009; Holden et al 2011; Ghebru and Holden 2009; Ali et al , 2007). The gender-disaggregated results (using also data from female spouses), however shows a positive and statistically significant effect of SLLC on tenure security (both private and collective) of married women while also having a positive effect in reducing private tenure risks for female heads (single/divorced and/or widows). The positive and statistically significant coefficient on "Treatment" variable for the private tenure risk indicates that having SLLC negatively affects men's perceived risk of private tenure security. The fact that the SLLC is predominantly administered by issuing joint land certificates to heads and spouses could explain the extra sense of security married women feel with SLLC and also perhaps why men feel the contrary compared to the status quo (no joint use rights). While we found no evidence to support that these positive effects on women perceived tenure security is driven by the LIFT intervention, the LIFT model seems to have a significant negative effect on perceived tenure security of non-beneficiary households who reside in close proximity to those beneficiary households under the LIFT program. Such result is indicative of the potential adverse effects associated with sporadic land titling/certification programs as those who are left behind (no certificate issued) might feel more secure under the status quo of no land certification (Byamugisha, 2016)

Results also reveal an overall positive effect the SLLC program has on households' participation in the land rental market. This is consistent with the findings from earlier similar studies that documented positive effects of the FLLC program has on land rental market activity. As shown by the positive and statistically significant interactive term (i.e., LIFT\*Treatment), such market stimulant effect of the SLLC on land rental market activity seems to be more driven by the LIFT model. The added value of the LIFT modality of service provision is not only via the direct effect on beneficiary households' participation in the land rental market (mainly with a higher likelihood of becoming a landlord) but also via the spillover effect the program has on non-beneficiary households' likelihood of renting in land (becoming a tenant) from beneficiary households who resides in close proximity. Such results indicate that designing future similar

programs by complementing (packaging) the SLLC program with formalization of land rental markets (similar like the LIFT model) may boost potential positive outcomes of the program in addressing the informality and associated market distortions that are common features of land rental markets in Ethiopia and Africa (Holden et al 2009, Deininger et al 2011).

Perhaps vindicating the need for data revolution in collecting perception and knowledge based questions, a more gender-disaggregated analysis on the impact of the SLLC program shows a contrasting effect the SLLC program on legal literacy and access to land information of men versus women. Regardless of their social status (married or unmarried/widow/divorce, etc), women in households with SLLC are reported to have lower legal literacy and/or more constrained access to land related legal information while the opposite remains to be the case for men. On the other hand, though it remains to have a positive coefficient across all the model specifications, we found no significant evidence on the extra value-added benefit the LIFT program might have on legal literacy and access to information of beneficiary households.

Empirical results also show that the SLLC program has an adverse effect on land rights of more vulnerable groups of a community (women and youth). The gender-disaggregated results shows that youth access to/control overland is more constrained for those who resides among beneficiary households and more so for those under beneficiary households headed by a female. This is contrary to the program effect on women land rights which seems to improve significantly among beneficiary households headed by women compared to those beneficiary households headed by male. The dire situation for youth under the SLLC program is even more pronounced under the LIFT model (compared to other similar SLLC programs) as results show that youth likelihood of making business decisions on a given parcel is more constrained among households who benefited from SLLC via the LIFT program compared to those who receive SLLC via other similar programs.

Overall, the robust negative effect the SLLC program has on women/youth land rights supports the notion that, unless such land right protection/formalization programs are designed to account for gender-sensitive dimensions and carefully tailored to protect land rights of vulnerable groups, they may not always guarantee a desired/favorable outcome when it comes to land rights of groups such as women and youth (Atilola 2010; Byamugisha 2013; Javelle 2013; Meinzen-Dick et al, 2018; Ghebru, 2019). This is mainly so since such tenure regularization/formalization/individualization in the form of a title/certificate may mean more exclusive/exclusionary rights to title/certificate holders unless otherwise carefully designed to protect intra-household interests/rights.

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## APPENDIX

Table A.1 Probit estimates on the impact of SLLC program on land tenure insecurity (marginal effects)

Explanatory variables	Using conventional data (Inter-household effect)		Pooled data including Spouse data (intra-household effect)	
	Private tenure risk	Collective tenure risk	Private tenure risk	Collective tenure risk
	ME/se	ME/se	ME/se	
<b>Treatment</b>	0.025 (0.05)	0.034 (0.04)	0.052* (0.03)	0.047 (0.03)
<b>Treatment*Female head</b>	-0.056* (0.04)	-0.047 (0.05)	-0.064 (0.04)	-0.01 (0.05)
<b>Treatment*Female spouse</b>			-0.074** (0.03)	-0.072** (0.03)
<b>LIFT</b>	0.166*** (0.06)	0.106* (0.06)	0.114** (0.05)	0.141*** (0.05)
<b>LIFT*Treatment</b>	0.049 (0.08)	0.01 (0.08)	0.016 (0.06)	0.027 (0.06)
<b>Head age</b>	0.001 (0.00)	0.000 (0.00)	-0.001 0.00	0.000 0.00
<b>Number of Adult members (15-64)</b>	0.01 (0.01)	0.015 (0.01)	0.02 (0.04)	0.012 (0.04)
<b>Head is married</b>	0.03 (0.04)	0.073* (0.04)	0.03 (0.03)	0.035 (0.03)
<b>Head can read write</b>	0.02 (0.03)	0.022 (0.03)	0.001 (0.01)	0.002 (0.01)
<b>Household size</b>	0.004 (0.01)	-0.003 (0.01)	-0.044 (0.06)	-0.061 (0.06)
<b>Household has agricultural equipment/assets</b>	-0.057 (0.06)	-0.045 (0.06)	-0.001 (0.02)	0.008 (0.03)
<b>Parcel has lem tef soil type (reference=lem soil type)</b>	0.032 (0.03)	0.021 (0.03)	-0.004 (0.03)	-0.024 (0.03)
<b>Parcel has tef soil type</b>	0.015 (0.04)	0.008 (0.04)	-0.03 (0.03)	-0.052** (0.03)

Explanatory variables	Using conventional data (In-ter-household effect)		Pooled data including Spouse data (intra-household effect)	
	Private tenure risk	Collective tenure risk	Private tenure risk	Collective tenure risk
	ME/se	ME/se	ME/se	
<b>Steep parcel (reference=plain parcel)</b>	-0.018 (0.03)	-0.044 (0.03)	-0.068 (0.08)	-0.027 (0.08)
<b>Cliff parcel</b>	-0.086 (0.09)	-0.092 (0.09)	0.023 (0.03)	-0.011 (0.03)
<b>Parcel acquired via allocation by the gov't (reference=purchase)</b>	-0.044 (0.04)	0.024 (0.04)	0.015 (0.03)	0.013 (0.03)
<b>Parcel acquired via inheritance</b>	0.011 (0.04)	0.03 (0.04)	0.002 0.00	0.002 0.00
<b>Parcel has permanent crop</b>	-0.022 (0.04)	0.015 (0.04)	-0.018 (0.01)	-0.004 (0.01)
<b>Maximum number of years since parcel acquisition</b>	0.001 (0.00)	0.003* (0.00)	0.452**** (0.06)	0.435**** (0.06)
<b>Total parcel size</b>	0.012 (0.02)	-0.023 (0.02)	-0.294**** (0.06)	-0.186**** (0.06)
<b>Community proportion of households who has dwelling with modern roofing material</b>	0.238*** (0.07)	0.499**** (0.07)	0.0000 1915	0.0000 1915
<b>Community proportion of households who participate in the land rental market</b>	-0.018 (0.07)	-0.307**** (0.07)	0.052* (0.03)	0.047 (0.03)
<b>Prob &gt; chi2</b>	0.0000	0.0000	0.0000	0.0000
<b>Number of Obs.</b>	1915	1915	2119	2119

Source: FtF Endline Survey (2018) and FtF supplemental survey (2018/19)

Figure in parenthesis are standard errors; \*\*\*\* significant at 0.1%; \*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%

**Table A.2 Probit estimates on the impact of SLLC program on land rights of women and youth (marginal effects)**

Explanatory variables	Women land rights				Youth (25-34 years of age) land rights			
	Female has land use rights	Female be-queath land	Female inherit land	Female contribute money for land	Youth made business decision	Youth be-queath land	Youth manage output	Youth land rights
	ME/se	ME/se	ME/se	ME/se	ME/se	ME/se	ME/se	ME/se
<b>Treatment</b>	-0.036 (0.02)	-0.128**** (0.03)	-0.084*** (0.03)	-0.039** (0.02)	-0.057* (0.03)	-0.04 (0.03)	-0.04 (0.03)	-0.049* (0.03)
<b>Treatment*Female head</b>	0.299**** (0.06)	0.609**** (0.07)	0.404**** (0.06)	0.177**** (0.04)	-0.048 (0.05)	-0.134*** (0.05)	-0.134*** (0.05)	-0.078* (0.05)
<b>LIFT</b>	-0.116*** (0.04)	-0.041 (0.05)	-0.053 (0.05)	-0.038 (0.03)	0.016 (0.05)	-0.046 (0.04)	-0.046 (0.04)	0.072 (0.05)
<b>LIFT*Treatment</b>	0.058 (0.05)	0.052 (0.07)	-0.01 (0.06)	0.055 (0.04)	-0.122 (0.07)	0.082 (0.05)	0.082 (0.05)	-0.056 (0.06)
<b>Head age</b>	0.001 0.00	0.001 0.00	0.000 0.00	0.000 0.00	-0.014**** 0.00	-0.017**** 0.00	-0.017**** 0.00	-0.005**** 0.00
<b>Number of Adult members (15-64)</b>	0.023** (0.01)	-0.002 (0.01)	0.025** (0.01)	0.014* (0.01)	-0.026* (0.01)	-0.036** (0.01)	-0.036** (0.01)	0.021** (0.01)
<b>Head is married</b>	-0.033 (0.03)	-0.097** (0.05)	-0.025 (0.04)	-0.019 (0.02)	-0.018 (0.04)	0.106*** (0.04)	0.106*** (0.04)	-0.01 (0.03)
<b>Head can read write</b>	-0.009 (0.02)	0.037 (0.03)	0.02 (0.02)	0.008 (0.02)	0.057** (0.03)	-0.003 (0.02)	-0.003 (0.02)	0.006 (0.02)
<b>Household size</b>	0.015*** (0.01)	0.001 (0.01)	0.003 (0.01)	0.015**** 0.00	-0.009 (0.01)	-0.012* (0.01)	-0.012* (0.01)	0.026**** (0.01)
<b>Household has agricultural equipment/assets</b>	-0.013	-0.011	0.006	0.016	-0.071	0.027	0.027	0.007

	Women land rights				Youth (25-34 years of age) land rights			
	Female has land use rights	Female bequeath land	Female inherit land	Female contribute money for land	Youth made business decision	Youth bequeath land	Youth manage output	Youth land rights
	ME/se	ME/se	ME/se	ME/se	ME/se	ME/se	ME/se	ME/se
<b>Explanatory variables</b>	(0.05)	(0.07)	(0.06)	(0.03)	(0.06)	(0.05)	(0.05)	(0.04)
<b>Parcel has lem tef soil type (reference=lem soil type)</b>	-0.005	-0.011	-0.036	0.009	-0.103****	-0.091****	-0.091****	-0.028
	(0.02)	(0.03)	(0.03)	(0.01)	(0.03)	(0.02)	(0.02)	(0.02)
<b>Parcel has tef soil type</b>	0.013	0.027	-0.004	0.054*	-0.026	-0.022	-0.022	0.103***
	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
<b>Steep parcel (reference=plain parcel)</b>	0.064***	0.025	0.04	0.062****	0.059**	0.064**	0.064**	0.009
	(0.02)	(0.03)	(0.03)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)
<b>Cliff parcel</b>	0.072	0.113	-0.015	-0.065	0.109	0.091	0.091	-0.137***
	(0.08)	(0.09)	(0.07)	(0.05)	(0.07)	(0.07)	(0.07)	(0.05)
<b>Parcel acquired via allocation by the gov't (reference=purchase)</b>	0.059**	0.034	0.077**	0.072****	0.112***	0.071**	0.071**	0.061**
	(0.03)	(0.04)	(0.03)	(0.02)	(0.04)	(0.03)	(0.03)	(0.03)
<b>Parcel acquired via inheritance</b>	-0.002	0.003	0.007	0.026	0.05	0.041	0.041	-0.025
	(0.03)	(0.04)	(0.03)	(0.02)	(0.04)	(0.03)	(0.03)	(0.03)
<b>Maximum number of years since parcel acquisition</b>	-0.003**	-0.001	-0.001	-0.001*	-0.004***	-0.002	-0.002	-0.002**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total parcel size</b>	-0.012	-0.003	-0.012	-0.014	-0.014	0.002	0.002	-0.002
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
<b>Community proportion of households who has dwelling with modern roofing material</b>	0.149***	0.167**	0.158***	0.213****	0.140**	0.061	0.061	0.161****
	(0.05)	(0.07)	(0.05)	(0.03)	(0.07)	(0.06)	(0.06)	(0.05)

Explanatory variables	Women land rights				Youth (25-34 years of age) land rights			
	Female has land use rights	Female be-queath land	Female in-herit land	Female contribute money for land	Youth made busi-ness deci-sion	Youth be-queath land	Youth man-age output	Youth land rights
	ME/se	ME/se	ME/se	ME/se	ME/se	ME/se	ME/se	ME/se
<b>Community proportion of households who partici-pate in the land rental market</b>	0.01 (0.05)	0.149** (0.07)	0.107* (0.06)	0.008 (0.04)	-0.016 (0.07)	0.051 (0.05)	0.051 (0.05)	0.135*** (0.05)
<b>Prob &gt; chi2</b>	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
<b>Number of Obs.</b>	1937	1843	1924	1947	1921	1907	1907	1947

Source: FtF Endline Survey (2018) and FtF supplemental survey (2018/19)

Figure in parenthesis are standard errors; \*\*\*\* significant at 0.1%; \*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%

Table A.3 Probit estimates on the impact of SLLC program on land investment and land rental market participation (marginal effects)

Explanatory variables	Soil and wa- ter conser- vation in- vestment or mainte- nance	Land rental market activity		
		Become a landlord	Become a tenant	land rental status change
	ME/se	ME/se	ME/se	ME/se
<b>Treatment</b>	0.128*** (0.03)	0.053** (0.02)	0.016 (0.02)	0.054*** (0.02)
<b>Treatment*Female head</b>	-0.119*** (0.04)	0.091*** (0.02)	-0.084** (0.04)	0.031 (0.03)
<b>LIFT</b>	-0.026 (0.04)	-0.017 (0.02)	0.052** (0.02)	0.059** (0.03)
<b>LIFT*Treatment</b>	0.041 (0.05)	0.080* (0.04)	-0.03 (0.03)	0.074** (0.04)
<b>Head age</b>	-0.001 0.00	0.001** 0.00	-0.002** 0.00	0.000 0.00
<b>Number of Adult members (15-64)</b>	0.003 (0.01)	-0.024*** (0.01)	0.016* (0.01)	-0.016* (0.01)
<b>Head is married</b>	-0.004 (0.03)	-0.046** (0.02)	0.102**** (0.03)	0.007 (0.03)
<b>Head can read write</b>	-0.012 (0.02)	-0.041** (0.02)	0.027 (0.02)	0.014 (0.02)
<b>Household size</b>	0.011 (0.01)	-0.003 (0.01)	0.000 (0.01)	-0.001 (0.01)
<b>Household has agricultural equip- ment/assets</b>	0.208*** (0.05)	-0.078*** (0.03)	-0.017 (0.04)	-0.090** (0.04)
<b>Parcel has lem tef soil type (refer- ence=lem soil type)</b>	0.075*** (0.02)	-0.007 (0.02)	0.017 (0.02)	-0.003 (0.02)
<b>Parcel has tef soil type</b>	0.04 (0.03)	0.022 (0.02)	0.019 (0.02)	0.033 (0.03)
<b>Steep parcel (reference=plain parcel)</b>	0.092*** (0.02)	0.01 (0.02)	0.002 (0.02)	0.019 (0.02)
<b>Cliff parcel</b>	0.035 (0.06)	-0.075 (0.05)	0.008 (0.05)	-0.048 (0.06)
<b>Parcel acquired via allocation by the gov't (reference=purchase)</b>	-0.036 (0.03)	0.071*** (0.02)	0.014 (0.03)	0.057** (0.03)
<b>Parcel acquired via inheritance</b>	0.069** (0.03)	0.054** (0.02)	0.017 (0.03)	0.048 (0.03)
<b>Maximum number of years since par- cel acquisition</b>	0.002 0.00	0.001 0.00	-0.003**** 0.00	-0.002 0.00
<b>Total parcel size</b>	-0.004 (0.01)	0.011* (0.01)	0.018*** (0.01)	0.028**** (0.01)
<b>Community proportion of households who has dwelling with modern roofing material</b>	0.087** (0.04)	0.051* (0.03)	0.132**** (0.03)	0.137**** (0.04)
	0.269***	0.257****	0.253****	0.444****

Explanatory variables	Soil and wa- ter conser- vation in- vestment or mainte- nance	Land rental market activity		
		Become a landlord	Become a tenant	land rental status change
	ME/se	ME/se	ME/se	ME/se
Community proportion of households who participate in the land rental mar- ket	(0.05)	(0.03)	(0.04)	(0.04)
<b>Prob &gt; chi2</b>	0.0000	0.0000	0.0000	0.0000
<b>Number of Obs.</b>	2272	2151	2151	2151

Source: FtF Endline Survey (2018) and FtF supplemental survey (2018/19)

Figure in parenthesis are standard errors; \*\*\*\* significant at 0.1%; \*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%

Table A.4 Probit estimates on the impact of SLLC program on access to land related legal advice and legal knowledge and awareness (marginal effects)

Explanatory variables	Using conventional data (Inter-household effect)		Pooled data including Spouse data (intra-household effect)	
	Access to land re- lated legal infor- mation	Land re- lated legal knowledg e and awareness	Access to land re- lated le- gal infor- mation	Land re- lated legal knowledge and aware- ness
	ME/se	ME/se	ME/se	ME/se
Treatment	0.041** (0.02)	-0.05 (0.03)	0.015 (0.03)	0.080**** (0.02)
Treatment*Female head	-0.060*** (0.02)	-0.148**** (0.04)	-0.117*** (0.04)	-0.073*** (0.03)
Treatment*Female spouse			-0.252**** (0.03)	-0.108**** (0.02)
LIFT	-0.062** (0.03)	-0.136*** (0.05)	-0.183**** (0.05)	-0.095**** (0.03)
LIFT*Treatment	-0.04 (0.03)	0.1 (0.06)	0.069 (0.06)	0.012 (0.03)
Head age	0.000 0.00	0.002 0.00	-0.001 0.00	0.000 0.00
Head is married	0.039** (0.02)	0.061 (0.04)	0.039 (0.04)	0.028 (0.02)
Head can read write	0.009 (0.02)	0.049* (0.03)	0.002 (0.03)	-0.009 (0.02)
Household size	-0.004 0.00	-0.011* (0.01)	-0.007 (0.01)	-0.009*** 0.00
Household has agricultural equip- ment/assets	0.026 (0.03)	0.033 (0.06)	0.086 (0.06)	0.049 (0.03)
Parcel has lem tef soil type (refer- ence=lem soil type)	0.044*** (0.02)	0.041 (0.03)	0.037 (0.02)	0.046*** (0.02)
Parcel has tef soil type	0.064** (0.03)	0.025 (0.03)	-0.013 (0.03)	0.062*** (0.02)
Steep parcel (reference=plain par- cel)	-0.018 (0.02)	0.015 (0.03)	-0.051** (0.03)	-0.002 (0.02)
Cliff parcel	-0.03 (0.05)	0.077 (0.07)	0.101 (0.07)	0.01 (0.05)
Parcel acquired via allocation by the gov't (reference=purchase	0.017 (0.02)	0.098*** (0.04)	0.114**** (0.03)	0.001 (0.02)
Parcel acquired via inheritance	0.029 (0.02)	0.075** (0.04)	0.099*** (0.03)	-0.003 (0.02)
Maximum number of years since parcel acquisition	0.000 0.00	0.001 0.00	0.001 0.00	-0.001 0.00
Total parcel size	-0.013 (0.01)	-0.008 (0.01)	-0.02 (0.01)	-0.009 (0.01)
Community proportion of house- holds who has dwelling with modern roofing material	0.073** (0.04)	-0.324**** (0.06)	-0.268**** (0.06)	0.087** (0.04)
	-0.099***	0.051	0.339****	-0.125****

	Using conventional data (Inter-household effect)		Pooled data including Spouse data (intra-household effect)	
	Access to land re- lated legal infor- mation	Land re- lated legal knowledg e and awareness	Access to land re- lated le- gal infor- mation	Land re- lated legal knowledge and aware- ness
Explanatory variables	ME/se	ME/se	ME/se	ME/se
Community proportion of house- holds who participate in the land rental market	(0.03)	(0.07)	(0.06)	(0.04)
<b>Prob &gt; chi2</b>	0.0000	0.0000	0.0000	0.0000
<b>Number of Obs.</b>	1936	1936	2123	2123

Source: FtF Endline Survey (2018) and FtF supplemental survey (2018/19)

Figure in parenthesis are standard errors; \*\*\*\* significant at 0.1%; \*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%

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