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The effects of land titling in Tanzania

Jehovaness Aikaeli,¹ and Thomas Markussen²

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Abstract: We use household survey data to investigate the effects of formal, private property rights to agricultural land on agricultural investment, land valuation and access to credit in Tanzania. Results show that while there are no detectable effects of formal, private land property rights (written documentation of ownership) on agricultural investment, land ownership documents nevertheless increase the market value of land substantially (more than 25 percent). One reason appears to be that well-documented private property rights facilitate the use of land as collateral for loans and therefore eases access to credit. The findings suggest that there are potentially significant, economic returns to systematic land titling in Tanzania and other countries, although more research is needed to firmly establish this conclusion.

Keywords: property rights, land titling, agriculture, investment, credit, Tanzania.

JEL classification: O12, O13, P26, Q15

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1 Introduction

Institutions are potentially important drivers of economic development (North 1990, Acemoglu and Robinson 2005). An essential type of institution is property rights, and in economies dominated by agriculture, property rights to agricultural land are a particular concern. A number of studies from different parts of the world have documented positive effects of strengthened, private land property rights on investment. The most striking results are the ones relating to the move from collective to household farming in East Asia (e.g. Lin 1991 and Jacoby, Li and Rozelle 2008 on China; Pingali and Xuan 1992 on Vietnam; summary in Rozelle and Swinnen 2002), but positive effects are also documented in a number of other contexts (e.g. Onshan 1987; Alston et al. 1996; Jacoby and Mansuri 2008; and Markussen 2008). Results for Africa are more ambiguous than for other regions of the world. Some studies do report positive effects of strengthened, private land property rights on investment (e.g. Besley 1995; Fenske 2011; Deininger and Jin 2006) but others find no impact (e.g. Pinckney and Kimuyu 1994; Sjaastad and Bromley 1997; Place and Migot-Adholla 1998; Braselle et al. 2002). In some cases, it is even argued that there are negative effects of private property rights (Baland and Francois 2007). First, a system of communal land rights, where chiefs distribute user rights among villagers, potentially acts as a social safety net, ensuring that all households have access to at least a minimal amount of land. Second, when rainfall is scarce and volatile, common property rights may under some circumstances be more efficient than private property rights. For example, if area A receives much more rain than area B in season 1, while area B receives much more rain in season 2, it might be efficient that all herders in both areas A and B take their animals to area A in season 1 and to area B in season 2. In principle, such arrangements could be negotiated through land rental agreements, but at early stages of development, land rental markets may not function well.

Land property rights may be protected in different ways. In some cases, traditional, informal institutions are quite effective (Sjaastad and Bromley 1997). In other cases, physical markers or barriers, such as trees, hedges or fences, are important. For example, Hornbeck (2008) documents the importance of the spread of barbed wire for property rights security on the U.S. frontier in the 19th century. However, in most advanced economies and in many developing economies, the primary means for defining and protecting land rights is land titles, accompanied by a detailed, cadastral information system.

It seems reasonable to assume that in any market economy, it does *at some point* become important to implement such a system. The question, is *when*? Most countries, including Tanzania, have some form of ‘sporadic’, or demand-based, land titling system, i.e. a system where citizens can apply for titles on their own initiative. However, in many cases it is prohibitively expensive for ordinary households to use such a system and titling rates therefore remain low (Ali et al. 2016). The unit cost of land titling can be dramatically reduced if a ‘systematic’, or supply-based, land titling program is implemented, i.e. a program that measures and titles all or most land plots in a given area at the same time. But even if systematic land titling is more efficient than sporadic titling, a comprehensive, systematic land measurement- and titling process is still enormously expensive, and public funds are scarce. It is conceivable that while comprehensive land titling is important in the long run, it might not be a *binding* constraint to the growth of economies at early stages of development, cf. Hausman, Rodrik and Velasco (2006).

Using the case of Tanzania, this paper investigates the effects of formal land ownership documentation in the agricultural sector of a poor, developing country. Evidence on these effects is essential for

debates about whether countries such as Tanzania should engage in comprehensive, systematic land titling soon, or they can postpone such efforts by several decades without significant cost. While a system for sporadic land titling exists in Tanzania, only very limited efforts at systematic land titling have been undertaken. Sporadic titling is highly expensive and the result is that very few agricultural plots are held with genuine titles. However, we exploit the fact that a significant share of plots (about 16 per cent) *are* held with at least some type of formal, written documentation of ownership, such as a letter of allocation from the local government, an inheritance letter or a government-certified purchase agreement. For some practical purposes, these documents are likely to serve the same function as genuine land titles although there are exceptions. For example, local governments and some credit providers typically acknowledge these documents as proof of ownership. Since the documents are not registered with the Lands Office, they cannot be formally locked as collateral, and formal financial institutions, such as banks, will therefore in general not extend loans on the basis of such documents. On the other hand, informal lenders may view various types of ownership documentation as sufficient for accepting a plot of land as collateral. On this basis, we investigate differences between plots held with written documentation of ownership, and other plots, and between households with at least one plot held with a document, and other households.

In particular, using the 2012-13 wave of the Tanzania National Panel Survey, we describe the distribution of ownership documents across rural and urban areas, and across socioeconomic groups. We then investigate the effects of land ownership documents on land values, plot-specific investment and access to land and credit markets. Our primary means to addressing identification issues is to use village and household fixed effects in regression analyses.

Results show that land ownership documents are more common in urban than in rural areas, and more common among rich and educated households than among others. We find little effect of land ownership documents on plot-specific investment, such as soil and water conservation infrastructure, perennial crops, or fallowing. Nevertheless, we find that households in both rural and urban areas report significantly higher land values per acre for plots with ownership documents than for other plots. A plausible reason is that ownership documents facilitate land sales and the use of land as collateral for informal loans. We show that a written ownership document increases the likelihood that households have the right to sell a plot, or use it as collateral, and that households with at least one plot held with ownership documents are more likely than other households to have taken out an informal, commercial loan (i.e. a loan with a positive interest rate).

While more research is needed to fully understand these correlations, the results are consistent with the view that land titling has significant, positive effects on the functioning of credit markets and agricultural land markets, already at the present stage of development in Tanzania. Therefore, systematic land titling is potentially a promising investment and the findings should encourage more investigations, both in Tanzania and in other countries, about the costs and benefits related to implementing such programs.

2 Theoretical perspective

This section briefly summarizes the theoretical arguments in Besley (1995) about the effects of land property rights on investment. We use this discussion to structure the empirical investigation presented below.

Property rights may affect investment through three separate channels: (1) the ‘assurance effect’; (2) credit markets; and (3) land markets. The assurance effect is driven by the simple fact that expected returns to investment are higher when investors are certain that they will be able to collect the benefits

from the investment than if they fear confiscation. Hence, the assurance effect implies that strengthening property rights to a specific plot of land should encourage investment on that particular plot. For example, a household is more likely to plant a fruit tree, which is expected to yield harvests for many years into the future, if they are confident that they will get to keep the plot, than if they fear losing it. One complicating factor is that property rights may be endogenous to some forms of investment. For example, tree planting might be a way to strengthen a household's claim to a plot of land (Besley 1995). In that sense, investment and land titles may be *substitutes*, rather than complements, and a negative correlation between titling and investment may result.

Property rights may facilitate access to credit, and thereby spur investment, because strong property rights make it easier to use land as collateral for loans. Both formal and informal lenders may require collateral, and the ability to document exclusive ownership, including transfer rights, is essential for allowing a plot of land to be accepted as collateral. Note that loans obtained by using a specific plot as collateral are not necessarily used to finance investment on *that* plot. The loan might be used to finance investment on other plots, or investment in a non-agricultural enterprise or agricultural assets that are not tied to the land (e.g. machinery). It may of course also be used to finance consumption. The important point is that if the credit market is the most important link between land property rights and investment, we may not see a close link between land titling and investment on the specific plots, which are titled.

Stronger property rights also facilitate the functioning of land markets. The reason is simply that well-documented property rights reduce the risk, from would-be buyers' point of view, that third parties make claims to a plot of land after a purchase agreement has been completed. Well-functioning land markets in turn facilitate investment for two reasons. First, such markets allocate land to those who can use it most efficiently. Second, access to markets reassures investors that they will be able to harvest the gains from investment. For example, if a farmer falls ill and therefore loses the ability to harvest his mango trees, his investment in mango trees may be lost, unless he is able to sell his land, which is more valuable because it is planted with fruits trees. Note that the market channel implies a link between property rights and plot-specific investment (i.e. higher investment on the plot with stronger property rights, rather than other plots owned by the same household).

3 Background

3.1 Land tenure in Tanzania

The Tanzania land tenure system has a long historical background as it dates back to the pre-colonial period before the 1880s when different tribes had their own ways of accessing, owning, controlling and disposing of land. All over the country, land was communally owned and allocated to the people for use, not hoarding. In case of any disputes, the clan and tribe elders were vested with powers to resolve the matter using customary mechanisms (Komu, 2003). Tribal chiefs administered the land on behalf of their chiefdoms' subjects, and would allocate it to those in need for farming and grazing purposes. The customary tenure system was practiced for a long period before colonialism. With the German colonial system in the second half of the 1880s, the land ownership system changed as a decree was signed in 1886 to shift land ownership of the then Tanganyika¹ territory from communities to the German Emperor. All land of Tanganyika, whether it was occupied, used, unoccupied or unused, was declared to be under colonial rule. The German colonial government had most interest in urban land and in

¹ Tanganyika was the name of today's Tanzania Mainland before it was unified with Zanzibar in 1964 to form the current Tanzania.

arable plots suitable for cash crops production. Following the defeat of Germany in the First World War, the British colonial government took over the Tanzania mainland as its protectorate. Land ownership in Tanganyika was thus put under the Governor on behalf of the queen and Land Act No. 3 (1923) was enacted to organize the dual land tenure system. This system provided for both rights of occupancy and customary tenure. During the British colonial era, some amount of land was withdrawn from the communities for large scale imperial settlers' farming and state-owned companies.

After independence in 1961, traditional chiefdom systems were abandoned for the powerful national government to preside. An important land reform Act was the Nyarubanja Land Tenure Act No.1 of 1965 which was enacted to enfranchise the land held under the Nyarubanja tenure system in the West Lake region (URT, 1965). This Act allowed some individuals to own land analogous to the modern market system. There were three variants of land ownership in the country: (i) communal/village land; (ii) group/family land; and (iii) the land for allocation to individuals or groups for their own different uses. This was the arrangement until the Arusha Declaration in 1967 when the major means of production, including land, were nationalized. The government became the sole owner of land and all other users would hire land for some specified periods. In 1972, the government announced a resettlement plan to move people from their traditional settlements to locate them in isolated pockets for creation of large villages as a part of a new rural development strategy. This entailed moving millions of people into new areas in a relatively short time. Ever since that initiative, which was referred to as *vijiji vya ujamaa* in Kiswahili, or socialist villagization program, there have been a number of debates on how the state allocated land, in most instances contrary to the people's wish. The program's stated objective was to facilitate the provision of essential social infrastructure in rural areas, including water, medical services, and primary education. Nevertheless, whether large settlements were a prerequisite for the provision of such facilities, and whether Tanzania had the resources to provide them are still debatable questions to date. Masses were alienated from their traditionally owned land and placed in new locations. The rural land was entitled to the villages and the users had to continue with their respective customary ownership under the encompassing village right.

The villagization program ended in 1985, and the broader *Ujamaa* (socialist) economic policy orientation was de facto abandoned as a consequence of the collapse of communism in Eastern Europe and the Soviet Union in the late 1980s and early 1990s. Nevertheless, land formally remains nationalized. Private users acquire land on 33-year, 66-year, or 99-year leases, which may be renewed on expiry. Thus, even a formal title only protects a time limited lease, although the long duration of leases and the possibility of renewal means that the practical difference between the current system and full, private ownership is limited.

In terms of land held with informal rights, even though the Law provides for the customary right of occupancy of villages, the customary legal power of traditional village authorities is either non-existent or continuously being diluted and polarized as a result of migration and urbanization. This means that the customarily owned land is the most vulnerable and unprotected form of tenure in Tanzania. Land held under customary land tenure is more exposed to land conflict than other types of, such as titled, urban land. The customary right of land occupancy is characterized by a number of weaknesses, including: (a) owners' inability to use their rights to access formal credit (except during the first decade of independence when one could mortgage rural land and obtain house loan from the now defunct Tanzania Housing Bank); (b) gender bias as women may be discriminated since they are not entitled land in most of the communities; (c) customary owners are susceptible to the government revoking use rights; and so forth (Shivji, 1994). Further, migration and erosion of traditions have reduced the strength of customary tenure and urbanization has changed customary ownership in several places. These are among the several issues that have surrounded customary land tenure in the country leading to weak legal ownership and protection. One consequence is that land-related conflicts are common.

3.2 Land conflicts in Tanzania

Like in most other developing countries, there have been many land disputes resulting from unclear ownership rights in Tanzania. Litigation of land cases overwhelm courts, take long time, and halt economic activities and social relations. During colonial rule, land conflicts were common since the natives struggled to reclaim land ownership and use rights. Among the most notable uprisings in colonial Tanganyika was the *maji maji*² war in southern parts of the country between 1905 and 1907. One of the main aims of this uprising against German colonial rule was to reclaim fertile land that had been grabbed by the colonial masters for agricultural use.

Even after independence, proper reorganization of land ownership has not been possible. Widespread protests resulted from the villagization program of the 1970s. Arguably, the program did not adequately take into account the needs of pastoral communities, and this turned out to be a source of conflict between the parastatal organizations that were established across the country and pastoralists. Among the land conflicts that have been cited is one between the National Agriculture and Food Corporation (NAFCO) and the Barbaig agro-pastoralists in the Hanang District (Shivji, 1996).

In 1992 the Presidential Commission was formed to probe the land disputes in the country. The commission's report shows that the genesis of land conflicts was the villagization programme of the 1970s, and that to resolve the matter it was necessary to settle land dispute in the judicial system. Further, the Land Policy of 1995 underscores the reason for issuance of village land certificates to the owners and also restoration of tenure that provides for ranch lands for the pastoralists. Nevertheless, it has not been possible to implement these recommendations since the nomadic pastoralist communities demand vast grazing areas amid widening demands from a variety of other land users as population growth pressure mounts.³

Aikaeli and Laseko (2015) explain the tense land conflicts in several places in the country at the present as a result of informality and lack of a proper land titling system. Incidences of conflicts between individuals and between groups due to scramble for land in the recent past have taken place in both urban and rural areas. In urban areas land conflicts are mostly a result of inaccurate information in the registration records of surveyed areas; corrupt allocation of some plots to more than one owner; arbitrary changes of land use for other purposes than the predetermined ones, e.g., the reallocation of open spaces to construction; lack of transparency and the existence of elements of corruption in the registration process; etc. There have been more conflicts in rural than in urban areas owing to a number of factors, but the most common conflicts have been between livestock keepers and crops farmers; and between investors' in natural resource extraction and individuals and societies engaged in farming activities. Areas where land conflicts were severe include Loliondo (regarding land use for farming versus natural resource extraction), Tarime, Kilindi, Kilosa, Kiteto, Usangu plains, Mahenge, Mbarali, Hanang, and Kilombero, *inter alia*. Land conflicts in Tanzania have been caused by lack of clear allocation of ownership rights, and those conflicts have compromised peace and security in the

² *Maji maji*, Swahili connotation which loosely stood for 'magic water', was bathed with belief that it could protect warriors from the bullets in the battle field.

³ One important example of a land dispute between civilians and the state is the Tanzania Court of Appeal case of *Lekengere Faru Paratu Kamunyu and 52 Other Maasai versus the Minister for Tourism, Natural Resources and Development and 3 others* regarding the Maasai pastoralist eviction from land they used under customary right of occupancy for a long period of time in Mkomazi Game Reserve. The Maasai were forcefully evicted, their homesteads and dwellings burnt, livestock and property destroyed. The Maasai claimed that the government had encroached on their land for game reserve purpose. It is as yet disputed whether the Maasai pastoralists had in fact existed in that area prior to the creation of the game reserve, but it seems likely that if the land ownership system had been well set and formalized, conflicts such as this one would not happen.

concerned areas. In some places incidences of deaths, destruction of valuable property and increased enmity among the people were noted.

The existing land related state of insecurity, uncertainty and inadequacies in land ownership rights especially in the rural areas exert pressure on the development process and suggests that the establishment of proper land ownership system and database would be beneficial. Because security of title ensures the owner an entitled long-term right, it encourages development of landed property, as discussed in the theory section above.

3.3 Land titling status in Tanzania

Tanzania has the legal framework for facilitation of land registration and titling, but in practice, titling has mostly taken place in urban areas. Even in urban areas, quite a number of land parcels are not assigned title deeds. Hence, most land in Tanzania is not titled. Land transfers are mostly conducted orally, especially in rural areas. Land is demarcated customarily. In most cases, landowners use some types of plants that are accepted as traditional *border plants* in a given society to show the boundaries.

The land market in Tanzania is not vibrant, arguably in part due to ownership informality. Land cannot be collateralized to create value for leveraging financial opportunities; one can only realize monetary value of untitled land when he/she sells it (cf. the theoretical discussion above). In some areas the individuals own land under the umbrella of their clans, and are required to sell land only to the other members of the same clan, except in cases with no demand from clan members.

From the formal view, the Land Act No. 4. of 1999 provides for the right of occupancy of land to: (i) citizens aged 18 and above. This could be an individual, a group of two or more citizens whether formed together in an association under the Land Act or any other; and (ii) foreign citizens, who are given derived rights for investment purpose as prescribed under the Tanzania Investment Act, 1997. In the context of the Act, all owners of land could register their parcels, however, the process of land registration and titling has in reality been complicated and too costly for the majority to afford. The country's land is not adequately planned, surveyed and mapped. In practice, getting a land title in Tanzania is a long and complicated process, which cannot be accomplished by most ordinary citizens. This is arguably the main reason why the rural land of Tanzania has largely remained in customary tenure system without formal documentation of ownership and rights.

4 Data set

4.1 Introduction to Tanzania National Panel Survey

Tanzania has had three rounds of national panel surveys (NPS) that are ready and reported, notably 2008-2009, 2010-2011 and 2012-2013. The NPS is nationally representative household survey which provides measures of poverty, agricultural yields, and several other key socio-economic development indicators. The NPS covers a broad range of socio-economic topics including: education, health, gender, crime and a number of others. NPS contains data that can allow analysis of the links between sectors and the determinants of different development outcomes.

Crucially for our purpose, the NPS collects information on land ownership documentation. However, the question formulation was changed between the second and third wave of the survey, results are not fully comparable across survey waves. For this reason, we present only results based on the third wave

of the NPS. We focus on the third wave because we prefer to question formulation used in that round of the survey and also because there is some value in using the most recent data set.

4.2 NPS questionnaire modules

The third wave of the Tanzania NPS consists of four survey instruments that were used to collect information, including: household questionnaire; agriculture questionnaire; livestock and fisheries questionnaire, and community questionnaire. The agricultural questionnaire was used to collect information related to the households' agricultural activities. Information was gathered at the farm/crop level and sales/market level.

4.3 Sampling procedure and representativeness

The sample size of the first NPS survey included 3,280 households and this size was calculated to sufficiently produce national estimates of poverty, agricultural production and other key indicators. This sample was thought to be adequate for the final analysis to produce disaggregated poverty rates for the four different strata: Dar es Salaam; other urban areas of mainland Tanzania; rural mainland Tanzania; and Zanzibar. The sample was constructed based on the national master sample frame, which is a list of all populated enumeration areas in the country developed from the 2002 population and housing census. This implies that the NPS is as nationally representative as possible. The sample targeted 3,280 households in 410 enumeration areas (2,064 households in rural areas and 1,216 urban areas).

The third round of NPS 2012/2013 revisited all households interviewed during the first two rounds. This comprised the original sampled households plus split-off households added into the sample in the second round. That means the total sample at the onset of the NPS 2012/2013 consisted of 3,924 target households. The eligibility requirement for the NPS remained to be defined as any household member aged 15 years and above, excluding live-in servants. Households with at least one eligible member were completely interviewed, including any subsequent non-eligible members present in the household. Any household or eligible members that had either moved or split away from a primary household were tracked and interviewed in their new location as it was done during the second round.

It is important to note the fact that the individuals who were interviewed in 2008/2009 but were not traced in the second round, if they were traced during the third round, they had to be interviewed as well. In view of this, the third wave had 703 additional interviewees assigned to their last known associated household. With these dynamics, the sample size for the third round of NPS, comprising the re-tracking from the previous two rounds and split-offs was 5,015 households. The attrition rate in the NPS is quite low. Attrition from the first to the second round was only 3.5%, and throughout the three waves, the attrition rate was 4.8%.

It was necessary to apply weighting/expansion factors to produce nationally representative NPS statistics. The panel survey weights helped adjusting for differences in the probability of selection into the sample for observations in various strata, sample splitting into multiple households through the different rounds, and attrition between rounds of the surveys.

The NPS applies a multi-stage clustered sampling design. First stage sampling involved the selection of survey clusters with the probability of selection proportional to cluster size within a stratum. The

sampling of these clusters was stratified along two dimensions: (i) eight administrative zones (seven in Mainland Tanzania and one in Zanzibar); and (ii) rural against urban clusters within each administrative zone. Primary sampling units were villages in rural areas and census enumeration areas in urban locations.

5 Methodology

5.1 Sample

We conduct analyses at the levels of land plots and households, respectively. In plot level analyses, we include only agricultural plots that households report to ‘own’, with or without written documentation. In household analyses, we include only households who own at least one agricultural plot. Both urban and rural households are included, conditional on owning agricultural land. A substantial share of urban households’ own agricultural plots (often located a few kilometres from the family home), typically on the outskirts of cities and towns.⁴ Land titles are expected to be particularly important for these households, both because land- and credit markets are more readily available in urban than in rural areas, and because land conflicts may also be more important in or around urban centres, since land is scarcer in these locations than elsewhere. In total, we have 2,858 households and 6,268 agricultural plots in the sample.

5.2 Models and identification

We run plot level models of the following type:

$$y_{ph} = T'_{ph}\beta + X'_{ph}\gamma + \theta_h + \varepsilon_{ph} \quad (1)$$

where y_{ph} is an outcome (plot value, plot transfer rights or plot-specific investment) on plot p in household h . T_{ph} is a vector of indicators for the type ownership document the plot is held with (with no ownership documents as the reference category). In some specifications, T is a scalar indicator for any ownership documents. X_{ph} is a vector of plot-specific controls, such as plot size and measures of land quality (see further description below). θ_h is a household fixed effect and ε_{ph} is an error term, allowed to be correlated across plots within the same household. β and γ are parameters to be estimated, with β the parameter(s) of interest.

We run household level models of this type:

$$C_{hv} = \lambda t_{hv} + Z'_{hv}\delta + \phi_v + \mu_{hv} \quad (2)$$

Where C_{hv} is a measure of access to credit for household h in enumeration area (‘village’) v . t_{hv} is an indicator for the household owning at least one agricultural plot with landownership documents. Z_{hv} is a vector of household specific controls, such as farm size and gender of the household head (see further description below). ϕ_v is an enumeration area (essentially village/ward) fixed effect. μ_{hv} is an error term,

⁴ We may distinguish between two different cases: (i) a person lives in a city/town like Dar es Salaam but he comes from some distant place that he refers to as home; (ii) a person lives in a city/town, and she has a farming plot outside the city where she has established a homestead. The second case is the most common and is the one referred to above. In small towns, the average distance to those homesteads can be less than 5km from the centre but for large cities, the farm plots are far from the central urban residential places.

allowed to be correlated across households within the same village/ward. λ and δ are parameters to be estimated, with λ being the parameter of interest.

A key question is whether a causal interpretation of the estimates of β and λ (the coefficients on measures of land ownership documents) is valid. An important concern is that households with ownership documents may be systematically different from other households. For example, they may be better connected to government officials or have more education. These factors may also drive land related investment and borrowing behaviour, potentially generating a spurious correlation between ownership documents and outcomes such as investment and plot valuation. In our plot level models, these concerns are entirely accounted for because the models include household fixed effects. Hence, we are only comparing plots with and without ownership documents *within the same household*. This strategy comes with a cost because it implies that the effect of ownership documents is essentially identified from the minority of households that own some plots with ownership documents and other plots without. There are 132 such households in the data set, owning a total of 406 plots. So, this approach ‘throws away’ a lot of information from households with either all or no plots held with ownership documents, but we believe that concerns about unobserved household characteristics are sufficiently important to justify the strategy.

In household level models, we control for a number of observable household characteristics, and include village-fixed effects. The latter feature is important because households differ systematically in terms of, for example, investment opportunities, cultural values and access to markets, across geographical areas. Another concern is that the exogenous characteristics of plots with and without ownership documents, respectively, are systematically different. In particular, households may have higher incentives to obtain ownership documents for more valuable than for less valuable plots. We address this concern by controlling for a number of plot characteristics in the plot level models. These characteristics include size, soil type, soil quality (subjectively assessed), slope, distance to family home, distance to nearest road and distance to nearest market. We cannot completely rule out that some important plot characteristics remain unobserved. Other papers have addressed these concerns either by including plot-fixed effects (Markussen 2016) or by using instrumental variables, assumed to be uncorrelated with unobserved plot characteristics. For Example, Besley (1995) instrumented land property rights with mode of plot acquisition, a dummy for the household having ever litigated over the plot, and duration of ownership. The former two variables are not available in the NPS data set (and if they were, it seems doubtful that they would be uncorrelated with relevant, unobserved plot characteristics). Duration of ownership is available, but the results below suggest that it would be a poor instrument (it has a strong, direct effect on land value in a model controlling for ownership documents, suggesting that the exclusion restriction would be invalid if duration of ownership was used as an instrument for ownership documents in that model). While instruments would be welcome, we believe that household fixed effects and plot controls go a long way toward addressing endogeneity concerns. By considering several different outcome variables in models at plot- as well household level, we aim to build a consistent and robust story about the effect of ownership documentation.

6 Descriptive statistics

Table 1 presents results on the prevalence of land ownership documents by region, gender and socioeconomic status of household heads. Entries are average shares of agricultural land held with each type of ownership document. Observations are *not* weighted by farm size, implying that results show averages across households, not shares of total farm land. The survey asks respondents whether their plots are held with any kind of ‘title’, and offers several specific answer categories, including ‘no title’. Since some of these options do not correspond to ‘titles’ in the standard, narrow sense of the term, we refer to the property rights documentation listed as ‘ownership documents’. We distinguish between

four different categories of ownership documents. ‘Government paper’ includes certificates of right of occupancy, letters of allocation and ‘other government documents’. A second category is ‘inheritance letters’, and a third is ‘purchase agreement’, which includes local government witnessed- and court certified purchase agreements. Finally, ‘other papers’ include ‘residential license’, ‘official correspondence’ and ‘utility- or other bill’, all of which are present for only a very small number of plots.

Table 1: Land ownership papers by region, gender and socioeconomic status

	<i>Per cent of farmland held with:</i>				
	Any written ownership documentation	Government paper	Inheritance letter	Purchase agreement	Other paper
<i>Region</i>					
Dar es Salaam	65.6	27.5	0.8	32.3	5.1
Rest of urban	18.4	12.4	0.8	4.3	1.0
Rural	14.8	9.2	2.3	2.7	0.6
Zanzibar	29.8	5.2	13.0	8.8	2.8
<i>Gender of hh head</i>					
Male	17.0	10.0	2.3	4.0	0.8
Female	14.5	9.5	1.9	2.4	0.7
<i>Consumption quintile</i>					
Poorest	13.1	7.8	1.9	2.9	0.5
2nd	12.5	9.6	1.0	1.3	0.6
3rd	12.7	7.7	2.4	1.5	1.0
4th	17.4	9.5	2.9	3.6	1.5
Richest	26.7	14.7	3.0	8.6	0.4
<i>Schooling of hh head</i>					
No schooling	14.7	10.1	1.6	2.1	0.9
Some primary	15.3	10.4	2.0	2.2	0.7
Finished primary	16.4	9.1	2.6	4.0	0.6
Finished secondary	32.8	14.2	2.4	13.8	2.4
All	16.5	9.9	2.2	3.6	0.8

Notes: N = 2,858. Only households who own agricultural land are included. Observations are not weighted by farm size. ‘hh’ stands for ‘household’. Source: Authors’ own calculations based on NPS 2012/13.

Table 1 shows that households on average have ownership documents for 16.5 per cent of their agricultural land. Government papers are most common but purchase agreements and inheritance letters also play a role. Ownership documents are more common in urban than in rural areas and much more common in Dar es Salaam than in other urban centres. Significantly, however, a significant share of rural plots (14.6 per cent) *are* held with formal documentation of ownership. This is important from a methodological point of view since it allows for meaningful analysis of the effects of ownership documents in rural areas. Purchase agreements are much more important in Dar es Salaam than elsewhere, and inheritance letters are most important in Zanzibar.

Richer and more educated households are more likely to hold their land with formal ownership documents, although only the richest quintile, and the most educated group (those with secondary education) really stand out from other groups. These correlations are of course in part driven by the difference in the prevalence of ownership documents between Dar es Salaam and other regions. There is no strong gender gradient in access to formal land property rights.

Table 2: Descriptive statistics, households

	<i>Rural</i>	<i>Urban</i>	<i>All</i>
Age of hh head	49.3	50.0	49.4
Female hh head (per cent)	24.5	28.3	25.0
Annual consumption per adult eq., TSh. (median)	616,432	984,437	659,114
Farm size, acres (median)	3.5	2.5	3.5
Number of agricultural plots owned	2.3	1.8	2.2
<i>Schooling of hh head (per cent)</i>			
None	27.3	15.1	25.6
Some primary	21.7	18.3	21.2
Finished primary	47.5	51.2	48.0
Finished secondary	2.6	12.2	3.9
<i>Outstanding loans (per cent)</i>			
Has commercial loan	5.6	10.7	6.3
Has commercial loan from formal lender	2.3	7.5	3.0
Has commercial loan from informal lender	3.3	3.2	3.3
Observations	2,186	463	2,858

Notes: Entries are means unless otherwise stated. Only agricultural land owners included. For observations from Zanzibar, the distinction between urban and rural is not made. These households are therefore neither included in rural nor urban. They are included in the *All* column. Farm size includes only land owned by the household (i.e. not rented or borrowed plots). A 'commercial loan' is defined a loan with positive interest.

Source: Authors own calculations based on NPS 2012/13.

Table 3: Descriptive statistics, agricultural plots

	<i>Rural</i>	<i>Urban</i>	<i>All</i>
<i>Land ownership papers (per cent)</i>			
Any written ownership documentation	14.6	22.1	15.5
Government paper	8.7	12.3	9.1
Inheritance letter	2.9	7.6	3.4
Purchase agreement	2.5	0.9	2.3
Other paper	0.6	1.3	0.6
Value per acre, TSh. (median)	166,667	300,000	166,667
Size, acres (median)	1.5	1.3	1.5
Years owned by hh (median)	16.0	15.0	16.0
<i>Tenure security and rights</i>			
Hh has right to sell or use as collateral (per cent)	88.1	91.5	88.4
HH is comfortable leaving plot without farming it for several months (per cent)	95.7	95.6	95.6
<i>Investment</i>			
Fallow in the last long rainy season (per cent)	11.8	15.8	12.2
Any perennial crops planted in the last 12 months (per cent)	9.8	8.5	9.6
Erosion control/water harvesting facility present (per cent)	7.5	7.2	7.5
<i>Remoteness</i>			
Distance from home, km. (median)	1.0	4.0	1.0
Distance from road, km. (median)	1.0	1.0	1.0
Distance from market, km. (median)	8.0	4.0	7.0
<i>Soil type (per cent)</i>			
Sand	13.1	11.7	13.0
Loam	51.1	49.8	50.9
Clay	16.2	14.6	16.1
Other	2.7	3.2	2.7
<i>Soil quality (per cent)</i>			
High	39.0	43.5	39.5
Medium	38.2	32.1	37.5
Low	5.9	3.6	5.7
<i>Slope (per cent)</i>			
Flat-bottom	49.0	51.9	49.4
Flat-top	4.5	3.7	4.4
Slight	25.3	22.4	25.0
Steep	4.2	1.3	3.9
Observations	5,149	832	6,268

Note: Only agricultural plots owned by households included. Observations from Zanzibar only included in the *All* column, see Table 2 note. Source: Authors own calculations based on NPS 2012/13.

Table 2 shows descriptive statistics at household level, and Table 3 presents plot level statistics. Table 3 shows, among other things, that for 88.4 per cent of plots, respondents say that they have the right to ‘sell or use [the plot] as collateral’ and on 95.6 per cent of plots, respondents say that they would be comfortable leaving the plot without farming it for several months. The former variable is a measure of transfer rights, while the latter is arguably a measure of tenure security. Since these percentages are much higher than the share of plots with formal ownership documents, it is evident that ownership documents are not a *necessary* condition for transfer rights and tenure security. It is still entirely plausible, though, that ownership documents *increase* the likelihood of enjoying transfer rights and tenure security. This is analysed in more depth below.

Table 2 shows, among other things, that use of commercial credit is not widespread, especially in rural areas, where only 5.6 per cent of households have an outstanding loan. We define ‘commercial loans’ as loans with a positive interest rate. A number of households have loans with negative or zero interest rates. These are likely to have been extended by friends or family members and we do not expect land ownership documents to be important for that type of loans. For commercial loans, on the other hand, it is plausible that land ownership documents facilitate the use of land as collateral and therefore increase access to loans.

7 Ownership documents and land sales values

If land markets function well, land prices are in theory a comprehensive index of the value of land, capturing both the value of investment on a plot, tenure security and the collateral value of the land, along with attributes such as soil quality and location. Therefore, the effect of land ownership documents on land sales values in principle captures all the potential channels through which property rights may affect investment, which we discussed above (the assurance effect, the credit market effect and the land market effect). The survey asks respondents what the value of each plot would be if it was sold today. This question is asked *before* the question on land ownership documents, implying that the survey does not increase the salience of ownership documents in the minds of respondents at the time when they answer the land values question. Almost all households provide answers to the land value question for almost all plots, suggesting that respondents do have knowledge about the market value of their land. Still, it is clear that while land is indeed traded, land markets are rather thin in some areas of Tanzania, especially in rural areas, cf. Section 3 above. One may therefore question the accuracy of respondent’s statements about land values. In this context, the use of household fixed effects in regressions plays an important role. The fixed effects capture all idiosyncratic, household level biases in land valuation and allow us to focus on intra-farm variation in land values. Since we control for a large number of plot characteristics (size, quality, location etc.), it is plausible that the estimated coefficients on land ownership documents capture the value that these documents add to plots, either directly through increased transferability in land sales markets, or indirectly through increased tenure security, investment or collateral value (i.e. the value of easier and cheaper access to credit).

Table 4 presents results of estimating equation (1) with the log of land sales value as the dependent variable. Results show a sizeable and statistically significant effect of land ownership documents on land sales values. Plots held with ownership documents are on average 26.9 per cent more valuable than plots without such documents, controlling for household and plot characteristics (regression 1). Regression 2 shows that this effect is driven by government papers rather than other types of ownership documents. Regressions 3 and 4 suggest that the effect of government papers is much stronger in urban than in rural areas, and that purchase agreements and inheritance letters have significant and strong effects on plot values in urban- but not in rural areas. The results for urban areas should be treated with some caution since they are based on fewer observations. It is important, however, that the effect of government papers is significant and strong (32 per cent) even in rural areas.

This is consistent with the view that there would be significant, positive effects of a land titling program, also in rural areas.

Result for control variables are mostly as expected. Plot size is obviously important, and land values are positively correlated with duration of ownership. One interpretation of this finding is that ownership duration increases tenure security and therefore investment. Another possibility is that plots, which are cleared from the bush, are only fully prepared for agricultural production after several years of ownership. For example, removing tree roots with traditional methods is highly cumbersome and might not be completed for several years after a plot is initially taken in to use. Plot values are negative correlated with distance to the family home, while effects of distances to markets and roads are not statistically significant, possibly because these factors do not vary much within households.

Table 4: Plot value regressions (hh fixed effects)

	<i>Dependent variable: Value of plot, TSh. (ln)</i>			
	All	All	Rural	Urban
Any written ownership documentation	0.269*** (0.094)			
Government paper		0.385*** (0.127)	0.322*** (0.124)	0.894** (0.365)
Inheritance letter		0.109 (0.157)	-0.139 (0.150)	1.030* (0.539)
Purchase agreement		0.21 (0.163)	0.088 (0.191)	0.972* (0.578)
Other paper		0.137 (0.278)	0.203 (0.304)	-0.936*** (0.232)
Size, acres (ln)	0.622*** (0.022)	0.622*** (0.022)	0.636*** (0.024)	0.560*** (0.075)
Years owned	0.009*** (0.002)	0.009*** (0.002)	0.010*** (0.002)	0.002 (0.006)
Distance to home, km., ln(x+1)	-0.093*** (0.030)	-0.091*** (0.029)	-0.076*** (0.029)	-0.156 (0.113)
Distance to road, km., ln(x+1)	0.027 (0.036)	0.025 (0.036)	0.005 (0.038)	0.116 (0.102)
Distance to market, km., ln(x+1)	-0.051 (0.043)	-0.054 (0.043)	-0.054 (0.045)	-0.025 (0.139)
Soil type				
Loam	0.085* (0.051)	0.085* (0.051)	0.130** (0.055)	-0.204 (0.183)
Clay	0.090* (0.053)	0.091* (0.053)	0.126** (0.057)	-0.075 (0.179)
Other	0.016 (0.119)	0.011 (0.120)	0.093 (0.127)	-0.399 (0.407)
Soil quality				
Medium	-0.066 (0.045)	-0.069 (0.046)	-0.089* (0.048)	0.043 (0.164)
Low	-0.072 (0.093)	-0.074 (0.093)	-0.08 (0.096)	0.244 (0.296)
Slope				
Flat-top	0.085 (0.094)	0.086 (0.094)	0.076 (0.100)	0.113 (0.255)
Slight	0.112** (0.048)	0.113** (0.048)	0.091* (0.051)	0.203 (0.149)
Steep	0.117 (0.101)	0.118 (0.101)	0.135 (0.103)	-0.206 (0.476)

Fixed effects	Household	Household	Household	Household
R^2	0.88	0.88	0.87	0.93
N	6,268	6,268	5,146	830

Note: Linear regressions. Robust standard errors in parentheses. Level of observation: plot. The reference category for soil type is 'sandy', for soil quality 'high' and for slope 'flat-bottom'.
Source: Authors own calculations based on NPS 2012/13.

8 Explaining the effect of ownership documents on land values

We now try to understand *why* households report higher values for plots with ownership documents than for those without them. Table 5 reports plot level regressions for, first, an indicator for households reporting that they have the right to sell a plot or use it as collateral and, second, for three different measures of plot-specific investment (above, we also presented a measure of whether the household is comfortable leaving the plot for several months with farming it. We refrain from modelling this variable due to very limited intra-household variation).

Table 5: Transfer rights and investment (hh fixed effects)

	<i>Dependent variable:</i>			
	Hh has right to sell or use as collateral	Erosion control/water harvesting facility present	Any perennial crops planted in the last 12 months	Fallow in the last long rainy season
Any written ownership documentation	0.065** (0.027)	-0.027 (0.025)	0.038 (0.033)	-0.013 (0.030)
Size, acres (ln)	0.006* (0.003)	0.006 (0.005)	0.007 (0.007)	-0.006 (0.006)
Years owned	0.000 (0.000)	0.000 (0.000)	0.000 (0.001)	0.000 (0.001)
Distance to home, km., ln(x+1)	0.014*** (0.005)	-0.007 (0.007)	-0.090*** (0.010)	0.013 (0.008)
Distance to road, km., ln(x+1)	-0.011* (0.006)	0.008 (0.008)	0.000 (0.012)	0.005 (0.010)
Distance to market, km., ln(x+1)	-0.009 (0.006)	0.000 (0.010)	0.035*** (0.013)	0.016 (0.013)
Soil type				
Loam	0.01 (0.009)	0.034** (0.014)	0.057*** (0.014)	-0.397*** (0.017)
Clay	0.009 (0.008)	0.046*** (0.015)	0.052*** (0.016)	-0.407*** (0.019)
Other	0.011* (0.006)	0.078* (0.044)	-0.019 (0.057)	-0.412*** (0.046)
Soil quality				
Medium	0.006 (0.008)	-0.012 (0.014)	0.013 (0.016)	-0.215*** (0.016)
Low	0.018 (0.020)	0.017 (0.029)	-0.013 (0.031)	-0.248*** (0.027)
Slope				
Flat-top	-0.007 (0.013)	-0.025 (0.027)	0.027 (0.031)	-0.097*** (0.024)
Slight	-0.015** (0.006)	0.087*** (0.016)	0.025 (0.016)	-0.103*** (0.013)
Steep	-0.026** (0.013)	0.152*** (0.038)	0.02 (0.043)	-0.123*** (0.025)
Fixed effects	Household	Household	Household	Household

R^2	0.93	0.67	0.62	0.76
N	6,268	6,268	6,268	6,268

Note: Linear probability models. Robust standard errors in parentheses. Level of observation: plot. The reference category for soil type is 'sandy', for soil quality 'high' and for slope 'flat-bottom'.

Source: Authors own calculations based on NPS 2012/13.

The three measures of investment we use are, first, a dummy for the presence of any erosion control- or water preservation infrastructure on the plot. This is a stock measure. A flow measure (e.g. whether new infrastructure was built, or repairs were made, during the last year) would have been even more ideal, since parts of the stock of infrastructure may have existed before ownership documents were obtained, but such a measure is unfortunately not available. Second, we also use a dummy variable for planting any perennial crops on the plot in the last year. This is a flow measure, and hence concerns about the direction of causality between ownership documents and investment are less pertinent. The same is true for the third measure of investment, an indicator for the plot being left fallow in the most recent long rainy season. Fallow is a form of investment because it implies that households sacrifice harvests in the short run in order to increase yields in the long run. Such investment is potentially risky because the probability that other households, or the government, attempt to confiscate a plot of land is often higher when the plot is unused (e.g. Goldstein and Udry 2008). Control variables are the same as in the land sales value regressions presented in Table 4. Regressions are linear probability models.

Results show that ownership documents have a significant effect on the right to sell or use a plot as collateral (6.5 percentage points), but no detectable effects on plot-specific investment. This suggests that the effect of ownership documents in land values is not primarily driven by the 'assurance effect'. If it were, we would have expected to see higher investment in plots with ownership documents. On the other hand, it remains plausible that documents increase land values because they increase access to credit and land markets.

To investigate the effect of ownership documents on use of credit, we need to shift from plot- to household level analyses. Loans are taken out by households, not plots. Table 6 presents estimates of equation (2), with measures of commercial lending (i.e. loans with positive interest rates, see above) as dependent variables. The independent variable of interest is an indicator for having at least one agricultural plot held with ownership documents. Regressions 1-3 are models for having an outstanding, commercial loan with any lender, and with formal and informal lenders, respectively. Regressions 4-6 model the total amount borrowed in the last 12 months from all lenders, and from formal and informal lenders. Control variables include the amount of land owned, and the age, gender and education level of the household head. As described above, the models also include village fixed effects, which account for village level variation in access to credit, investment opportunities and so on.

Results show that agricultural households with land ownership documents are indeed more likely to have an outstanding loan, and have borrowed more money, than households without such documents. The effect of ownership documents is stronger for informal than for formal loans. As discussed above, formal lenders may not accept the documents in question as proof of land ownership – as explained the documents are rarely proper land titles – while informal lenders often do. A related interpretation is that informal lenders do not care about ownership documents per se, but do consider whether borrowers have uncontested claims to land, which they may claim as compensation in case of defaults on loan repayment.

Table 6: Use of commercial credit

	<i>Dependent variable:</i>					
	Has commercial loan	Has commercial loan from formal lender	Has commercial loan from informal lender	Amount borrowed in last 12 months, ln(x+1)	Amount borrowed in last 12 months from formal lender, ln(x+1)	Amount borrowed in last 12 months from informal lender, ln(x+1)
Any written land ownership documentation	0.028** (0.014)	0.005 (0.011)	0.024** (0.010)	0.397** (0.189)	0.115 (0.151)	0.282** (0.124)
Farm size, acres (ln)	0.006 (0.005)	0.007* (0.004)	-0.001 (0.004)	0.088 (0.069)	0.094 (0.058)	-0.005 (0.045)
Age of hh head	0.002 (0.001)	0.000 (0.001)	0.001 (0.001)	0.025 (0.017)	0.007 (0.014)	0.018* (0.011)
Age squares	-0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000* (0.000)	0.000 (0.000)	-0.000* (0.000)
Female hh head	0.006 (0.012)	-0.004 (0.009)	0.01 (0.009)	0.023 (0.150)	-0.088 (0.117)	0.111 (0.103)
<i>Schooling of hh head</i>						
Some primary	0.004 (0.012)	-0.003 (0.008)	0.007 (0.010)	0.014 (0.148)	-0.052 (0.102)	0.066 (0.112)
Finished primary	0.030** (0.012)	0.008 (0.009)	0.022*** (0.008)	0.347** (0.150)	0.087 (0.118)	0.260*** (0.100)
Finished secondary	0.159*** (0.035)	0.128*** (0.032)	0.032 (0.020)	2.233*** (0.483)	1.833*** (0.451)	0.4 (0.245)
Fixed effects	Village	Village	Village	Village	Village	Village
R ²	0.20	0.26	0.12	0.23	0.27	0.13
N	2,858	2,858	2,858	2,858	2,858	2,858

Note: Linear regressions. Robust standard errors in parentheses. Level of observation: household. The reference category for schooling is 'no schooling'. A commercial loan is defined as a loan with positive interest.

Source: Authors own calculations based on NPS 2012/13.

Results on control variables suggest that age and gender of the household head have little effect on use of credit. On the other hand, well-educated household heads borrow significantly more than others, especially from formal lenders.

These results are consistent with the view that land ownership documents facilitate access to credit, and that this is part of the explanation as to why land plots with documented ownership are more valuable than other plots. The 'De Soto effect' might be important in Tanzania (cf. De Soto, 2000)! If strengthened land property rights facilitate the functioning of credit markets, we would also expect it to facilitate investment and therefore economic development. As noted above, this investment is not necessarily linked to specific land plots, or even to agriculture. For example, households may take a loan, using their land as collateral, and use the borrowed funds to start or expand a non-farm enterprise, or send their children to a boarding school.

This paper has shown that written documentation of land ownership is associated with a significant increase in land sales values, as estimated by households. The estimated prices of agricultural plots held with ownership documents are about 27 per cent higher than the prices of other plots. It does not appear that this effect emerges because ownership documents increase plot specific investment. We found no effects of ownership documents on investment in erosion control, water conservation, perennial crops or fallowing. Rather the effect of ownership documents on land prices appear to be driven by improved access to credit, and possibly by improved rights to sell land. Households are more likely to say that they have the right to sell a plot, or use it as collateral, when they have ownership documents. Also, households with ownership documents are more likely than others to take out loans, and borrow larger amounts.

Without exogenous, experimental variation in land property rights, it is difficult to conclude with certainty that the correlations we have uncovered are driven by causal relations (i.e. that land ownership documents *cause* land prices to increase). However, we do believe that our use of household and village fixed effects, in addition to a number of control variables, go a long way toward addressing endogeneity concerns. In particular, the most plausible interpretation of the results on land sales values is that households genuinely care about land ownership documents.⁵ Our finding of weak effects of formal, private land rights on agricultural investment are similar to those reported in earlier papers on East Africa, such as Pinckney and Kimuyu 1994 and Place and Migot-Adholla 1998. However, while these papers concluded that land titling was unimportant, we argue that it might have significant effects, operating through credit and land markets. One reason for these different conclusions might be that markets for credit and land have developed significantly during the roughly two decades between their studies and ours.

Where does this leave us in terms of discussions about whether, when and to what extent Tanzania and other poor countries should implement comprehensive, systematic land titling programs? Decisions on such programs of course depend on the cost of the program and the cost of financing it (through taxation, debt or aid). This paper does not attempt to estimate these costs. We also do not offer a comprehensive, quantitative estimate of program benefits, but our results are nevertheless informative about that side of the equation. In particular, if the estimate that land titles increase land values by as much 32 per cent (our estimate for ‘government papers’ in rural areas), it is difficult to imagine that a titling program would not be economically worthwhile. Further research is required to investigate the robustness of this estimate. Note, though, that while the estimate may be biased upward by reverse causality (households actively seeking titles for plots that are highly valuable for exogenous, but unobserved, reasons), it is also plausible that genuine land titles would be more valuable to households than the documents captured in the NPS, most of which are issued by local governments. For example, a systematic land titling program might come with exact mapping of plot boundaries, and this information could be included on land title documents. Such information is likely to be missing in the vast majority of the papers captured in the survey, but might be valuable to households because it helps reduce the risk of border disputes. Also, formal lenders are more willing to accept proper titles than the papers picked up in the survey. The conclusion that households value land titles is consistent with the results in Ali et al. (2016), which showed that slum dwellers were eager to obtain land titles as soon as prohibitively high costs of titling were removed.

⁵ Note that one alternative interpretation of our results is that, rather than ownership documents driving up prices, the mechanism driving the correlation is that households spend more resources on seeking to obtain titles for their most valuable plots - but this interpretation still assumes that households regard ownership documents as important. Why else would they spend resources on getting them?

Our data does not allow us to investigate heterogeneity in the effects of land ownership documents across different parts of rural Tanzania. We can only conclude that certain effects are present on average. It is entirely plausible that some regions exist where land- as well as credit markets are missing, and traditional systems of land tenure function well. In such areas, it might well make sense to postpone land titling. Such considerations about local context are important if and when a land titling program is being rolled out.

Do the results carry over from Tanzania to other countries? They may well do, but one aspect of Tanzanian history, discussed in Section 3 above, which sets it somewhat apart from other African countries (and brings it closer to some Asian countries) is the experience of the Ujamaa villages. This was a form of land collectivization and such experiences may strengthen the effects of consequent land titling programs for two reasons: First, collectivization efforts undermine traditional land tenure institutions, and the need for modern, formal institutions is therefore potentially higher. Second, collectivization programs increase household concerns about government land expropriation. Land titling is a signal from the government to farmers that the government is sincere about protecting private property rights. These mechanisms are likely to be important for explaining the positive effects of land titling in countries such as Cambodia and Vietnam, with have histories of comprehensive agricultural collectivization (Markussen 2008, 2016, Do and Iyer 2011, Rozelle and Swinnen 2000). While the Ujamaa program was somewhat less radical than the programs implemented in Vietnam and Cambodia, the same mechanisms may be active in Tanzania.

In sum, we conclude that more evidence is needed in order to determine whether and when systematic land titling should be pursued in Tanzania and other countries. The results presented here do suggest that returns to land titling could be significant and the collection of more evidence should therefore be a priority.

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