Land Reform, Property Rights and Private Investment: Evidence from a Planned Settlement in Rural Tanzania

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Abstract

I investigate the mass resettlement of rural population in Tanzania that occurred in early 1970s. The policy was implemented to strengthen the role of the state in establishing villages for communal production and development. The villagisation process that followed was implemented with unclear goals, haste and at some point coercion that it was unlikely to bring any short-term improvement in the rural economy. I exploit a recent survey data to examine the impact of the ujamaa operation on farming activities. The findings show that areas affected by the villagisation in which proprietary rights in land were given to households had significantly better transferability rights and had made significant investments in land. I detect improvement in access to rural credit market and a closing gender gap in land ownership.

Key words: Property rights, Land tenure, Land redistribution, Villagisation, Tanzania.

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Effective regime of property rights is central to economic development, particularly in developing countries (Besley and Ghatak, 2010). Often, lack of clearly defined property has been used to explain low private investment in developing countries, especially in agriculture (Jacoby et al., 2002; Galiani and Schargrodsky, 2010; Goldstein et al., 2015). In most parts of the developing world, and especially in Sub-Saharan Africa, land is often commonly owned. Communal land ownership limits transferability rights and prevents the emergence of an active land market which in turn undermines land enhancing investments and farm productivity. In contrast, private land property rights can induce individuals and firms to make productive land investment and efficient resource use (Deininger and Jin, 2006). Convincingly identifying the effects of improved property rights on economic outcomes, however, faces at least two challenges. First, improving economic outcomes can affect property rights, leading to reverse causality. Second, a third set of factors (e.g. increased market openness) can influence both property rights and economic outcomes, leading to omitted variable bias.

In this paper, I exploit a land redistribution undertaken in Tanzania in the early 1970s to estimate the causal effects of improved property rights on farm level investments. The resettlement program, usually referred to as the villagisation operation or *ujamaa*, consisted in removing about eleven million peasants from their old villages to new settlements. One of the officially stated goal was to improve the efficiency of the provision of public services in these new and larger villages. Farmers who were resettled received their "own land", with an official land record (Mwapachu, 1976). This type of individual land ownership was a significant shift from the communal ownership described above. I hypothesize that the shift from communal to private land rights would have led to increased farm investments, a more active land market and increased farm productivity in the new settlements.

For the empirical implementation, I use farm level and village level surveys from Tanzania, collected in 2008, 2010 and 2012. I use the village level data and administrative data to map and identify villages that were part of the villagisation operation (treatment villages) and villages that were not part of the operation (comparison villages). Matching the treatment and comparison villages with the farm level surveys, allows us to test and identify the effects of the resettlement on the outcomes of interest. I first establish the link between the villagisation operation and the occurrence of private land ownership, and then test the extent to which improved land tenure regime has affect land market, farm investments and productivity.

There is a sizable literature that examines the effect of property rights on economic outcomes and highlights its key importance for development (Abdullah, 1976; Feder and Feeny, 1991; Roth et al., 1994; Gavian and Fafchamps, 1996; Brasselle et al., 2002; Holden et al., 2011). Institutions are established to regulate life of a community. Property rights or an individual rights to freely use his asset are therefore essential to the institutional structure of an economy. The issue is of importance as even an intermediate level of property right enforcement in a dysfunctional economy allows a socially optimal allocation (Acemoglu and Verdier, 1998). Oligarchic societies where property rights are on the hands of few could experience high growth rates and greater efficiency. However, barriers to entry eventually harm efficiency and become extremely prohibitive to development causing these economies to fall behind democratic systems (Acemoglu, 2008).

In general, those without property rights face a higher risk of expropriation and are often unable to make sensible change on their land. Thus, in a system with a dominant agricultural tenancy a change or reform in property right should in theory bring more efficiency (Banerjee et al., 2002). With a formal and individual ownership, a farmer is provided with incentives to make land enhancing and productive investments. The body of empirical research, however, has generated mixed results on the direct impact on efficiency (see, Place, 2009). The net effect would in fact be negative in case the tenant no longer subject to the threat of eviction under tenure security chooses to make less efforts on his land (e.g., Place and Hazell, 1993; Besley and Burgess, 2000).

This paper is related to a body of literature that link property rights and investment incentives on land. In Argentina, for instance, a study uses a natural experiment in which legal owners were offered the option to transfer their land after several unsuccessful attempts to evict squatters on their property (Di Tella et al., 2007). Some landowners surrendered their land whereas others did not. The examination of parcels of land affected by the expropriation law reform revealed important differences in future expectations between squatters with and without secure property right. Another empirical study compares districts in India under different land revenue liability systems (Banerjee and Iyer, 2005). Districts where land revenue collection was taken over by the colonial British administration had a single cultivator responsible for the tax. In other districts, however, the revenue liability fell either under a landlord system or a village body system. Notable differences were found not only in agricultural production but also in public investments in education and health in districts under non-landlord land revenue system.

Jeon and Kim (2000) assess the impact of an agricultural land reform in Korea on the country economic outcomes. The government implemented a large scale operation in which land that belonged to the ruling class was purchased by the state. The objective was to later redistribute land to tenants by giving them the opportunity to make payment in kind. The intervention was successful in reducing transaction costs, increase agricultural production, and favoring income redistribution from landlords to tenants. Deininger and Jin (2006) investigate in Ethiopia the link between farm production and land investments such as tree planting and terracing. A new land reform that recognized the right of the landless farmer to own land was anchored in the country constitution. The previous regime had land tenure under the authority of peasants association and transferability rights strictly limited. Findings of this study indicate that land rights impact on investment incentives was mostly dependent of the type of investment. In other words, the farmer efforts on his land were not necessarily rewarded with tenure security[2].

In Tanzania, the idea of *ujamaa* villages was initiated in the years that follow the country's access to independence. At the beginning of the reform, the process depended on voluntariness and acceptance of peasants to the socialist idea of communal living. However, the lack of spontaneneity to move to new clustered villages prompted the government to make the resettlement compulsory

[2]The review above indicates that land policy interventions are not the panacea (see, Hanstad et al., 2008). Some studies have reached the conclusion that establishing formal land registration government can generate more state capacity and help households lower the private cost of defending their property rights (e.g., Deininger and Feder, 2009). In general, individuals with better social network and political influence are more likely to maintain the ownership over their land in case of dispute (Goldstein and Udry, 2008)

(Nyerere, 1977). As argued in Hyden (1975) not much choice was left to the people as the policy represented the decision made by few individuals within the narrow circle of policy-makers. Farmers were expropriated and forced to move from their villages into new communities. Most villagers had to move up to five miles from their homes (Mwapachu, 1976). The magnitude of land redistribution was such that "there were no comparable policies developed in such larger scale in an effort to bring agriculture development" (McHenry, 1981). It directly affected the lives of as many individuals as the entire rural population. At the beginning of the year 1977 the official number of registered "planned villages" counted about thirteen million people (Coulson, 1982).

Land reforms that involve settlement schemes are developed to improve not only social equity but also and ultimately to increase productivity and provide additional income, consumption and wealth. I could categorize them into two types: the sponsored type of settlement where people are forced to move; and the spontaneous type in which the demographic change occurs because, one could say, fertile land becomes available. The Kenya highlands settlements program in the 1960s, for instance, is one of the most successful experience of settlement plan (Binswanger and Elgin, 1998). The government purchased with the help of the United Kingdom europeans-owned large acreage of land and redistributed them to African farmers in the form of small holdings. Productivity and peasants cash income increased immediately in the new high density areas. Kazianga et al. (2014) document an interesting case where mass land settlement occurred rather more spontaneously than planned. They report the demographic movement of the population in Burkina Faso after a campaign of spraying larvacide along rivers to eliminate blackflies responsible of river blindness disease. People responded by spontaneously moving to the treated and more fertile land. The study finds that villages closer to treated rivers were more likely to have land transactions, and less likely to require permits before transactions.

This paper is part of the broad research body on land settlement reforms. I have the particularity of working on a unique case in the *ujamaa* land policy in which villagers were forced to move to new settlements and were allocated a land to start farming. I compare recent outcomes in terms of land rights and differences in agricultural investments. The empirical estimation suggests that villages formed after the *ujamaa* operation had a significant higher land tenure security than other villages. Using our preferred specification, landowners are 9.94 percentage points more likely to be able to sell their land or use it as a collateral. The data suggest that more households in *ujamaa* relative to other villages (4.02 percentage points increase) benefit from better rural financing options or access to a credit instrument. I also find that land rights for women is 3.69 percentage points higher in *ujamaa* villages. There is no substantial difference on farm yields between the treatment and comparison villages. However, I detect a correction in market imperfections in the *ujamaas*.

Historical Background

The *ujamaa* concept was initiated in Tanzania to promote family-hood by creating a commonly organized socialist village where people could live, work together, and share common basic goods and services. After the independence in 1961, the country rapidly faced the challenge of speeding up rural development and creating economic growth (Nyerere, 1964; Raikes, 1975). Around that time, rural peasants were living in scattered homesteads distant from each other. Providing basic social and agricultural services was not only an enormous task but also far too costly for the state.

The objective of the resettlement was therefore to relocate the rural population in order to first increase agricultural production and second to facilitate the provision of services like schools, health services, and improved water supply (Moore, 1979). With the newly created villages the expectation was to build new structures for the implementation of socio-economic programs difficult to promote with scattered villages. In 1969, the government even ordered direct spending plans to villages as inducement to voluntary migration to *ujamaa* villages.

The socialist concept of communal living, however, was not massively embraced by rural peasants. Confusion existed about the nature of *ujamaa* villages and the concept of "living together" or "working together" was not clearly defined (Mwapachu, 1976; Kudo, 2012). The population also quickly realized that public good provisions would not be provided immediately (Coulson, 1982). To expedite the process, the government decided in 1973 to make the villagisation a matter of coercion, and no longer of persuasion. Houses were set on fires, roofs ripped off, doors and windows removed, and personal belongings damaged when loaded to truck for transportation. In the next two years that followed, around eleven million peasants were removed from their old settlements into new ones. At the end of the operation in 1976, a total of thirteen million were displaced (McHenry, 1981; Shao, 1986). Not carefully planned, the villagisation campaign had disastrous consequences on the country economy which was left bankrupt. Although by 1979 around 90 percent of peasants had been moved to new settlements only a mere 5 percent of the country agricultural output came from communal plots (Meredith, 2005).

Because of the government ordinance, it was assumed that customary land tenure rights in new villages could be ignored. Land was allocated to village councils for communal farming and individual village members were provided with plots for farming at the household level (Killian, 2011). Under customary law, only the clan heads were responsible of allocating land. In the *ujamaas* every ordinary individual aged eighteen or above was eligible to village assemblies, irrespective of gender and marital status (Kudo, 2012).

The pattern of the new villages was more or less the same (Shao, 1986). The individual household were allocated an area of two acres for their houses and gardens. The homesteads were around a “central service area” of fifty acres designated for school, dispensary, clean water and so on. Around the homesteads and apart from them were the farm blocks. Each block was assigned for a specific crop designated by the government authority (Ghai et al., 1979). Households were given the responsibility of farm blocks to grow the designated crop. The structure of the new settlement was designed to create development opportunities and coordination for the transformation of the rural society.

Empirical Approach

I compare land tenure security and agricultural investments between villages formed by the villagisation operation and other villages by estimating regressions of the form:

$$\mathrm{y}_{ijt} = \psi + \alpha_t + \beta \text{ ujamaa}_j + \sum \phi_i \mathrm{X}_{ijt} + \varepsilon_{ijk} \qquad (1)$$

where y_{ijt} is the dependent or outcome variable for a given plot i located in village j during year t. The right-hand-side variables include ψ, the ward fixed effects control for ward specific factors that are fixed over time; α_t, the year-specific intercepts to control for unobserved time varying factors common to all villages (treatment and comparison); X_{ijt}, a set of controls on household and plot characteristics that vary over time across villages; ujamaa_j, a dummy variable that takes the value of 1 if the village is *ujamaa* and 0 otherwise.

In each regression, the control variables include household head schooling, household size, household expenditures on education, food, and utilities, distance from plot to home, distance from plot to nearest road, soil type and rainfall indicators. Ultimately, I cannot rule out the eventuality of omitting variables or a set of unobservable factors that are correlated with both property right and investment incentives. Normally, the inclusion of ward fixed effects control for time invariant differences at the ward level. It becomes problematic for our identification when the omitted variables are not time invariant. To address this issue I include an interaction between each ward fixed effects and year of survey. The ward-year trend is one way for us to assume ward effects follow some linear trend.

It should be noted that I am not able to use village fixed effects in our regressions. The reason is because the *ujamaa* status is fixed for village in the time horizon of our study. The same is also true for household fixed effects, all policy variations will be lost otherwise. Finally, since the data consist of repeated observation for each village over time, I adjust the standard errors for within-village correlation (see, Antonakis et al., 2010).

Data and descriptive statistics

I use the Tanzania National Panel Survey (NPS) for the years 2008, 2010, and 2012. The surveys are a part of the living standards measurement studies conducted by the World Bank. The primary goal is to promote and improve the collection of household level data in developing countries. The information obtained is a nationally representative household panel data which gathers information on a wide range of topics including agricultural production, non-farm income generating activities, consumption habits, and other socio-economic characteristics. It also contains village-level features on infrastructure, social structure, religion and demographics.

The administrative division presented in the data comprises in descending order regions, districts, ward, and enumeration areas or villages (in rural areas). I am able to identify households in enumeration areas for which I have information across all three rounds. To the individual household data I add information on consumption expenditures, agriculture activities, and village community characteristics. These are households with at least one landholding. I drop observations on household members to keep only entries identified as the head of the household. I assume the household head is free to rearrange resources across the plots he controls as an individual (Udry, 1996). The working sample contains a total of 20,705 observations (household $\times$ plots $\times$ years).

Figure 1 shows villages formed by the forced migration policy. It is worth noting that the operation was extended to most regions of the country. Some areas, however, appears to have been affected more than others. Conveniently and working in favor of our identification strategy, the new settlements are geographically close to other villages identified in the working sample. It allow us to be less concerned about confounding factors such as topography, location and soil characteristics.

In each district, I compute the proportion of *ujamaa* villages. Districts such as Kusini Pemba or Kusini Unguya have less new settlements from the villagisation, whereas districts such as Mara or Manyara have higher concentration of new villages. I then use this information against the self-reported tenure on each parcel of land. Figure 2 shows the scatterplot of land tenure against *ujamaa* villages by district. The data suggest that there is a positive correlation between the two variables implying that new villages might have better land tenure security compared to other villages. The slope of the fitted line is 0.584 with an r-squared of 0.357. I plot a similar graph regrouping land tenure and *ujamaa* villages by ward. The correlation is weaker but positive. The fitted regression line has a slope of 0.285 and r-squared of 0.07.

Overall, the data I have suggest that districts and wards with higher proportion of *ujamaa* villages have higher proportion of land rights. The difference in property rights is important for at least four reasons. First, farmers with secure land rights face a lower risk of eviction and therefore receive incentives to make investments on their land. Second, land tenure security significantly reduces the number of land conflicts and the incurred cost of defending property rights. Third, landowners are encouraged to transfer their land to more productive producers. Finally, land as a fixed asset can be used as a collateral to facilitate financial transactions.

Table 1 displays the means and standard deviations of some key variables available in the dataset and used in our empirical analysis. In columns 1-3, I show the statistics for the unrestricted sample and then present the sample restricted to observations in rural areas and urban areas. I also present the means for *ujamaa* enumeration areas, as well as others areas not identified as *ujamaa* (columns 4-5). In Tanzania, around 31 percent of the total population lives in urban areas. However, most of the result presented focus on the rural sample to capture the policy impact on farm activity. I thus break down the rural sample to show mean averages in rural *ujamaa* versus other rural areas (columns 6-7). Finally, the last two columns show the mean difference and p-value between rural *ujamaa* and other villages.

Broadly, household characteristics points towards some level of education, medium size household and consumption expenditures mostly on food. A head is on average 48.98 years old (life expectancy in Tanzania is about 62 years). Households are headed in majority by male (77 percent). Around 73.5 percent of individuals have attended school at some point. The average number of years spent in getting education is 4.95. The country literacy rate defined as individual above 15 who can write or read english, swahili or arabic is 70 percent. Interestingly, surveyed household in *ujamaa* reported better outcome in education (75.7 percent) relative to those in other areas (68.9 percent). I control for these differences in our regressions.

The economy of Tanzania depends on agriculture which provide 25 percent of exports and employs 80 percent of the country's work force. Agricultural products includes maize, cassava (manioc, tapioca), bananas, beans, cashew nuts, corn, wheat, cotton, coffee, and fruits. Land use for agriculture in Tanzania covers 43.7 percent of the total land employed for either permanent pasture or crops. The sample on plot characteristics shows that 70.8 percent of plot owner have the right to sell their land or the right to use it as a collateral. The document title on a specific parcel of land could be of multiple form: government granted right of occupancy, certificate of customary right, local court certified purchase agreement, inheritance letter, official correspondence, etc. The average distance from the plot to the nearest road in 2.22 kilometers (1.38 miles). I also show the statistic for crop yield. It indicates how much was the crop output worth in the market during the harvest season. The self reported value of the harvested crop per hectare is 147,600 Tanzanian shillings. The plot area in our sample is 0.959 hectare (ha.).

Table 2 shows plot characteristics for each survey rounds. The number of observations is roughly about the same across the three years.

Results

The empirical section focuses on examining the impact of the *ujamaa* policy on land tenure security. I estimate the potential impact on land related investments but also on farm productivity. To address the validity threat of omitted variables bias, I present first a basic model that includes a set of covariates as well ward fixed effects. The model is then augmented by additional controls in the right-hand-side of the equation. Gradually, I add the year fixed effects and the ward-year linear trend to the regression. The year fixed effects control for any time trend in the data. The ward-year trend is to hopefully control for unobservable factors that changes over time within each ward.

In table 3, I present the first set of results by beginning with a model with no restriction on the sample size (columns 1-3). I then restrict the sample to show the results for rural areas (columns 4-6) and urban areas (columns 7-9). The *ujamaa* policy has a positive and significant effect on land ownership. More precisely, in enumeration areas formed by the villagisation operation landowners are 9.14 percentage points more likely to sell their land or use it as a collateral for financial transactions relative to non *ujamaa* areas (column 3). The results also suggest that larger plots are more secure than smaller plots. The estimate on the largest plot quintile (0.192) is at least four times the estimate on smallest plot (omitted category). This indicates that farmers are more likely to have tenure security on larger landholdings than smaller ones. The estimates on age quintiles are also informative on land ownership. The coefficients on the first two age quintiles are relatively small and not significantly different from zero. In other words, a group composed of older individuals is more likely to possess secure property rights on their land compared to younger groups.

A similar pattern emerges when I restrict the sample to rural areas (columns 4-6). Although the results are qualitatively the same, the estimates for the *ujamaa* policy are higher compared to the ones found on the entire working sample. Land security is increased by 9.94 percentage points in *ujamaa* villages (column 6). Large plot benefits more from tenure security relative to small plot and older individuals are more concerned about property rights of their land than the young ones. I also use the same specification on the urban sample (columns 7-9). However, the point estimates are smaller. The effects of the *ujamaa* policy on land rights drop significantly after controlling for ward time trend. The result should not be surprising, urban environments are in general not propitious for farming activity.

Overall, the result in table 3 show that farmers in *ujamaa* areas have more secure property rights on their land, and column 6 shows that the effect is stronger in rural areas. Nevertheless, complexity and ambiguity on the land tenure response to the policy could arise as the farmer cultivate plot of different size. Boesen et al. (1977) record that household existing at that time had an average of 1.17 ha and the minimum needed to feed a family of average size was between 0.4 ha and 0.8 ha, depending on yields. Initially, however, the settlement policy allocated two acres of land (0.8 hectares) to each individual households. Even though there was some latitude for expansion, the planned villages had households at the beginning concentrated on smaller plots. The variation on plot size allows to examine the heterogeneity of the policy relative to area of land owned by the cultivator.

The estimated coefficients are presented in table 4, where I use information rural areas and include ward and year fixed effects along with the within variation time trend on each regression. In column 3, the main effect represents 14.1 percentage points higher probability of land tenure security for plot of 1st quintile in *ujamaa* villages. For plot of larger size, however, the effect of *ujamaa* appears to be lower. For example, going from from the 1st plot quintile to the 2nd quintile is a 6.37 percentage points decrease in the *ujamaa* effect. The new settlement policy has a even lower impact for the largest plot quintile (10.7 percentage points decrease). Is it also interesting to see that the effect on the farmer land right for this group remains positive for as long the plot is larger than 1.31 ha. One explanation for the drop in the estimated coefficients for large farm size could be that large landholdings reflect the cultivator's social status or political power that mitigate the risk of conflict or eviction from the land (Goldstein and Udry, 2008).

Land tenure security reduces information asymmetry and facilitates land transactions. In fact, land investments are encouraged when it is easier to convert land to liquid assets. In Tanzania, the level of private saving and investment is rather low (Tesha, 2013; Epaphra, 2015). Land as a collateral can be used a means to minimize efficiency losses due to uncertainty and moral hazard. Thus, credible land transferability rights provides additional confidence to lenders to make loans and makes the credit market more efficient. The emergence of a credit market is indeed encouraged by land rendered collateralizable (Bardhan and Udry, 1999; Binswanger et al., 1995).

In table 5, I estimate the response of the rural credit market to the *ujamaa* policy. Access to rural credit is defined in the survey as a 0 or 1 dummy to denote the household membership to a credit or saving group. These self-help groups or "saccos" are different from any other government assistance programs or non-governmental institutions (such as church). In column 1, I find that there is a statistically significant positive relationship between *ujamaa* and access to credit. The point estimate indicates that farmers in *ujamaa* are 4.02 percentage points more likely to participate in the saccos and obtain credit.

In modeling intrahousehold allocation, Udry (1996) makes the argument that in a setting where control over land is individualized, women land rights are particularly insecure and under constant pressure of male relatives. Under communal tenure regime, women often obtain usufruct rights to family land, but they do not possess inheritance rights (e.g., Quisumbing et al., 2001). I therefore investigate the possibility of potential impact of *ujamaa* on the likelihood of a female owned plot and present the result in column 2. The coefficient on the *ujamaa* policy is positive and significantly different from zero at the 5 percent level. The model predicts that conditional on observed characteristics, fixed effects controls and relative to villages not affected by the policy females are 3.69 percentage points more likely to own a plot in the *ujamaas*.

I use the same outcome variables to examine plot size variation in the *ujamaa* policy effect. The omitted plot size category is the 1st quintile. In column 3, the point estimate is positive and significant to indicate that farmer in *ujamaa* with smaller plot have more access to credit than those in other villages (2nd and 3rd quintiles). The coefficient on the policy and plot size interaction, however, tells us that between two farmers with slightly larger plot (2nd quintile) the one in the *ujamaa* is less likely (by 5.36 percentage points in probability) to access credit. Along the same line, in column 4 the point estimate on the *ujamaa* interactions for plot owned by female suggests for medium size plot women are 6.62 percentage points more present in *ujamaa* than other areas (3rd quintile).

Another argument to make is that the villagisation reform enhanced investment incentives on the land. Basically, farmers would not invest in their land if the fruits of their hard labor are going to reaped by other individuals. Land tenure security is therefore a key element to higher investment. However, measuring the impact of tenure security poses the problem of endogeneity. Numerous studies have found evidence of a positive relationship between land rights and farmer's investments (e.g., Place and Otsuka, 2001; Deininger and Jin, 2006; Goldstein and Udry, 2008). Others find ambiguous the effect of tenure security on investment and agricultural yields emphasizing the weakness of the empirical link between the two variables (e.g., Brasselle et al., 2002; Fenske, 2011).

In Tanzania, the cultivators affected by the *ujamaa* reform had no decision inputs on the forced migration. The historical context of the operation makes it unlikely for our estimation to suffer from a selection bias or a reverse causality.

Under the assumption of orthogonality, I present the results for land related investments and *ujamaa* in table 6. Farmer improvements made on land include tree planting, plot fallowing and access to improved maize seeds. Planting trees is a long term investment. Land shifting or plot fallowing in rural Africa remains one of the most important mechanism to maintain land productivity. Also, the acquisition of improved seeds can be interpreted as the adoption of new technology susceptible to increase agricultural output. The point estimates on the three variables are positive and significant at the 5 percent level. Farmers in *ujamaa* are 2.77 percentage points more likely to plant trees, 4.49 percentage points more inclined to leave their plot on fallow, and 21.9 percentage points more enticed to use improved seeds. The estimated coefficients on land investments are fairly small. It is important to note that the percentage of rural farmers who are planting trees or use fallowing in the sample is low. Nonetheless, an increase of 2.77 percentage points corresponds to a 24.0 percent increase in tree planting in the *ujamaas* relative to others villages.

In columns 4-6, I interact the *ujamaa* policy indicator with plot quintiles for the same land investment variables. The results found in the first three columns hold for tree planting and plot fallowing. *Ujamaa* villages have more investment incentives than other villages. More trees are planted, less in smaller plantations. The likelihood of plot left on fallow is higher, although the probability decreases with plot size. By contrast, improved seeds seems to matter for small plots and not for large plots.

As stated earlier, a secure land tenure removes information asymmetry between buyers and sellers and enhances transferability rights. Such transfers provide institutional framework for land transactions. The literature shows that when market failure or efficiency loss exists in one market but complete in others no systematic relationship between plot size and productivity should hold (e.g., Feder, 1985; Conning and Udry, 2007). Therefore, the development of land market should increase farmer efficiency on the plot.

Our measure of farm productivity or yield is the value of the harvested land crop divided by plot area. Descriptive statistics for yield and plot area for each round survey are reported in table 2. Agricultural yield appears to be lower in rural *ujamaa* villages, particularly in 2008 where the difference is significant. I first estimate the direct impact of the *ujamaa* policy on crop yield. The results are presented in table 7. I find that the villagisation reform does not affect farm yield per hectare, the point estimate of -0.134 is not significant at the 10 percent level (column 3). I then estimate a linear probability model in which I interact *ujamaa* and plot size. The results are shown in table 8. I include fixed effects controls for ward, year, and crop type. I also add a crop-year fixed effects as well as a ward-year linear trend. Since the *ujamaa* policy is at the village level I am unable control for the within household characteristics. To go around this problem, I follow Wooldridge (2013) and average household level variables across survey years and include them in the regressions. The grouping of household variables based on year acts similarly to a fixed effects estimation.

The presence of a strong negative and significant coefficient in plot size suggests that small plot sizes are farmed more intensively (column 1). The result is robust to inclusion of additional controls. There is a clear indication at some market imperfections (see Ali and Deininger, 2014). However, I also note that the point estimate on the interaction term is positive and significant at the 5 percent level (column 3). This result is of importance as it suggests that there is evidence of market failure correction in *ujamaa* villages. One plausible interpretation is that compared to other villages, the *ujamaas* have a relatively better functioning land market that mitigate the relation between farm size and productivity.

Surprising and less expected, the point estimate on *ujamaa* is negative although not significant. It appears that there is no detectable effect of the policy on agricultural output. This finding does not converge with the previous results obtained in this study despite the controls included in the regressions. It is rather puzzling to find that land investment in the *ujamaa* does not translate to more productivity. However, few other studies that examined the effect of property rights on agricultural productivity have reached similar conclusion (Besley and Burgess, 2000; Quisumbing et al., 2001; Bellemare, 2013; Goldstein et al., 2015). I briefly discuss this finding in a section below.

Robustness Check

The main results as reported in the last section are consistent with respect to the included controls variables, fixed effects and ward linear trends. However, the treated and control villages could have been systematically exposed to different changes. In other words, time varying heterogeneity between the two groups could be a threat to our identification. In this section, I test the robustness of the results by comparing villages not exposed to the land settlement policy. To assert that I uncovered a causal relationship, I have by assumption attributed differences in the outcome variables to nothing else but the *ujamaa* treatment. If it is true, there should not be any apparent differences when comparing control villages.

To verify this, I proceed by restricting the sample to villages other than the *ujamaas*. I then randomly assigned a fake status of treatment to one half of these villages and a status of control to the other half. The results are presented in table 9 and use specifications similar to the ones in tables 3, 5, 6, and 7. The point estimates on the variable *not ujamaa* capture the effect of placebo treatment on each dependent variables. None of the estimated coefficients are significantly different from zero at the 10 percent level. There is no detectable difference between control villages. These results provide additional evidence that the *ujamaa* land policy had a long term impact on farm activity.

Discussion

The fact that land tenure in *ujamaa* have no significant impact on crop yields could be explained by three possible reasons. First, there might be more binding constraints on production such as missing labor market or inadequate access to credit. Second, the elimination of eviction threats due to better tenure security could have led the plot owner to reduce labor supply on the land. With a lower probability of losing his land, it is possible for the farmer to apply less effort and hence to choose not increase output. Finally, land related investments investigated in this study are primarily land-conserving rather than yield-enhancing (Holden et al., 2009). Investments in agricultural techniques like irrigation, drainage are more susceptible to increase crop yield. In terms of policy implications, the lack of empirical evidence on productivity, of course, does not imply the villagisation operation had lesser long-term significance in changing farming activities in the *ujamaas*.

Conclusion

I analyze recent economic outcomes of villages formed by the land redistribution operated by the socialist regime in Tanzania in the early 1970s. Land tenure security is central to economic development, particularly in developing countries. Property rights to land brings the correct incentive to individuals and firms to make productive land investments and efficient resource use.

In many African countries, however, land tenure systems are complex. When individuals have heritable use rights, land transferability to outsiders are often not possible. In fact, land under customary law belongs to the community. The absence of functional land market undermines land enhancing investments and farmer productivity. Farm activity and production are then below the social optimum and land is not reallocated to the more efficient cultivators.

The villagisation operation in Tanzania during which eleven million peasants were removed from their old villages and concentrated to new settlements is used in this study to capture variation in land tenure and property rights associated with investments in land. The villagisation process and rural development approach, *ujamaa*, was implemented with unclear goals, haste, and at some point violent coercion that it was unlikely to bring short-term improvements in the rural economy. In fact, the villagisation settlement policies were highly criticized and blamed for undermining the economic progress of newly created communities. The reform however marked a shift on the land tenure system in the new villages as customary land rights where extinguished.

I hypothesize and test whether the emergence of land market and the security of land ownership were more likely to occur in these new villages relative to the non *ujamaa* villages. I show that farmers in villages formed by the villagisation are 9.94 percentage points more confident about their rights to sell their land than farmers in villages where the operation did not take place. The percentage points correspond to 14.5 percent increase in land transfer rights relative to comparison villages. I also determine 36.3 percent increase in access to a rural financial market in form of membership to self-help group. Females are also more involved in farming activities in *ujamaa* as 17.6 percent are more likely to own a plot. The difference in land rights also appears in form of farmer's agricultural investments, but not in farm's yield.

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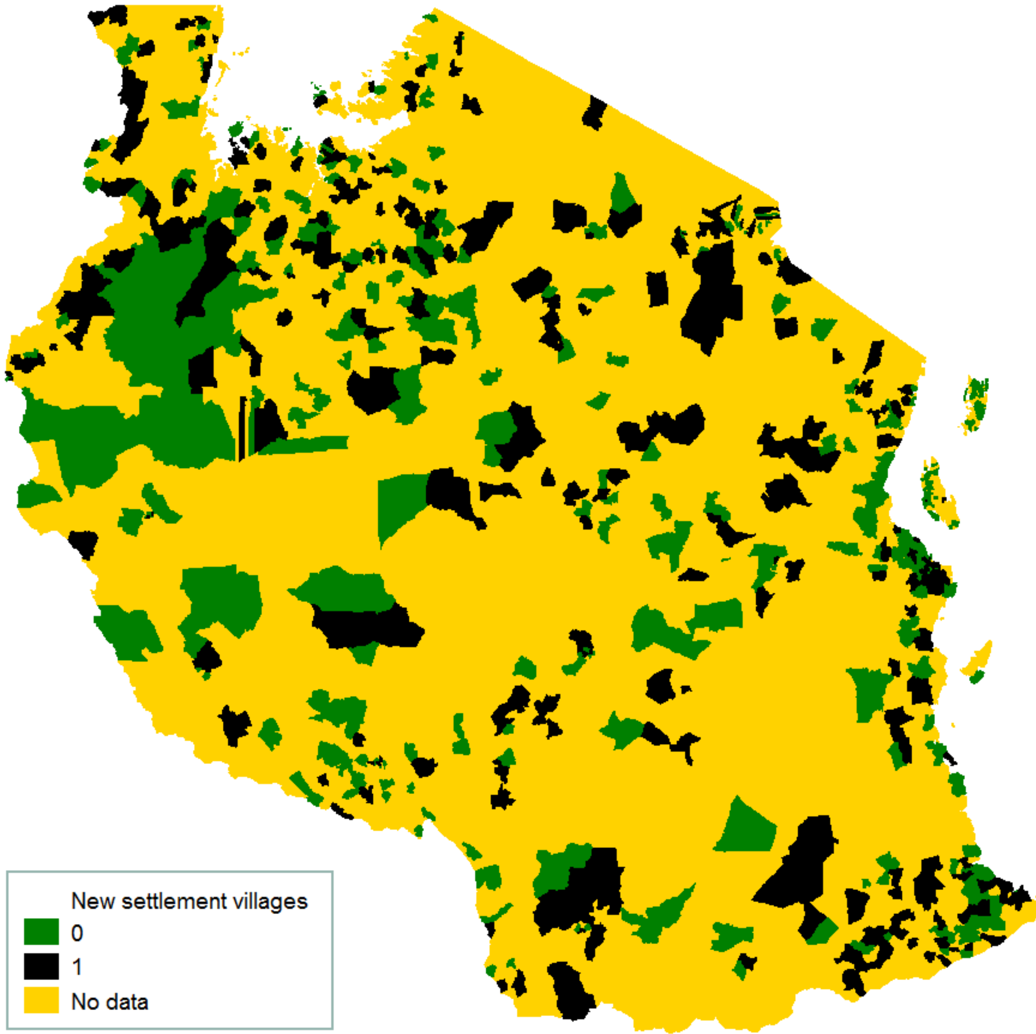
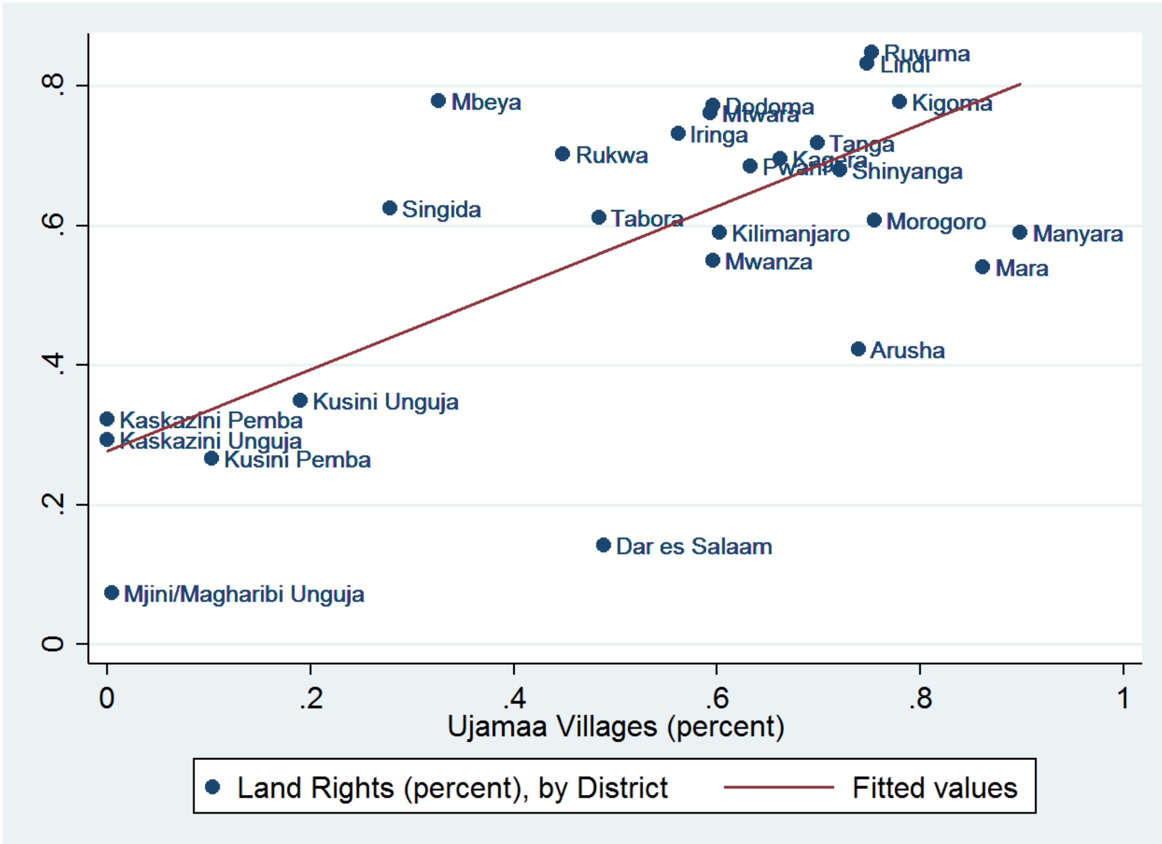
Figure 1. Village Land Formed by 1971 the Villagization Act in Tanzania



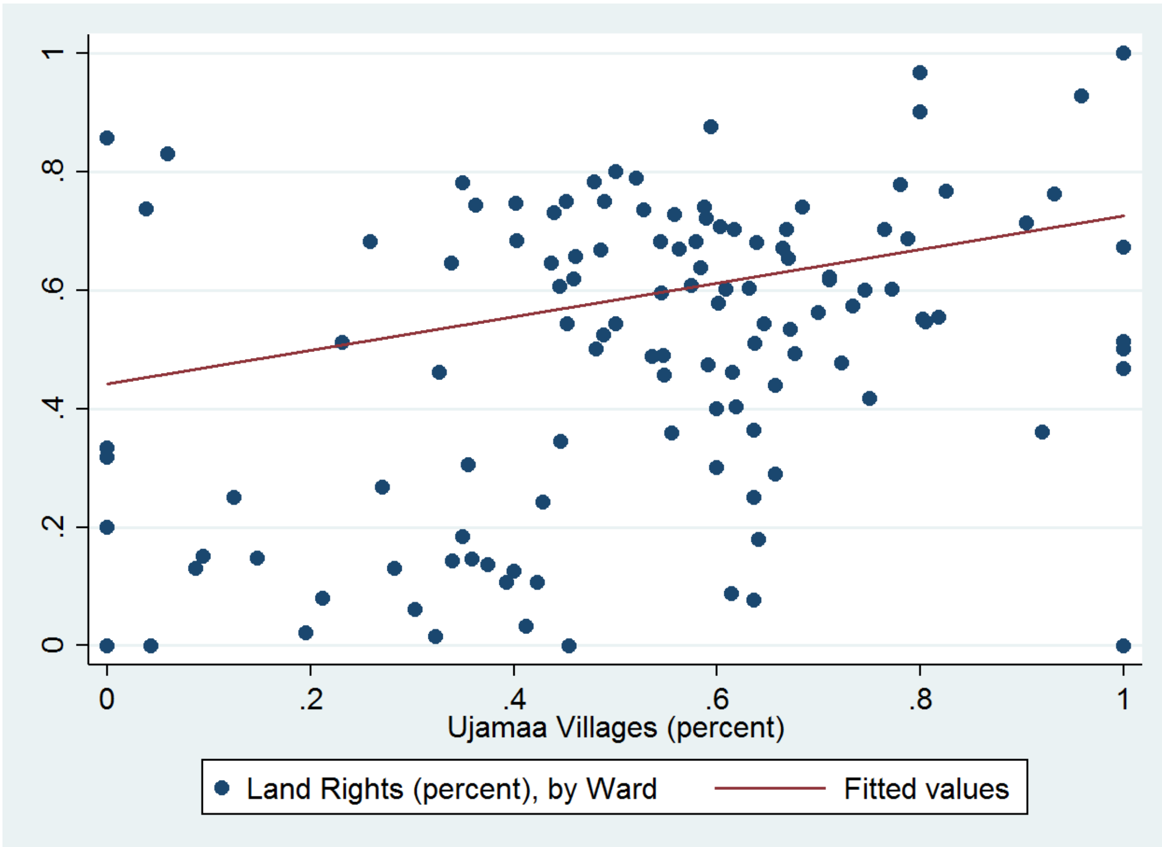
Source: Author's calculations from the Tanzania LSMS.

Figure 2. Land Tenure and Ujamaa Villages, By District



Notes: Author's calculations using working sample from all round surveys. Scatter plot of concentration of land rights and new formed villages (*ujamaa*) by district.

Figure 3. Land tenure and Ujamaa Villages, By Ward



Notes: Author's calculations using working sample from all round surveys. Scatter plot of concentration of land rights and new formed villages (*ujamaa*) by Ward.

Table 1. Summary Statistics, all round surveys combined

	(1) All	(2) Rural	(3) Urban	(4) Ujamaa	(5) Others	(6) Ujamaa rural	(7) Others rural	(8) means (6-7)	(9) p-value
Household Characteristics									
Schooling	0.735	0.727	0.757	0.757	0.689	0.752	0.678	0.074	0.000
	(0.441)	(0.445)	(0.429)	(0.429)	(0.463)	(0.432)	(0.467)		
Years of education	4.954	4.840	5.259	4.913	5.044	4.797	4.925	-0.127	0.101
	(3.763)	(3.707)	(3.893)	(3.498)	(4.278)	(3.396)	(4.257)		
Age	48.986	48.442	50.426	48.663	49.681	48.022	49.279	-1.256	0.000
	(15.405)	(15.408)	(15.307)	(15.493)	(15.193)	(15.467)	(15.258)		
Household size	5.795	5.927	5.445	5.744	5.903	5.878	6.024	-0.146	0.033
	(3.202)	(3.262)	(3.013)	(2.955)	(3.678)	(2.918)	(3.854)		
Access to credit	0.120	0.115	0.133	0.128	0.104	0.121	0.104	0.017	0.009
	(0.325)	(0.319)	(0.340)	(0.334)	(0.305)	(0.326)	(0.305)		
Education exp	0.110	0.093	0.156	0.122	0.084	0.101	0.076	0.025	0.000
	(0.364)	(0.307)	(0.482)	(0.388)	(0.307)	(0.339)	(0.226)		
Food exp	1.835	1.851	1.791	1.810	1.888	1.816	1.920	-0.104	0.000
	(1.415)	(1.472)	(1.249)	(1.313)	(1.612)	(1.327)	(1.724)		
Utilities exp	0.068	0.055	0.100	0.066	0.072	0.052	0.062	-0.010	0.000
	(0.110)	(0.080)	(0.160)	(0.113)	(0.103)	(0.079)	(0.081)		
Female owned plot	0.214	0.210	0.225	0.219	0.205	0.212	0.207	0.005	0.502
	(0.410)	(0.408)	(0.418)	(0.413)	(0.404)	(0.409)	(0.405)		
Plot Characteristics									
Plot size	0.959	0.899	1.119	1.045	0.776	0.986	0.727	0.258	0.000
	(3.058)	(1.820)	(5.032)	(3.582)	(1.346)	(2.058)	(1.196)		
Right to sell	0.707	0.704	0.716	0.749	0.617	0.750	0.612	0.137	0.000
	(0.455)	(0.457)	(0.451)	(0.434)	(0.486)	(0.433)	(0.487)		
Distance to home	4.389	3.342	7.161	4.533	4.078	3.696	2.638	1.058	0.000
	(19.745)	(13.344)	(30.668)	(19.825)	(19.568)	(15.751)	(6.169)		
Distance to road	2.223	2.155	2.402	2.208	2.255	2.171	2.123	0.048	0.571
	(4.495)	(4.086)	(5.428)	(4.796)	(3.769)	(4.487)	(3.141)		
Crop yield	1.476	1.170	2.287	1.484	1.458	1.020	1.467	-0.446	0.000
	(21.954)	(5.664)	(40.906)	(26.204)	(6.440)	(4.757)	(7.125)		
Rainfall	2.860	2.845	2.902	2.898	2.779	2.893	2.749	0.143	0.000
	(1.025)	(1.059)	(0.926)	(1.010)	(1.052)	(1.053)	(1.065)		
Tree planting	0.100	0.115	0.059	0.100	0.098	0.119	0.107	0.012	0.067
	(0.300)	(0.319)	(0.236)	(0.301)	(0.297)	(0.324)	(0.309)		
Plot Fallowed	0.113	0.109	0.125	0.125	0.090	0.125	0.078	0.047	0.000
	(0.317)	(0.312)	(0.331)	(0.330)	(0.286)	(0.331)	(0.267)		
Observations	13969	10141	3828	9538	4431	6748	3393		

Notes: The table shows the means with the standard deviations in parentheses of the variables used in this study. The sample has 1407 unique enumerative areas identified as affected by the *ujamaa* policy and 1564 others that were not. Columns 7 and 8 present the difference in means and the associated p-value between *ujamaa* villages and others in rural areas. *Schooling* is a dummy variable to indicate whether the household head ever attended school. *Years of education* is computed from grade completed by the respondent using the number of years required to complete a grade. *Age* represents the age of the respondent in years. Education, food and utilities expenses are scaled ($\times 10^{-6}$) and in Tanzania Shillings (real terms). *Female owned plot* indicates whether the gender of the plot owner is female. Distance from plot to home and closest road are in kilometer. *Plot size* is expressed in hectare. *Right to sell* is a dummy variable to indicate landowner tenancy over the plot. *Crop yield* indicates the value ($\times 10^{-5}$) of the plot's harvest per hectare in Tanzanian Shillings. *Tree planting* and *plot fallowed* are respectively dummies to indicate whether any trees have been planted or whether the plot or the plot has ever been left on fallow.

Table 2. Summary Statistics, for each round survey

	(1) All	(2) Rural	(3) Urban	(4) Ujamaa	(5) Others	(6) Ujamaa rural	(7) Others rural	(8) means (6-7)	(9) p-value
Panel A: 2008 round survey									
Right to sell	0.650	0.644	0.668	0.704	0.541	0.703	0.532	0.171	0.000
	(0.477)	(0.479)	(0.471)	(0.457)	(0.499)	(0.457)	(0.499)		
Plot size	0.949	0.883	1.124	1.045	0.754	0.986	0.687	0.299	0.000
	(3.991)	(2.073)	(6.811)	(4.783)	(1.282)	(2.449)	(1.003)		
Crop yield	2.072	1.501	3.566	2.094	2.026	1.137	2.193	-1.055	0.000
	(36.834)	(7.229)	(69.085)	(44.376)	(10.096)	(3.221)	(11.451)		
Observations	4806	3478	1328	3230	1576	2278	1200		
Panel B: 2010 round survey									
Right to sell	0.721	0.727	0.705	0.755	0.648	0.769	0.643	0.126	0.000
	(0.449)	(0.446)	(0.456)	(0.430)	(0.478)	(0.421)	(0.479)		
Plot size	0.931	0.874	1.079	0.996	0.790	0.939	0.747	0.191	0.000
	(2.268)	(1.417)	(3.652)	(2.582)	(1.360)	(1.494)	(1.243)		
Crop yield	1.544	1.363	2.017	1.555	1.518	1.323	1.442	-0.118	0.593
	(6.047)	(6.148)	(5.748)	(7.038)	(2.950)	(7.305)	(2.685)		
Observations	4730	3423	1307	3228	1502	2269	1154		
Panel C: 2012 round survey									
Right to sell	0.754	0.743	0.783	0.791	0.670	0.778	0.670	0.107	0.000
	(0.431)	(0.437)	(0.412)	(0.407)	(0.470)	(0.416)	(0.470)		
Plot size	1.001	0.944	1.156	1.095	0.787	1.034	0.752	0.282	0.000
	(2.589)	(1.905)	(3.877)	(2.959)	(1.403)	(2.115)	(1.340)		
Crop yield	0.758	0.610	1.160	0.770	0.730	0.588	0.658	-0.070	0.347
	(2.862)	(1.982)	(4.421)	(2.983)	(2.565)	(1.831)	(2.270)		
Observations	4433	3240	1193	3080	1353	2201	1039		

Notes: Sample means on selected plot characteristics are reported. Standard deviations are in parentheses. Each panel represents a specific round survey. *Right to sell* is a dummy variable to indicate landowner tenancy over the plot. *Plot size* is expressed in hectare. *Crop yield* indicates the value ($\times 10^{-5}$) of the plot's harvest per hectare in Tanzanian Shillings.

Table 3. Land Tenure and Ujamaa Policy

Right to sell land	All sample			Rural sample			Urban sample		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ujamaa	0.0960***	0.0955***	0.0914***	0.101***	0.100***	0.0994***	0.0772**	0.0798**	0.0647*
	(0.0181)	(0.0181)	(0.0178)	(0.0217)	(0.0217)	(0.0214)	(0.0336)	(0.0339)	(0.0334)
Plot quintile: 2	0.0425***	0.0435***	0.0446***	0.0509***	0.0511***	0.0524***	0.0204	0.0239	0.0237
	(0.0123)	(0.0123)	(0.0123)	(0.0143)	(0.0143)	(0.0143)	(0.0234)	(0.0234)	(0.0236)
3	0.0950***	0.0953***	0.0958***	0.0876***	0.0878***	0.0882***	0.119***	0.121***	0.119***
	(0.0170)	(0.0170)	(0.0170)	(0.0198)	(0.0198)	(0.0199)	(0.0323)	(0.0322)	(0.0321)
4	0.118***	0.119***	0.121***	0.110***	0.110***	0.111***	0.143***	0.145***	0.148***
	(0.0138)	(0.0138)	(0.0137)	(0.0163)	(0.0163)	(0.0163)	(0.0244)	(0.0240)	(0.0236)
5	0.190***	0.190***	0.192***	0.180***	0.180***	0.181***	0.217***	0.220***	0.218***
	(0.0148)	(0.0149)	(0.0148)	(0.0177)	(0.0177)	(0.0177)	(0.0256)	(0.0255)	(0.0253)
Age quintile: 2	0.0306	0.0296	0.0274	0.0139	0.0132	0.0116	0.0753**	0.0741**	0.0762**
	(0.0188)	(0.0187)	(0.0188)	(0.0215)	(0.0215)	(0.0215)	(0.0376)	(0.0374)	(0.0379)
3	0.0396**	0.0391**	0.0387**	0.0230	0.0230	0.0221	0.0795**	0.0782**	0.0808**
	(0.0185)	(0.0185)	(0.0184)	(0.0212)	(0.0212)	(0.0211)	(0.0359)	(0.0358)	(0.0361)
4	0.0461**	0.0448**	0.0422**	0.0213	0.0208	0.0183	0.0930**	0.0901**	0.0906**
	(0.0198)	(0.0198)	(0.0196)	(0.0233)	(0.0232)	(0.0231)	(0.0374)	(0.0373)	(0.0369)
5	0.0850***	0.0838***	0.0871***	0.0690***	0.0689***	0.0716***	0.113***	0.110***	0.118***
	(0.0194)	(0.0194)	(0.0192)	(0.0228)	(0.0227)	(0.0226)	(0.0368)	(0.0366)	(0.0362)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Crop fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ward fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Ward-year trend	No	No	Yes	No	No	Yes	No	No	Yes
Observations	13969	13969	13969	10141	10141	10141	3828	3828	3828
R-squared	0.124	0.124	0.137	0.134	0.134	0.146	0.174	0.178	0.203

Standard errors in brackets, clustered at the ward level.
* significant at 10%; ** significant at 5%, *** significant at 1%.
Notes: The dependent variable is the farmer's *right to sell* his land. Columns 1-3 have no restrictions on the sample size. Columns 4-6 and 7-9 are restricted to rural and urban areas, respectively. The omitted age category is the 1st quintile. The omitted plot size category is the 1st quintile. The controls variables include household head schooling, household size, distance from plot to home, distance from plot to nearest road, soil type indicators, and rainfall indicators. In each regression, I control for crop fixed effects, ward fixed effects, year fixed effects and ward-year trend.

Table 4. Land Tenure and Ujamaa Policy, Interaction

Right to sell land	(1)	(2)	(3)
Ujamaa	0.115***	0.0994***	0.141***
	(0.0219)	(0.0214)	(0.0295)
Plot quintile: 2		0.0524***	0.0910***
		(0.0143)	(0.0237)
3		0.0882***	0.112***
		(0.0199)	(0.0343)
4		0.111***	0.123***
		(0.0163)	(0.0303)
5		0.181***	0.256***
		(0.0177)	(0.0325)
Ujamaa×plot quintile(2)			-0.0637**
			(0.0299)
Ujamaa×plot quintile(3)			-0.0408
			(0.0417)
Ujamaa×plot quintile(4)			-0.0240
			(0.0358)
Ujamaa×plot quintile(5)			-0.107***
			(0.0393)
Controls	Yes	Yes	Yes
Crop fixed effects	Yes	Yes	Yes
Ward fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Ward-year trend	Yes	Yes	Yes
Observations	10141	10141	10141
R-squared	0.131	0.146	0.147

Standard errors in brackets, clustered at the ward level.
* significant at 10%; ** significant at 5%, *** significant at 1%.
Notes: The dependent variable is the farmer's *right to sell* land. The omitted age category is the 1st quintile. The omitted plot size category is the 1st quintile. The controls variables include household head schooling, household size, distance from plot to home, distance from plot to nearest road, soil type indicators, rainfall indicators, and age quintiles. Column 2 is similar to column 6 of table 3. Each regression includes crop fixed effects, ward fixed effects, year fixed effects, and ward year linear trend.

Table 5. Credit Opportunity and Gender difference

	(1) Rural credit access	(2) Female owned plot	(3) Rural credit access	(4) Female owned plot
Ujamaa	0.0402***	0.0369**	0.0618***	0.0523*
	(0.0155)	(0.0186)	(0.0221)	(0.0279)
Plot quintile: 2	0.0103	-0.0304**	0.0437**	-0.0257
	(0.0122)	(0.0139)	(0.0192)	(0.0220)
3	0.0362**	-0.0492***	0.0508*	-0.0969***
	(0.0166)	(0.0186)	(0.0280)	(0.0324)
4	0.0199	-0.0848***	0.0295	-0.0498
	(0.0151)	(0.0166)	(0.0226)	(0.0304)
5	0.00548	-0.103***	0.00973	-0.0647**
	(0.0174)	(0.0178)	(0.0267)	(0.0309)
Age quintile: 2	0.0480***	0.0863***	0.0489***	0.0879***
	(0.0184)	(0.0204)	(0.0187)	(0.0204)
3	0.106***	0.142***	0.107***	0.144***
	(0.0224)	(0.0226)	(0.0225)	(0.0225)
4	0.0874***	0.160***	0.0884***	0.162***
	(0.0226)	(0.0248)	(0.0227)	(0.0248)
5	0.0736***	0.161***	0.0740***	0.162***
	(0.0211)	(0.0255)	(0.0211)	(0.0254)
Ujamaa×plot quintile(2)			-0.0536**	-0.00876
			(0.0247)	(0.0286)
Ujamaa×plot quintile(3)			-0.0246	0.0662*
			(0.0347)	(0.0390)
Ujamaa×plot quintile(4)			-0.0177	-0.0508
			(0.0288)	(0.0364)
Ujamaa×plot quintile(5)			-0.0111	-0.0529
			(0.0327)	(0.0393)
Controls	Yes	Yes	Yes	Yes
Crop fixed effects	Yes	Yes	Yes	Yes
Ward fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Ward-year trend	Yes	Yes	Yes	Yes
Observations	10141	10141	10141	10141
R-squared	0.099	0.174	0.100	0.175

Standard errors in brackets, clustered at the ward level.
* significant at 10%; ** significant at 5%, *** significant at 1%.
Notes: The dependent variable under *credit access* is a dummy variable to denote farmer's household access to rural credit. In column 4-6, the dependent variable *female owned plot* indicates whether the owner of the plot is female. The omitted age category is the 1st quintile. The omitted plot size category is the 1st quintile. The controls variables include household head schooling, household size, distance from plot to home, distance from plot to nearest road, soil type indicators, and rainfall indicators. Each regression includes crop fixed effects, ward fixed effects, year fixed effects, and ward-year trend.

Table 6. Land Investments and Ujamaa Policy

	(1) Tree planting	(2) Plot fallowed	(3) Improved seeds	(4) Tree planting	(5) Plot fallowed	(6) Improved seeds
Ujamaa	0.0277**	0.0449***	0.219***	0.0445**	0.0694***	0.179***
	(0.0136)	(0.00987)	(0.0428)	(0.0181)	(0.0156)	(0.0577)
Plot quintile: 2	-0.0182*	-0.00103	-0.00812	-0.00632	0.00813	-0.0444*
	(0.00948)	(0.00866)	(0.0181)	(0.0145)	(0.0116)	(0.0253)
3	-0.00178	0.00137	-0.0417	0.00908	0.0229	-0.0433
	(0.0152)	(0.0133)	(0.0255)	(0.0259)	(0.0193)	(0.0417)
4	-0.0196*	0.00485	-0.0312	-0.00329	0.0380**	-0.0664
	(0.0114)	(0.0111)	(0.0261)	(0.0175)	(0.0164)	(0.0406)
5	-0.0202	0.000403	-0.0111	0.000826	0.0298	-0.0648
	(0.0136)	(0.0129)	(0.0323)	(0.0217)	(0.0206)	(0.0580)
Age quintile: 2	0.0130	-0.000433	0.0277	0.0140	0.00125	0.0252
	(0.0117)	(0.0124)	(0.0267)	(0.0117)	(0.0124)	(0.0266)
3	0.0372***	-0.0209*	0.00366	0.0381***	-0.0194	0.00156
	(0.0129)	(0.0119)	(0.0312)	(0.0129)	(0.0119)	(0.0309)
4	0.0299**	-0.00516	0.0336	0.0307**	-0.00389	0.0314
	(0.0132)	(0.0135)	(0.0306)	(0.0132)	(0.0134)	(0.0305)
5	0.0286**	-0.00616	0.0384	0.0292**	-0.00537	0.037
	(0.0137)	(0.0123)	(0.0311)	(0.0137)	(0.0123)	(0.0310)
Ujamaa×plot quintile(2)				-0.0202	-0.0169	0.0604*
				(0.0191)	(0.0166)	(0.0344)
Ujamaa×plot quintile(3)				-0.0184	-0.0349	0.00918
				(0.0321)	(0.0258)	(0.0524)
Ujamaa×plot quintile(4)				-0.0260	-0.0510**	0.0571
				(0.0227)	(0.0215)	(0.0493)
Ujamaa×plot quintile(5)				-0.0319	-0.0448*	0.0806
				(0.0272)	(0.0256)	(0.0674)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Ward fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Ward-year trend	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10141	10141	10141	10141	10141	10141
R-squared	0.080	0.040	0.256	0.080	0.041	0.257

Standard errors in brackets, clustered at the ward level.
* significant at 10%; ** significant at 5%, *** significant at 1%.
Notes: The outcome variable of column 1 *tree planting* is a dummy that indicates whether any trees have been planted on the plot. In column 3, the dependent variable *plot fallowed* is a dummy to indicate whether the land has ever been left fallowed. The dependent variable in column 4 *improved seeds* is a dummy to indicate whether improved seed for maize could be purchased in the village. The omitted category for age is the 1st quintile. The omitted category for plot size is the 1st quintile. The controls variables include household head schooling, household size, distance from plot to home, distance from plot to nearest road, soil type indicators, and rainfall indicators. Each regression is estimated with ward fixed effects, year fixed effects, and ward-year trend.

Table 7. Plot Output per Hectare and Ujamaa Policy

	Crop yield per hectare		
	(1)	(2)	(3)
Ujamaa	-0.249*	-0.136	-0.134
	(0.128)	(0.119)	(0.122)
Plot quintile: 2		-0.953***	-0.950***
		(0.182)	(0.183)
3		-0.891***	-0.891***
		(0.164)	(0.165)
4		-0.910***	-0.908***
		(0.161)	(0.159)
5		-1.274***	-1.272***
		(0.163)	(0.164)
Age quintile: 2			0.0709
			(0.112)
3			0.0815
			(0.173)
4			0.169
			(0.225)
5			0.363
			(0.282)
Controls	Yes	Yes	Yes
Crop fixed effects	Yes	Yes	Yes
Ward fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Crop-year fixed effects	Yes	Yes	Yes
Ward-year trend	Yes	Yes	Yes
Observations	10141	10141	10141
R-squared	0.217	0.222	0.222

Standard errors in brackets, clustered at the ward level.
* significant at 10%; ** significant at 5%, *** significant at 1%.
Notes: The dependent variable *crop yield* indicates the value ($\times 10^{-5}$) of the plot's harvest per hectare in Tanzanian Shillings. *Ujamaa* is a dummy that indicates whether the village was formed by the villagisation operation. The omitted plot size category is the 1st quintile. The omitted age category is the 1st quintile. The controls variables include the head schooling, household size, distance from plot to home, distance from plot to nearest road, rainfall indicators, and soil type indicators. Additional controls are household level effects such as age and years of education. I control also for demographics variables as defined in Benjamin (1992). Each regression includes crop fixed effects, ward fixed effects, year fixed effects, crop-year fixed effects and control for ward-year linear trend.

Table 8. Plot Output per Hectare and Ujamaa Policy, Interaction

	Crop yield per hectare		
	(1)	(2)	(3)
Plot size	-0.115***	-0.112***	-0.262***
	(0.0270)	(0.0263)	(0.0730)
Ujamaa		-0.215	-0.358**
		(0.131)	(0.171)
Ujamaa×plot size			0.172**
			(0.0747)
Controls	Yes	Yes	Yes
Crop fixed effects	Yes	Yes	Yes
Ward fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Crop-year fixed effects	Yes	Yes	Yes
Ward-year trend	Yes	Yes	Yes
Observations	10141	10141	10141
R-squared	0.218	0.218	0.218

Standard errors in brackets, clustered at the ward level.
* significant at 10%; ** significant at 5%, *** significant at 1%.
Notes: The dependent variable *crop yield* indicates the value ($\times 10^{-5}$) of the plot's harvest per hectare in Tanzanian Shillings. *Plot size* is expressed in hectare. *Ujamaa* is a dummy that indicates whether the village was formed by the villagisation operation. The controls variables include the head schooling, household size, distance from plot to home, distance from plot to nearest road, rainfall indicators, soil type indicators, indicators for plot slope, and age quintiles. Additional controls are household level effects such as age and years of education. Demographic variables such as prime age males and females are between 16 and 55 years old, whereas elderly males and females are over 55 years old. I also include crop fixed effects, ward fixed effects, year fixed effects, crop-year fixed effects and control for ward-year linear trend to each regression. In another specification I add ward-crop-year fixed effects (not shown), the results are qualitatively similar.

Table 9. Robustness Check

	(1) Right to sell land	(2) Rural credit access	(3) Female owned plot	(4) Tree planting	(5) Plot fallowed	(6) Improved seeds	(7) Crop yield
Not Ujamaa	-0.000825	-0.00743	0.00986	-0.0166	0.000496	0.0460	0.147
	(0.0313)	(0.0205)	(0.0313)	(0.0149)	(0.00864)	(0.0580)	(0.127)
Plot quintile: 2	0.0724***	0.0502***	-0.0304	-0.00535	0.000745	-0.0224	-1.156***
	(0.0224)	(0.0191)	(0.0226)	(0.0147)	(0.00897)	(0.0201)	(0.344)
3	0.0706**	0.0545**	-0.0956***	-0.00485	0.0256**	-0.0212	-1.270***
	(0.0336)	(0.0267)	(0.0332)	(0.0252)	(0.0109)	(0.0331)	(0.402)
4	0.0874***	0.0425*	-0.0639**	0.00676	0.0173	-0.0466	-1.089***
	(0.0289)	(0.0223)	(0.0309)	(0.0173)	(0.0106)	(0.0341)	(0.216)
5	0.198***	0.0442*	-0.0903***	0.0277	0.0217	-0.0837*	-1.529***
	(0.0294)	(0.0235)	(0.0301)	(0.0207)	(0.0141)	(0.0455)	(0.290)
Age quintile: 2	0.00984	-0.00219	0.0150	-0.00183	0.0282*	0.0444	-0.197
	(0.0344)	(0.0297)	(0.0348)	(0.0180)	(0.0144)	(0.0318)	(0.210)
3	0.0581*	0.104***	0.0987**	0.00202	0.0143	0.0179	0.136
	(0.0326)	(0.0362)	(0.0419)	(0.0186)	(0.0134)	(0.0382)	(0.412)
4	0.00880	0.0595	0.0950**	-0.000733	0.0125	-0.0311	-0.176
	(0.0421)	(0.0430)	(0.0422)	(0.0193)	(0.0143)	(0.0387)	(0.251)
5	0.0310	0.0371	0.0933**	0.00578	0.0117	-0.00152	0.248
	(0.0384)	(0.0368)	(0.0429)	(0.0220)	(0.0146)	(0.0438)	(0.277)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Crop fixed effects	Yes	Yes	Yes	No	No	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ward fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ward-year trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3393	3393	3393	3393	3393	3393	3393
R-squared	0.255	0.170	0.185	0.182	0.581	0.446	0.170

Standard errors in brackets, clustered at the ward level.
* significant at 10%; ** significant at 5%, *** significant at 1%.
Notes: The outcome variables from columns 1-9 are as previously defined. The variable *Not Ujamaa* represents a randomly assigned status of *Ujamaa* to villages that were not affected by the villagisation settlement policy. The covariates include he head schooling, household size, distance from plot to home, distance from plot to nearest road, rainfall indicators, and soil type indicators. Demographic variables and indicators for plot slope are added in column 7.