Rural-rural Migration and Land Conflicts: Implications on Agricultural Productivity in Uganda

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Abstract

We use community and household data with plot-level information to explore the determinants of different forms of land conflicts and the conflicts' impact on agricultural productivity in Uganda. Tracing rural-rural migration patterns, we find that communities that receive/host more immigrants (and thus have many coexisting tribes) tend to have more land conflicts than those sending migrants out. Unbundling conflicts by type reveals that the number of tribes and being in a 'receiving' community are associated with a higher probability of eviction conflicts than 'sending' communities and those with fewer tribes. Turning to conflict impact, we find that plots with conflicts have 17% lower yield than those without conflicts. Moreover, breaking down conflicts by type reveals that plots with eviction conflicts have 36% lower yield than those with inheritance conflicts. Our results suggest that rural-rural migration weakens community-specific informal land arrangements and conflict resolution mechanisms, which, in the absence of formal institutions, result in eviction conflicts that, in turn, hurt productivity.

Keywords: rural-rural migration, community heterogeneity, institutions, land conflicts, agricultural productivity

JEL Classification Codes: Q15, K11, N37, O12, O13

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I.   Introduction

Land-related conflicts are increasingly becoming a threat to rural economic activities such as agriculture in most sub-Saharan African countries (Yamano and Deininger, 2005; Deininger and Castagnini, 2006). The prevalence of these conflicts is escalating at a time when crop yields are stagnant or even declining for some countries in the region (Otsuka, 2006). It is therefore apparent that, as governments grapple to enhance technology adoption and revamp the agriculture sector's performance to meet the high and increasing demand for food, land tenure security becomes crucial in attaining this goal (World Bank, 2008)[1]. However, institutions governing land, including the protection of property rights, conflict resolution mechanisms, and enforcement of contracts are still weak in most African countries to curb the conflict threat (Fred-Mensah, 1999; Donge and Pherani, 1999). Coupled with population pressure[2] and hence, land scarcity, land conflicts have raised concerns over likely food insecurity and high poverty incidence in the affected areas (Andre and Plateau, 1998; Deininger and Castagnini, 2006). In addition, small-scale land conflicts have a potential to turn into widespread civil wars, thereby threatening national security (Renner, 1997; Andre and Plateau, 1998).

The literature on land in sub-Saharan Africa widely documents pervasive legal insecurity over land[3]. Many studies have thus linked land conflicts to weak or non-existent formal land institutions and the failure of current customary land tenure systems to resolve conflicts (Fred-

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[1] Studies have suggested that SSA needs to double food production in the next 20 years to match rapid population growth and changing diets (Alain De Janvry, 2010).

[2] SSA's rapid population growth rate is 2.53% higher than the world average of 2.1%. For some countries such as Uganda, the focus of this study, population growth rate is 3.2%, second in the world. The first is Niger, which is also in SSA (World Bank, 2011).

[3] A large body of literature details the existence of insecure land tenure systems in Africa and their deleterious impact on land transactions, land investment, and agricultural productivity (Atwood, 1990; Feder and Feeny, 1991; Migot-Adholla, Hazell, Blarel, and Place, 1991; Place and Hazell, 1993; Besley, 1995).

Mensah, 1999; Donge and Pherani, 1999). Other factors such as population pressure, especially in areas that started with unequal land distribution; agriculture commercialization, which increases the demand and value for land; across-community migrations; and cultural factors cause land conflicts (Fred-Mensah, 1999; Andre and Plateau, 1998). Land is fundamental and represents a core value in African society: 'African people are emotionally attached to "their" land,' which represents an important source of their identity and is typically seen in a holistic perspective' (Donge and Pherani, 1999). Questions of identity and migration, therefore, become particularly salient. As observed in many African countries, original inhabitants oppose the transfer of traditionally owned family and community land to 'strangers' by committing acts of sabotage, looting, burning, and theft of property and crops of new landholders (Platteau, 1996; Donge and Pherani, 1999; Fred-Mensah, 1999). To the extent that alienation of land to 'strangers' violates social norms, resentment and tensions are aroused in case of immigration, which can translate into open violence and land conflicts (Platteau, 1996). Across-community migrations, on the other hand, involve mixing of tribes with their specific values and internal land arrangements. This leads to breakdown of pre-existing informal institutions, which, in the absence of formal institutions, lead to conflicts in host communities. Indeed, Fred-Mensa (1999)[4] argues that host communities in Ghana have been plagued by what he terms "ubiquitous conflicts" in the form of land evictions.

Land conflicts create insecurity over accessed land and hence impede land improvement, which translates into low agriculture output per hectare (Deininger and Castagnini, 2006). In

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[4] Fred-Mensa (1999) argues that in conflict communities of Ghana, traditional authorities have lost the power to control land operations, but the state has not developed the capacity to take full control, hence the term "institutional ambiguity."

addition to its effect on the agriculture sector performance, small-scale land conflicts can escalate into widespread civil strife that may threaten national security. Studies have suggested that land scarcity and land conflicts, mainly between ethnic groups, fueled the Rwandan genocide of 1994 (Renner, 1997; Andre and Platteau, 1998).

Despite the increasing incidence of land-related conflicts and their undisputable effects on agriculture performance, empirical studies[5] on the determinants and consequences of such conflicts are scanty. For instance, no empirical study has examined the relationship between rural-rural migrations and land conflicts while such migrations have increased in the recent past, especially in countries that started with unequal land distribution across regions; some descriptive studies have suggested that such migrations weaken customary institutions and lead to conflicts. In addition, though conflicts take different forms, the available studies have bundled them in the analysis. This paper seeks to fill the gap in the existing literature by (i) tracing the migration history of households in each community and examining whether such migrations are associated with land conflicts and the pathways through which they do; (ii) unbundling land-related conflicts by type so as to investigate the relative impact of conflict forms and what causes them; and (iii) looking at the impact of land conflicts and conflict types on agricultural productivity in Uganda.

In this analysis, we classified our study communities into "receiving" and "sending" communities based on their historical patterns of migration. Through surveys, we solicited

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[5] We know of only two studies that have quantitatively looked at causes and consequences of land conflicts. Studies by Deininger and Castagnini (2005) and Yamano and Deininger (2005) examine the determinants and impact of land conflicts on agricultural productivity in Uganda and on fertilizer application in Kenya, respectively. They both bundle all land conflicts in the analysis and do not trace the evolution of land conflicts to rural migrations in the respective countries.

information on the proportion of current households that immigrated. We did the same for their parents' generation. Particularly, we asked these questions: (i) out of the households (current generation) in this village, how many were not born here (or immigrated)? (ii) out of those who were born in, how many of their parents (second generation) were not born in this village? A community is defined as "receiving" if at least 30% of the current or second-generation inhabitants immigrated. We set the threshold at 30% because immigrations from neighboring villages sometimes happen and these can set the number of immigrant households above zero, yet such migrations do not affect land tenure arrangements as customary land arrangements cut across neighboring communities[6]. Also, if immigrants are very few, they remain the minority and thus do not influence the functioning of village-specific land arrangements, even if those immigrants are of a different ethnicity.

The remaining communities are defined as either "sending" or "closed." They are sending if there were emigrations but less than 30% immigrant households for both current and past generations. They are closed if they had less than 30% immigrants and no emigrants. We, however, found that, in our sample, all our non-receiving communities have had emigrants and hence can be classified as sending. We considered two generations because land scarcity and migrations are of recent history in Uganda: at least from our focus group interviews and available historical studies, within-country migrations started in late 1946 in the form of kingdom resettlement arrangements (Ngologoza, 1998).

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[6] A community in our study is a village that comprises the smallest unit of administration in Uganda. Some clans can occupy more than one village and, in many cases, land arrangements can cover many villages to a level of a parish, the second level of administration from a village.

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Using community and household data with parcel- and plot-level information from two simultaneously conducted surveys in 2012, we analyzed the impact of rural-rural migration on land conflicts in Uganda. Specifically, we examined the relationship between being in a receiving community, number of tribes[7] (a proxy of village heterogeneity), and different conflict types. To gain an understanding on how detrimental land conflicts can be, we analyzed the impact of land conflicts on agricultural productivity: kilograms of maize and beans harvested per hectare for two seasons in 2012.

Our main findings revealed that the probability of having a conflict over a parcel was 6% points higher in receiving than in sending communities and that conflict probability was higher in communities with many tribes (the most heterogeneous). Unbundling land conflicts by type revealed that having many tribes in a community was associated with a higher likelihood of eviction and inheritance conflicts but not boundary conflicts. On the impact of land conflicts, we found yield to be 17% lower in plots with conflicts than in those without conflicts. The impact was even bigger when we broke down conflicts by type. Yield was 36% lower in plots with eviction conflicts than those with inheritance conflicts, whereas the impact of boundary conflicts was not significantly different from that of inheritance conflicts.

The rest of the paper is structured as follows. Section two provides an overview of land conflicts in Uganda and the existing institutional structure handling land issues. In section three, we develop a conceptual framework and a theoretical model that shape our hypotheses, and we detail the empirical strategy. Section four discusses the data used and the descriptive statistics.

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[7] The family lineage in Uganda follows a patrilineal system; hence, intermarriages that involve a male from a certain tribe marrying one from other tribes do not change the family-tribal identity. In other words, the household takes on the tribe identity of the husband. In this study, we capture the number of tribes by ascertaining tribal identity of households according to community definitions.

Econometric results are presented and discussed in section five and we present sensitivity analysis in section six. Section seven concludes and provides policy implications of the study.

II.   Background
A. Rural-rural migration and land conflicts in Uganda

Uganda provides an interesting case of a country that started with unequal land distribution[8] across regions, followed by massive rural-rural migration due to population explosion in the recent past. The country, like most sub-Saharan African countries, is very heterogeneous, with about 53 tribes that have tremendously mixed due to migrations since the country's independence in 1962. These characteristics of rural Uganda can enable us to quantitatively explore the sources of land conflicts by mainly relating land conflicts to migration history, community heterogeneity, and the functioning of customary institutions.

Land is an essential pillar of human development and economic growth in Uganda since the agriculture sector employs 73% of the working population and contributes 24% to gross domestic product (Ministry of Agriculture, 2010). However, land conflicts have become a major threat to rural agricultural communities in the country. The gravity of the issue led to the passing of the controversial and highly contested Land Act of 2010[9] that aims to protect lawful and bona fide occupants from illegal evictions (Uganda, 2010). The land issue in Uganda

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[8] Ngologoza (1998), one of the *saza* (county) chiefs at the time, notes that the Kigezi region in southwestern Uganda was the first kingdom to face population pressure partly because of high fertility rates and heavy immigration from Rwanda due to the 1927/1928 great famine in that country. Because of the bigger population, the chiefs organized with other kingdoms (the Ankole kingdom in 1946 and the Tooro kingdom in 1955, among others) the resettlement of Bakiga (people from Kigezi) in other kingdoms with abundant and unsettled land.

[9] The Land Amendment Act (2010) is controversial because it grants land rights to bona fide and lawful occupants in Mailo land while at the same time recognizing title holders of the same land as rightful owners. This has threatened the land rights of the latter group, leading to land conflicts.

remains culturally and politically sensitive yet is recognized as central to economic development.

Land conflicts in Uganda can be broadly categorized into three major types: boundary, inheritance, and eviction (sometimes termed as land grabbing)-related conflicts, which emerge differently. Due to the historically disproportionate population distribution in the country, land scarcity became rampant in densely populated areas earlier than in other parts. Land scarcity, coupled with soil exhaustion due to overcultivation and absence of technology adoption to maintain higher yield on small pieces of land, led to emigration from the densely populated communities. Emigration was sometimes arranged by society leaders who visited other kingdoms that had unoccupied land to secure land for their subjects. For instance; Paul Ngologoza, Mukombe, among others, the then *saza* (county) chiefs of Kigezi, one of the densely populated regions at the time, played an important role in resettling the Bakiga people of Kigezi in the kingdoms of Ankole and Tooro from the late 1940s to the 1960s with the assistance of the colonial masters (Ngologoza, 1998). At this time, land acquisition was free, and a token of appreciation to the chief or king who settled the immigrants was given. The chiefs also, derived much power from having many subjects as it meant higher revenue collections from taxes. Therefore, immigrants were very much welcomed, as land was abundant. Over time, with land getting scarce, land markets developed and some individuals started selling land from their native areas at a relatively higher price, acquiring more land in sparsely populated areas. Others just settled on unoccupied land without any permission and, given the land abundance, neither the government nor the absentee owners bothered to claim the land.

In the decades following the country's independence in 1962 to date, Uganda's population has grown at a rapid rate[10] (Figure 1). The current fertility rate is 6.7 children per mother and the population growth rate is 3.2 (World Bank, 2011), which is second in the world. This has led to land scarcity in all regions of Uganda. With land value increasing, the original owners started claiming land from the immigrants, which has led to increased tenure insecurity and high incidences of eviction-related conflicts. In the host/receiving communities, populations were highly heterogeneous, the consequence of commingling of immigrants from different ethnic/tribal backgrounds. Tribal heterogeneity makes it hard to establish informal conflict-resolution mechanisms common to all tribes in a community. Secondly, the mixing of tribes weakens and, in most cases, lead to a breakdown of previous ethnic-specific land customary tenure arrangements and commonly agreed-upon procedures of resolving conflicts found in the place. Coupled with the weak (almost non-existent) formal institutions, land evictions have escalated in those areas.

Other forms of land conflicts, boundary and inheritance conflicts, have existed for long but these have been amicably solved by clan members and elders in the community in the past, especially in homogeneous communities. Boundary conflicts have persisted because of poor land demarcation procedures. Individuals plant live plants at the land borders to mark their boundaries. However, these plants can be uprooted and replanted in a different location without the owner noticing the change, especially if boundary monitoring is minimal, as it has always been in the past in many rural areas in Uganda because of the land abundance angle. With land getting scarce, cases of trespassing and boundary manipulations have increased recently in

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[10] Uganda's population was 5.5 million in 1950 and has increased to 34 million in 2012 (Figure 1), an increase of about sevenfold.

Uganda. This is especially rampant in places where the household head is a woman or is relatively poor, the most vulnerable groups due to the inferior position they hold in the community. Inheritance conflicts, on the other hand, emanate from disagreements among siblings on how to share the land following the death of a parent. Until recently, in many cultures, girls and women were not allowed to inherit land after the death of the parents or husband. To date, even with the existence of a law requiring equal sharing of property, many communities still follow traditional beliefs and deprive women of their rights to inherit land, leading to inheritance-related conflicts.

B. Land institutional arrangements in Uganda

Uganda has experienced a series of land reforms[11] since its independence in 1962. The 1995 Constitution of Uganda mandates the Uganda Land Commission to manage the ownership and allocation of public land, whereas the District Land Board, in liaison with area land committees, facilitates the registration and transfer of interest and handling of other land-related issues within a district. In the case of land disputes mainly relating to registered land, land tribunals are mandated to determine the source of dispute and the compensation required (Uganda Constitution, 1995: Articles 248-243). To operationalize the constitution stipulations, a new land law was passed in 1998. The 1998 Land Act's objective was to develop an institutional framework for the control of land under a decentralized system of governance (Mwebaza and Ziwa, 2011). Land conflicts relating to customary land are handled in accordance with area-specific customary land arrangements. Due to ambiguous land laws, especially with regard to

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[11]The major land reforms are the Land Decree of 1975, the Constitution stipulations of 1995, the Uganda Land Act of 1998, and the most controversial, the Land (Amendment) Act of 2010 (Ministry of Lands, 2011; Mwebaza and Ziwa, 2011).

the relationship between land-owners and land tenants, the mandated institutions failed to resolve the land conflicts (Ministry of Lands, 2011). The main conflict cases, especially those relating to land evictions, are currently handled by the state minister for lands, who has faced several criticisms for usurping the powers of established institutions.

III.   **Conceptual Framework**

According to the evolution theory of land rights, increasing population density and land transactions can set in motion the precise definition of property rights (Platteau, 1996). In other words, property rights evolve with population growth. However, this may not be true in the case of heterogeneous communities where common informal institutions cannot be developed. Hence, failure to respond to population growth with the appropriate formal institutional innovations can lead to increased land conflicts over the shrinking pie (Deininger and Castagnini, 2006). In this section, we develop a conceptual framework to illustrate how land conflicts emerge following an increase in population density, especially in communities that start with unequal land distribution such as those in Uganda.

A. Emergence of land conflict

In our conceptual framework (Figure 2), two communities are traced over three periods. In period 0, population is generally sparse and land is abundant in both communities 1 and 2. However, communities are different in terms of agricultural potential and living conditions. Community 1 has better conditions for settlement and agriculture than Community 2. The thick forests, pests and diseases, and wild animals make Community 2 nearly uninhabitable; it remains occupied by a few indigenous inhabitants. Land tenure arrangements are purely

communal customary with land entrusted in the hands of clan heads and chiefs who are in charge of distribution and production arrangements. Access to better soils and expansion of arable land are realized through clearing the bushes using rudimentary tools of slash-and-burn. At this stage, both societies are purely homogeneous in terms of tribe composition.

In period 1, population increases in Community 1 (formerly inhabitable), land gets scarce and, at this stage, there is no longer unutilized land in the area. Land transactions begin in Community 1 and private customary tenure arrangements begin to emerge as land acquisition modes change from allocation by chiefs to purchases, renting, and inheritance. Following a period of land abundance where little attention on land boundaries was paid, when land value increases, boundary disputes emerge. This leads to higher monitoring, clear land demarcations, and formation of informal conflict-resolution mechanisms. A few farmers start out-migrating to Community 2 but, given the costs of emigration at this point such as parting with family and hostilities from indigenous settlers, out-migration it still minimal. In Community 2, due to population growth, animals are driven out and forests are cleared, but land is still abundant and it is almost at the level of Community 1 in period 0. With a few immigrants, the society starts getting heterogeneous, but the proportion of the indigenous settlers is large and they are able to relatively easily design common customary land arrangements to oversee land use, allocation, and conflict resolution in the community.

In period 2, land gets scarce in Community 1, transactions are high and, at this point, private customary tenure arrangements are at play. The community is still homogeneous and, due to high population density and the resulting small land sizes, land monitoring increases. Also, due to homogeneity of inhabitants, informal conflict-resolution mechanisms are

established, leading to a decline in land disputes. However, there is massive out-migration from Community 1 since selling a small piece of land enables a buyer to acquire a larger one in Community 2. What follows is land scarcity in Community 2 and, like Community 1 in period 1, boundary conflicts emerge. The difference here is that the community is highly heterogeneous, which makes formation of customary conflict-resolution mechanisms complicated and less functioning. Secondly, due to land abundance, the first immigrants just walk into a land sometimes allocated by the chiefs and community leaders to the indigenous settlers. When land gets scarce, the indigenous settlers start claiming their ancestral land and this sparks off land evictions.

In conclusion, as population density increases in communities that started with unequal land distribution, people emigrate from densely to sparsely populated communities. Sending communities remain homogeneous while receiving/host communities become heterogeneous. With land getting scarce, boundary conflicts emerge and this leads to the formation and strengthening of informal institutions in homogeneous communities. On the other hand, the mixing of tribes and ethnicities in the receiving communities lead to the breakdown of existing customary institutions in the receiving communities and a disagreement on the common institutions. This, in turn, in the absence of formal institutions, leads to an escalation of land-related conflicts as indigenous settlers turn against immigrants, demanding for their ancestral lands.

B. Theoretical model

We use a simple theoretical model to derive testable hypotheses. In the model, incidence of land conflicts in community j, represented by a binary indicator, LC_j, is determined by two

factors: land tension denoted by LT_j and tension absorption capacity or a threshold level, denoted by TA_j, above which tension turns into conflict, that is, $LC_j = 1$ if $LT_j > TA_j$ and 0 otherwise.

The land tension is increasing in demand for land in a given community ($DemandLand_j$), that is,

$$LT_j = f(DemandLand_j (+)),$$

where $+$ or $-$ in the parentheses indicate the sign of the effect of the right-hand variable on the left-hand variable. The demand for land, on the other hand, is an increasing function of population density and soil quality and a decreasing function of remoteness:

$$DemandLand_j = h(Pop_j(+), Remote_j(-), Soil_j(+)).$$

Land institutions determine the level of the threshold TA_j and evolve so as to reduce conflicts LC_j. However, in the absence of external intervention to alter institutional structure, land institutions remain history-dependent and take time to change. The current institutions are shaped by the community history in terms of number of immigrants, previous population density, and previous institutions. Thus, the current tension absorption capacity is determined by the past population density. If past population density was high, there will be fewer immigrants and hence informal institutions will remain strong, whereas many tribes weaken the functioning of customary institutions as different tribes have different customary beliefs that are hard to harmonize. That may be represented by the following equation:[12]

$$TA_{j,t} = g(Pop_{j,t-1}(+), NumTribes_{j,t}(-)),$$

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[12] The second subscript represents time in the equation, which is added corresponding to the consideration of the time dimension.

In sum, the reduced form equation of land tension is given by

$$LT_{j,t} = f(Pop_{j,t}\,(+), Remote_{j,t}(-),\ Soil_{j,t}(+)).$$

The likelihood of land conflicts occurring is expressed by the following equation:

$$\Pr(LC_{j,t} = 1)\quad = \Pr(\,LT_{j,t} > TA_{j,t})$$

$$= \Pr(\,f(Pop_{j,t}, Remote_{j,t},\ Soil_{j,t}) - g(Pop_{j,t-1},\ NumTribes_{j,t}) > 0).$$

From the likelihood equation, we derive the following hypotheses:

1) Communities with many tribes (most heterogeneous) have more land-related conflict cases than their counterparts with fewer tribes. This is because heterogeneity lowers tension absorption capacity since it is costly for multi-tribe societies to come up with common land institutions and to establish conflict-resolution mechanisms.

2) Higher past population density means fewer immigrants and hence strong traditional institutions. Sending communities had relatively higher past population density than receiving communities and hence fewer immigrants. It, therefore, follows that informal institutions are weak in receiving communities, which lowers tension absorption capacity. We therefore hypothesize that there are more conflict cases in receiving communities than in sending communities.

3) Higher current population density leads to higher demand for land, which increases land tension and thus increase the likelihood of conflicts. We therefore hypothesize that high current population density is associated with more conflict cases after controlling for community type.

Boserup (1965) argues that demographic changes are the major determinants of changes in agricultural technology aimed at maintaining or even improving yields to ensure food security. Agrarian societies shift from forest fallow, to bush fallow, annual cropping, use of fertilizers and to more intensive mechanisms as population grows. However, with land conflicts, population increase and land scarcity may not be followed by agriculture intensification. Land conflicts create land insecurity, which impedes meaningful land improvements and this, in turn, results in lower productivity. We hypothesize thus:

4) There is lower yield on plots with conflicts than on the counterparts without conflicts owned by the same household. Also, eviction conflicts have more impact on yield than other conflict types: boundary and inheritance conflicts. This is because eviction conflict poses a greater threat of not retaining the land in future, which acts as a disincentive to investing in the land, hence affecting productivity.

C. Estimation strategy

To assess the impact of rural-rural migration on the likelihood of land conflicts, we adopt a linear probability modeling framework. Denote plot by p, household by i, and village by j. Let C_{pij} be a dummy variable equal to 1 if there has been a conflict on plot p in the past two cropping seasons, owned by household i in village j. We hypothesize that being in a receiving community and having many tribes in a community are associated with a higher probability of having a conflict on a plot, holding other factors constant. Formally, we estimate a linear probability equation of the form:

$$C_{pij} = \alpha + \beta R_j + \gamma Tr_j + \delta Pop_j + \theta R_j * Pop_j + \vartheta M_{pij} + \partial X_{ij} + \emptyset Z_j + \varepsilon_{pij} \qquad (1)$$

where R_j is a dummy that takes the value of 1 if a community is categorized as receiving and zero if it is sending, Tr_j stands for the number of tribes in a community, M is a vector of plot characteristics such as whether the plot is under private customary[13], communal customary or Mailo[14] tenure system. Under Private customary tenure, farmers hold land permanently and they have full rights to transfer, bequeath and give away land without any consultation with other community members whereas under community customary the right to use, modify or inherit land is granted by the clan or extended family head(s) such as chief whose moral power is derived from their position as senior member(s) of the family. Also the head allocates land to new comers and settles disputes. X_{ij} is a vector of household characteristics, including head age, gender, years of schooling, family size, and household assets (in Uganda shillings). Z_j is a vector of other village controls: whether road to district is tarmac, all-season dirt, or season dirt road. These variables capture the impact of accessibility/remoteness on land conflicts. Demand for land increases with accessibility, which, in turn, increases land value. Higher land value, in the absence of strong institutions to regulate land transactions and management, raises the likelihood of trespassing and land grabbing. In terms of quality, tarmac road is better, followed by all-season dirt road and season dirt road, in that order. ε_{pij} is the idiosyncratic error term.

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[14] In central Uganda (Buganda kingdom), the colonialists introduced the Mailo tenure system where land, about 19,600 square miles, was divided into mile blocks (hence Mailo) and given to chiefs and other officials with their titles in Buganda kingdom through the Buganda Agreement of 1900 (West, 1965; Rugadya, 1999). Former peasants who were cultivating the land never got a share and instead became tenants, obliged to pay rent to title holders. Since then, a landlord-tenant relationship has been created. Landlords own titles, but tenants have usufruct rights.

To test for the impact of land-related conflicts on yield, we use a household fixed effects regression using two seasons (the second cropping season in 2011 and the first cropping season in 2012) semi-panel data set. Letting Y_{pis} be yield from plot p, belonging to household i in season s, we run the following regression:

$$Y_{pis} = \alpha + \beta C_{pis} + \gamma Z_{pis} + \delta X_i + v_{is} + \mu_{pis} \qquad (2)$$

where C_{pis} is a dummy variable that takes 1 if there has been a conflict on the plot and zero otherwise. In a different specification, we break down conflicts into eviction, boundary, and inheritance conflicts so C_{pis}, in this case, is a vector of variables eviction and boundary conflicts using inheritance conflict as a reference cartegory variable. Plot characteristics Z_{pis} include distance to the plot in minutes, whether the plot is in private customary tenure or Mailo tenure, evaluated against communal customary, and how the plot was acquired (inherited, just walked in, and purchased using whether it was rented as a reference). X_i is a vector of household controls including farm size in hectares, household head gender, age, and years of schooling, household assets, Thompson index (a measure of land fragmentation) and dependence rate (the ratio of family members less than 15 and above 65 years to family work force; those between 15 and 65 years). v_{is} captures household and season fixed effects, while μ_{pis} is an error term that may be heteroskedastic and correlated within a household and season. We adjust for this by using robust standard errors and covariance matrices that allow for "clustering" of the error terms at village, season, and year groups (see Wooldridge, 2010, Chapter 20).

IV. Data and Descriptive Evidence

A. Data

We used two data sets from the household and community surveys in Uganda, one collected as part of the Research on Poverty, Environment, and Agricultural Technology (RePEAT) panel studies and another from a survey on land tenure systems in Uganda. Both studies were simultaneously conducted in 2012/2013. The sample for the RePEAT project largely builds upon and complements a completed research project on policies for improved land management in Uganda, conducted by the International Food Policy Research Institute (IFPRI) and Makerere University from 1999 to 2001 (Pender, et. al, 2004). The latter involved a survey of 107 Local Council ones (LC1s), selected from two-thirds of the regions in Uganda, including the more densely populated and more secure areas in the southwest, central, east, and parts of northern Uganda and representing seven of the nine major farming systems of the country. Because of insecurity issues in the north and northeastern parts of the country, LC1s in this region were excluded from the surveyed samples. The RePEAT project was conducted in 29 of 32 districts and in 94 of 107 LC1s studied by IFPRI. From each LC1, 10 households were selected to make a total of 940 sample households (Yamano et al., 2004). The RePEAT surveys were jointly conducted by Makerere University, the Foundation for Advanced Studies on International Development (FASID), and the National Graduate Institute for Policy Studies (GRIPS) in 2003, 2005, 2009, and by Makerere University and GRIPS in 2012/2013. We supplemented the RePEAT data with data on land tenure systems. For each RePEAT LC1, we randomly sampled one of the neighboring LC1s for land survey. In both RePEAT and land tenure projects, community surveys were conducted along with the household surveys. In the

household survey, information were solicited on basic household composition and demographics, wealth, and economic activities. Plot-level information were also collected on land tenure systems, land conflicts, land use, and crop inputs and harvests for the two seasons (the second cropping season in 2011 and the first cropping season in 2012). The community survey also elicited information on migration history of community inhabitants for two generations (current and the second generations), number of tribes in the community, accessibility in terms of nature of quality roads to district headquarters and to main markets.

B. **Descriptive statistics**

Tables 1 and 2 provide information on the characteristics of sending and receiving communities using data from the RePEAT and land tenure projects, respectively. In receiving communities, 52% of the current-generation and 41% of the second-generation households immigrated. In the sending communities, the proportion of current and second-generation households that immigrated were 10% and 8%, respectively. Because of many immigrants from different origins, receiving communities are highly heterogeneous as reflected in the number of tribes (seven tribes) compared with three tribes in the sending communities. Table 2 presents the proportion of households belonging to the largest tribe as another measure of heterogeneity. Sixty-seven percent of the households belonged to the largest tribe in the receiving communities while the proportion rose to 93% in the sending communities. Sending communities are more densely populated than receiving communities. There are 4.3 persons per hectare in sending communities, higher than 3.5 persons per hectare in receiving communities (Table 1). Land

transactions started earlier in the sending than in the receiving communities. Land renting[15] started in the 1970s in most of the sending communities, while it started around 2000 for most of receiving communities. This reinforces the argument that sending communities became densely populated much earlier than receiving communities, which motivated migrations across communities.

Table 3 presents information on household, parcel, and plot characteristics. On average, households in sending communities have smaller land (2 hectares) than in receiving (2.9 hectares). Land was more fragmented in sending communities with a Thompson index[16] of 0.54 in sending communities compared with 0.36 in receiving communities. The average distance to the plot was 21 minutes in sending communities, higher than 17 minutes in receiving communities. This is due to land scarcity, which forces people to operate plots far away from their homesteads, either through renting or purchase, and is consistent with the high level of land fragmentation in sending communities. Private customary arrangements have developed in sending than in receiving communities; 61% and 50% of the parcels were in private customary tenure in sending and receiving communities, respectively. Mailo tenure, on the other hand, was dominant in receiving communities, with 25% of parcels in receiving communities being in Mailo tenure compared with 6% in sending communities. In terms of acquisition mode, most of the parcels in sending communities were inherited, while in receiving communities, they were purchased. This is consistent with the fact that most inhabitants in receiving communities

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[15] We do not use land purchase information because historically people would acquire land by paying a small token of appreciation as hen or traditional cloth (Kanzu) to the chiefs. This was sometimes reported as in-kind purchase, which could be monetized so we had to opt for land renting, which was not ambiguous.

[16] Thompson index is a measure of fragmentation that ranges from 0 to 1. It takes 0 if a household has one parcel and 1 if has infinite parcels.

immigrated and purchased land from indigenous people. Fewer parcels were rented-in in sending communities than in receiving communities. From focus group discussions, we learned that, due to land scarcity in sending communities, renting was being phased out and people chose migration if they cannot find enough land to till.

There were more cases of land conflicts in receiving communities than in sending communities. Households in receiving communities have had conflict concerns on 16% of the parcels they access, while 8% have had similar concerns in sending communities. There have been conflicts on 12% of the parcels in receiving communities compared with 5% in sending communities. Unbundling conflicts by type reveals that all conflict types were higher in receiving than in sending communities. Eviction, boundary, and inheritance-related conflicts were seen in 4%, 5%, and 2% of the parcels in receiving communities, respectively. In sending communities, on the other hand, 1%, 2%, and 1% of the parcels have had eviction, boundary, and inheritance conflicts, in the same order.

The average maize yield was not different between the two community types. Yield was 1282.7 kilograms per hectare in sending and it was 1181.2 kilograms per hectare in receiving communities. Farmers in sending communities used improved seeds on 33% of the maize plots, while they were used on 29% of the plots in receiving communities. Given that receiving communities are closer to the capital city and less remote than sending communities, the less use of improved seeds warrants close attention. Twenty-three percent of receiving communities can access district headquarters on a tarmac road, but only 14% of sending communities can access the district by tarmac. Also, 58% of the communities can access district headquarters by

all-season dirt roads in receiving communities, higher than 46% in sending communities. In contrast, 39% of sending communities can access district headquarters using season dirt roads (poor type) compared with 19% of receiving communities.

V.   Econometric Results

We discuss the estimates of the relationship between rural-rural migration and land conflicts in Uganda. We start with results comparing conflict cases on parcels in receiving communities and those in sending communities. Also, we show how community heterogeneity (using number of tribes as a proxy) and population density are related to land conflicts. In the second part, we compare yield on plots with conflicts with yield on those without conflicts operated by the same household. As indicated above, the unit of observation for the first part is a parcel and that for the second part is a plot.

A. Rural-rural migration and land conflicts

Table 4 presents results on the association between community type, number of tribes, and land conflicts. We found that the probability of having a conflict on a plot was 6% points higher on plots in receiving communities than those in sending communities. This, we think, is caused by the weak traditional informal land arrangements in receiving communities following immigration and the mixing of tribes with different ethnic-specific land arrangements and conflict-resolution mechanisms. Indeed, we found that communities with many tribes had a higher probability of having conflicts on the parcels. There was no relationship between population density and land conflicts, but the coefficient has a negative sign. This is reasonable

because sending communities, which were densely populated, were homogeneous and had better functioning informal land institutions. The findings reinforce the notion that population explosion leads to land conflicts if institutions are weak (Fred-Mensah, 1999; Donge and Pherani, 1999).

We also found that accessibility was positively associated with land conflicts. Communities connected to district headquarters by tarmac roads and all-season dirt roads had a higher probability of conflicts than those connected by season dirt roads. Accessibility means better opportunities over land. Well-accessed land can be used for modern farming because of available market for goods. This raises demand for land, land value, and hence, in the absence of strong institutions to oversee land transactions, land conflicts emerge.

Consistent with past studies (e.g., see Deininger and Castagnini 2006), we found that the probability of female-headed households to be affected by land conflicts was 3% points higher than male-headed households. In Uganda, traditionally, women were not allowed to inherit land, claiming that they belonged to the household they married into. Though abolished by the 1995 Constitution and the Land Act of 1998, many societies still follow their traditions of not bequeathing land to their daughters and widows. This has raised conflicts over land occupied by women. Secondly, women, being one of the vulnerable groups, are looked down and it is common for neighboring farmers to trespass and claim part of their land, which raises disputes. We also noted the higher likelihood of conflicts on parcels under Mailo tenure and private customary compared with those on communal customary tenure. Mailo tenure arrangements grant rights to both owners and tenants, and this has increased insecurity and friction over the same land between tenants and landlords.

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Looking at conflicts by type (Tables 5a and 5b), we found that having many tribes in a community was associated with a higher likelihood of land evictions and inheritance conflicts but not boundary conflicts. Also, parcels in a receiving community had, 2% points, higher probability of eviction and boundary conflicts but not inheritance conflicts. These results suggest that migrations are mainly associated with eviction conflicts. We also found that having a female-headed household was associated with about 2% points more boundary and inheritance conflicts but no effect on eviction conflicts, reinforcing the belief that women are neglected when bequeathing land and, due to their weak status in society, people encroach on their land, which increases boundary conflicts. On the other hand, there were more eviction conflicts on parcels under Mailo tenure system, but no association was found for other conflict types. This confirms the belief that the level of insecurity on Mailo tenure has raised incidences of land eviction. We found that there are significantly more boundary conflicts and less inheritance conflicts on parcels under private customary than those under communal customary.

Table 6 presents results on the use of informal customary institutions to resolve conflicts by those farmers with conflicts on their parcels. We found that receiving communities had, 23% points, lower probability of consulting informal institutions[17] to resolve their conflicts than sending communities. This suggests the lack of trust in the capacity of customary institutions to handle conflicts in receiving communities. This is not surprising since receiving communities are very mixed in terms of ethnicity and languages, and hence, traditional institutions of elders

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[17]Informal customary institutions involve consulting clan members, elders, and neighbors. Those who do not trust those institutions report to the police and seek redress from the courts, whose capacity to handle conflicts is still weak and costly in rural Uganda.

are likely to be biased in handling conflicts, especially if local committees are dominated by people from one section.

To examine whether there is a difference in relationship between the timing of immigrants and land conflicts, we looked at the proportion of immigrants in the past and current generation and related it to conflicts and conflict types. As shown in Tables 7 and 8, communities with larger proportions of immigrants, both in the past and current generations, relative to indigenous people had a higher probability of conflicts. However, unbundling conflicts by type reveals that communities with a large proportion of current-generation immigrants have more eviction conflicts, while those with a large proportion of past-generation immigrants had more boundary conflicts. The possible explanation for these findings is that, due to land scarcity and high land value, current-generation immigrants face strong resistance from original inhabitants, which increases land evictions. The past generations face boundary-related conflicts because there was (is) no clear land demarcation in rural Uganda. Many people use live plants to mark boundaries and these can be uprooted and replanted in a different position. In the past, due to land abundance, less attention was paid to boundaries, but with increasing land scarcity, disputes over boundaries have risen, mainly affecting past immigrants.

B. Productivity impact of land conflicts

Table 9 presents the impact of land-related conflicts on bean and maize yields, widely grown annual crops in Uganda. Specifications 1 and 3 control for village and season dummies, while 2 and 4 control for household and season dummies. Also, specifications 1 and 2 bundle conflicts, while 3 and 4 look at the relative effects of different conflict types on productivity.

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Yield was 17% significantly lower on plots with land conflicts than on other plots without conflicts and owned by the same household. Furthermore, after unbundling conflicts, we found that eviction conflicts hurt productivity more than did other conflict types. Plots with eviction conflicts had 36%, significant at 5%, lower yield compared with those with inheritance conflicts. We did not find a significant impact of boundary conflicts on yield relative to inheritance conflicts. The results can be explained by the fact that eviction conflicts created uncertainty over owning the same conflicted parcel of land in the future, which increases land insecurity. The insecurity in turn impedes land improvement, which hurts agricultural productivity. Also, acts such as destroying other people's crops as a threat to evict them are common if there are eviction disputes over land. It is thus not surprising that the impact of eviction conflicts on productivity was twice the impact of all conflicts combined.

VI. **Sensitivity Analysis**

Table 10 presents different specifications by which we classified receiving communities on the basis of different criteria. In Tables 4 and 5, communities were defined as receiving if more than 30% of the current or past community households were immigrants. We argued that neighborhood migration -where some people in-migrate from neighboring communities that share the same customary institutions- can set a higher proportion of immigrants without changing land arrangements. Also, even if immigrants are from far-away communities with different tenure arrangements, land conflicts may not arise since the minority groups will adopt the prevailing customary institutions in their host communities. In Table 10, we present different thresholds above which a community was categorized as receiving: 70%, 20%, 10%,

and 0% of immigrants. As noted before, the coefficient for receiving community dummy got smaller as we moved from a threshold of 30% toward zero but significant. At 70%, a higher threshold, the coefficient was smaller though still significant. These findings suggest that the selected threshold may well represent the situation in rural communities and is thus a better choice for community cartegorization.

VII.   **Conclusion and Policy Implications**

Are rural-rural migrations associated with land conflicts and do land conflicts hurt agricultural productivity? Indeed, they do. Tracing rural-rural migration patterns, this study finds that the probability of having land-related conflicts is higher in receiving than in sending communities. Also, we find that increasing the number of tribes, a measure of heterogeneity, increases the probability of having conflicts. Land conflicts, in turn, reduce productivity by 17%, an impact that increases after unbundling conflicts, by type, to 36% for land evictions.

Our results suggest that rural-rural migrations weaken pre-existing informal land institutions, which leads to the breakdown of conflict-resolution mechanisms and, in the absence of well-functioning formal institutions, to an increase in land conflicts. The impact will be even higher if the in-migrants are from various tribal backgrounds. Indeed, we find that, among farmers with land conflicts, those in receiving communities are less likely to approach informal institutions such as clan members to resolve those conflicts.

We, however, note that our productivity impact of land conflicts can be taken as lower bound because: we did not observe the effect on those plots lost due to conflicts, a conflict on

one plot can have spillover effect on the security over other owned plots especially if it is of eviction type, and some farmers hide some conflict information due to the sensitivity of the issue as observed by Deininger and Castagnini (2007).

These findings have several key implications. For example, most governments in SSA claim that formalizing land institutions, such as titling, is an expensive undertaking for poor countries and hence question its cost effectiveness. Indeed, some studies find no impact of titling in SSA (Brasselle, Gaspart, and Platteau, 2002; Jacoby and Minten, 2007). However, our results suggest that titling and formalization efforts can target only those areas where informal land institutions are not functioning and, hence, which are prone to land conflicts as our study suggests. Indeed, Jacoby and Minten (2007) argue that land titling may not yield any significant impact if pre-existing informal institutions are well functioning.

Secondly, administration of land should be reformed, especially in the conflict-prone areas. Uganda currently relies more on local leaders in resolving conflicts. When a case is recorded or even before applying for a title, the area land committee has to be consulted. However, in heterogeneous communities, the composition of such committees is biased toward the larger ethnic group, in most cases, the original inhabitants. For this reason, cases of land forgeries and illegal transactions have been on the rise, especially in receiving communities and this has raised the cases of land evictions. An independent body in charge of controlling land transactions and resolving land conflicts would help reduce the incidence and escalation of land-related conflicts in Uganda.

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Table 1: Community characteristics.

	Sending (S)		Receiving (R)		|S-R|
	Mean	SD	Mean	SD	
Number of tribes	2.630	1.884	6.565	4.554	***
Current generation born out	0.097	0.087	0.522	0.249	***
Past generation born out	0.082	0.138	0.410	0.264	***
Total immigrants	0.179	0.197	0.932	0.295	***
Village density in 2003 (population/total ha)	4.298	1.555	3.533	1.855	***
Road to district: tarmac	0.143	0.356	0.219	0.417	
Road to district: all-season dirt	0.464	0.508	0.578	0.498	***
Road to district: season dirt	0.393	0.497	0.188	0.393	***
Observations	27		64		

Note: Authors' computation using RePEAT data: 2012 & 2003.
*** is significant at 1%, ** at 5%, and * at 10%.

Table 2: Summary statistics

	Sending (S)		Receiving (R)		|S-R|
	Mean	SD	Mean	SD	
Number of tribes	2.179	1.926	7.706	5.994	***
Proportion in largest tribe	0.932	0.134	0.665	0.201	***
Average land size per HH	1.732	1.551	2.120	1.932	
Size above which HH is a large holder	3.089	2.322	4.183	4.811	
Size below which HH is a small holder	1	0.817	0.875	0.915	
When did land renting start?					
Before 1970	0.643	0.488	0.196	0.401	***
1970s & 1980s	0.000	0.000	0.000	0.000	
1990s	0.107	0.315	0.275	0.451	*
2000s	0.250	0.441	0.490	0.505	**
Land demarcation methods					
Live plants	0.964	0.189	0.824	0.385	*
Survey stones	0.000	0.000	0.078	0.272	
Live fence	0.000	0.000	0.098	0.300	*
Separating trench	0.036	0.189	0.000	0.000	
Observations	28		51		

Notes: Authors' own computation using own land project data, 2012.
*** is significant at 1%, ** at 5%, and * at 10%.

Table 3: Plot, parcel, and household characteristics

	Sending (S)		Receiving (R)		|S-R|
	Mean	SD	Mean	SD	
Plot level					
Yield (kg/ha)	1283	1433	1193	1225	
Intercropped	0.59	0.49	0.67	0.47	***
Improved seed	0.19	0.39	0.15	0.35	***
Observations	1382		2436		
Parcel level					
Distance to parcel	21.34	40.94	17.61	37.11	**
Tenure systems					
Private customary	0.61	0.49	0.50	0.50	***
Leasehold	0.00	0.03	0.01	0.11	***
Mailo	0.06	0.23	0.25	0.44	***
Communal customary	0.33	0.47	0.18	0.39	***
Acquisition mode					
Inherited	0.47	0.50	0.26	0.44	***
Walked in	0.00	0.04	0.01	0.08	**
Purchased	0.42	0.49	0.57	0.49	***
Rented	0.08	0.27	0.10	0.31	***
Mailo tenant	0.04	0.19	0.17	0.38	***
Has right to sell the parcel	0.59	0.49	0.58	0.49	
Title	0.01	0.11	0.08	0.26	***
Council-endorsed transaction agreement	0.32	0.46	0.52	0.50	***
Not endorsed agreement	0.28	0.45	0.19	0.39	***
Land conflicts					
Conflict concern	0.08	0.26	0.15	0.36	***
Had conflict	0.05	0.21	0.12	0.32	***
Conflict type					
Inheritance conflict	0.01	0.12	0.02	0.12	*
Boundary conflict	0.02	0.15	0.05	0.22	***
Eviction	0.01	0.11	0.04	0.19	***
Conflict-resolution mechanism					
Formal mechanisms	0.03	0.16	0.07	0.26	***
Informal mechanisms	0.02	0.13	0.03	0.16	
Observations	1117		1420		
Household level					
Land size	2.00	1.92	2.82	3.81	***
Thompson index	0.54	0.25	0.36	0.28	***
Female-headed household	0.13	0.34	0.18	0.38	
Household head's age	53.16	15.16	52.98	13.81	
Household head's grade	5.53	3.86	5.94	3.79	**
Family size	7.69	3.78	7.90	3.58	**
Asset values (per 1000 Uganda shilling)	719.4	990.8	1040.2	1355.5	**
Observations	304		599		

Notes: Authors' computation using 2012 RePEAT data.

The plot-level characteristics are for the two major annual crops grown, maize and beans.

*** is significant at 1%, ** at 5%, and * at 10%.

Table 4: Rural migration, community heterogeneity, and land conflicts.

Dependent variable takes 1 if there has been a conflict over a parcel			
	(1)	(2)	(3)
Receiving community=1	0.0586***		0.0602***
	(4.818)		(2.641)
Number of tribes		0.00661***	
		(3.400)	
Village density in 2003 (persons/ha)	-0.000124	-0.000703	-1.13e-06
	(-0.0724)	(-0.416)	(-0.000675)
Receiving* density			-0.000319
			(-0.0801)
Road to district[a]: Tarmac=1	0.0242	0.0201	0.0241
	(1.470)	(1.193)	(1.465)
All-season dirt road=1	0.0353***	0.0338**	0.0354***
	(2.662)	(2.530)	(2.667)
Has right to sell plot=1	-0.0227	-0.0175	-0.0227
	(-1.571)	(-1.220)	(-1.574)
Tenure system[b]: Mailo =1	0.0498**	0.0520**	0.0498**
	(2.326)	(2.372)	(2.325)
Private customary=1	0.0221*	0.0256*	0.0221*
	(1.688)	(1.927)	(1.686)
Female head=1	0.0331	0.0302	0.0331*
	(1.643)	(1.495)	(1.647)
Head's age	0.000971**	0.000827*	0.000976**
	(2.001)	(1.692)	(1.992)
Head's grade	7.98e-07	-0.000134	8.80e-06
	(0.000478)	(-0.0811)	(0.00526)
Family size	0.000734	0.000432	0.000748
	(0.426)	(0.248)	(0.428)
Assets log (Uganda shillings)	0.000596	0.00119	0.000588
	(0.109)	(0.219)	(0.108)
Constant	-0.0403	-0.0306	-0.0413
	(-0.836)	(-0.633)	(-0.849)
Observations	2,251	2,251	2,251
R-squared	0.030	0.028	0.030
P-value. Ho: Population density has no effect on conflicts in Receiving communities. [c]			0.9289

Notes: In parentheses are t-statistics computed using robust standard errors.

*** is significant at 1%, ** at 5%, and * at 10%.

[a] The reference category for tarmac and road to district is the season-dirt road.

[b] The reference category for Mailo and individual customary is community customary

[c] We test for the differential impact of population density across communities. P values are reported.

Table 5a: Rural-rural migration and land conflict types

	Eviction conflict=1			Boundary conflict=1		
	(1)	(2)	(3)	(4)	(5)	(6)
Receiving community=1	0.0211***		0.0203	0.0218**		0.0294*
	(3.425)		(1.452)	(2.428)		(1.876)
Number of tribes		0.00334**			-0.000207	
		(2.501)			(-0.193)	
Village density 2003 (persons/ha)	0.00109	0.000858	0.00103*	-0.000746	-0.000895	-0.000151
	(1.008)	(0.804)	(1.854)	(-0.618)	(-0.741)	(-0.105)
Receiving* density			0.000166			-0.00155
			(0.0609)			(-0.603)
Road to district[a]: Tarmac=1	0.0145	0.0108	0.0145	-0.00195	0.00275	-0.00227
	(1.558)	(1.148)	(1.574)	(-0.172)	(0.238)	(-0.198)
All-season dirt road=1	0.00794	0.00529	0.00788	0.0169*	0.0223**	0.0174*
	(1.021)	(0.686)	(1.024)	(1.871)	(2.359)	(1.938)
Has right to sell plot=1	-0.00342	-0.000958	-0.00341	-0.000393	-2.78e-05	-0.000500
	(-0.396)	(-0.112)	(-0.395)	(-0.0435)	(-0.00308)	(-0.0555)
Tenure system[b]: Mailo =1	0.0339**	0.0325**	0.0339**	-0.00188	0.00496	-0.00191
	(2.479)	(2.241)	(2.479)	(-0.158)	(0.411)	(-0.160)
Private customary=1	-0.00427	-0.00248	-0.00426	0.0247***	0.0246***	0.0247***
	(-0.567)	(-0.320)	(-0.565)	(2.887)	(2.845)	(2.878)
Female head=1	0.000716	-0.00120	0.000693	0.0233	0.0247*	0.0235
	(0.0683)	(-0.114)	(0.0661)	(1.614)	(1.709)	(1.633)
Head's age	0.000535*	0.000468*	0.000533*	0.000460	0.000446	0.000479
	(1.902)	(1.707)	(1.879)	(1.375)	(1.323)	(1.421)
Head's grade	0.000214	4.04e-05	0.000210	-0.000349	-5.05e-05	-0.000310
	(0.228)	(0.0452)	(0.227)	(-0.348)	(-0.0501)	(-0.307)
Family size	0.000857	0.000685	0.000850	0.000121	0.000184	0.000190
	(0.852)	(0.670)	(0.837)	(0.0956)	(0.145)	(0.149)
Assets log (Uganda shillings)	-0.00272	-0.00293	-0.00271	0.00192	0.00334	0.00189
	(-0.963)	(-1.058)	(-0.957)	(0.519)	(0.920)	(0.508)
Constant	-0.0201	-0.0147	-0.0196	-0.0303	-0.0321	-0.0351
	(-0.704)	(-0.528)	(-0.726)	(-1.012)	(-1.063)	(-1.132)
Observations	2,251	2,251	2,251	2,251	2,251	2,251
R-squared	0.017	0.020	0.017	0.014	0.011	0.014
P-value. Ho: Population density has no differential effect on conflicts across communities[c]			0.6551			0.4245

Notes: In parentheses are t-statistics computed using robust standard errors.

*** is significant at 1%, ** at 5%, and * at 10%.

[a] The reference category for tarmac and road to district is the season-dirt road.

[b] The reference category for Mailo and individual customary is community customary.

[c] We test for the differential impact of population density across communities. P-values are reported.

Table 5b. Rural migration, heterogeneity, and land conflicts

VARIABLE	(1)	(2)	(3)
	Inheritance conflict=1		
Receiving community=1	0.00335		-0.00533
	(0.636)		(-0.565)
Number of tribes		0.00121*	
		(1.827)	
Village density 2003 (persons/ha)	-0.000482	-0.000536	-0.00117*
	(-0.754)	(-0.860)	(-1.791)
Receiving* density			0.00178
			(1.121)
Road to district[a]: Tarmac=1	0.0153*	0.0131	0.0156*
	(1.813)	(1.515)	(1.864)
All-season dirt road=1	0.000172	-0.00177	-0.000436
	(0.0271)	(-0.293)	(-0.0671)
Has right to sell plot=1	-0.00812	-0.00732	-0.00800
	(-1.178)	(-1.075)	(-1.164)
Tenure system[b]: Mailo =1	0.0260**	0.0242*	0.0260**
	(2.027)	(1.912)	(2.028)
Private customary=1	-0.0102*	-0.00952	-0.0101*
	(-1.671)	(-1.563)	(-1.656)
Female head=1	0.0181*	0.0171	0.0178*
	(1.673)	(1.607)	(1.649)
Head's age	-0.000172	-0.000193	-0.000194
	(-0.805)	(-0.886)	(-0.904)
Head's grade	0.000801	0.000684	0.000756
	(1.002)	(0.881)	(0.944)
Family size	0.000205	0.000133	0.000126
	(0.332)	(0.217)	(0.195)
Assets log (Uganda shillings)	-0.00306	-0.00340	-0.00302
	(-1.120)	(-1.276)	(-1.102)
Constant	0.0387*	0.0410*	0.0442*
	(1.688)	(1.792)	(1.868)
Observations	2,251	2,251	2,251
R-squared	0.020	0.022	0.021
P-value. Ho: Population density has no differential effect on conflicts across communities[c]			0.66

Notes: In parentheses are t-statistics computed using robust standard errors.
*** is significant at 1%, ** at 5%, and * at 10%.
[a] The reference category for tarmac and road to district is the season-dirt road.
[b] The reference category for Mailo and individual customary is community customary.
[c] We test for the differential impact of population density across communities. P-values are reported.

Table 6: Rural-rural migration and conflict resolution mechanisms

	Dependent variable takes 1 if farmer used informal means to resolve land conflict	
	(1)	(2)
Receiving community=1	-0.218**	
	(-2.362)	
Number of tribes		-0.000866
		(-0.102)
Village density 2003 (persons/ha)	-0.0201	-0.0190
	(-1.322)	(-1.078)
Road to district[a]: Tarmac=1	-0.0206	-0.0420
	(-0.170)	(-0.339)
All-season dirt road=1	-0.0869	-0.118
	(-0.816)	(-1.114)
Has right to sell plot=1	0.00583	0.0206
	(0.0772)	(0.261)
Tenure system[b]: Mailo =1	-0.0532	-0.146
	(-0.475)	(-1.367)
Private customary=1	-0.0575	-0.128
	(-0.560)	(-1.241)
Female head=1	0.0448	0.0595
	(0.485)	(0.630)
Head's age	-0.00678***	-0.00605**
	(-2.760)	(-2.337)
Head's grade	-0.000560	-0.00244
	(-0.0595)	(-0.247)
Family size	-0.00281	-0.00762
	(-0.302)	(-0.781)
Assets log (Uganda shillings)	0.0451	0.0588
	(1.232)	(1.528)
Constant	0.744***	0.571**
	(3.022)	(2.313)
Observations	192	188
R squared	0.090	0.061

Notes: In parentheses are t-statistics computed using robust standard errors.
*** is significant at 1%, ** at 5%, and * at 10%.
[a] The reference category for tarmac and road to district is the season-dirt road.
[b] The reference category for Mailo and individual customary is community customary.

Table 7: Proportion of immigrants and land conflict cases

	Dependent variable takes 1 if there has been conflict over a parcel		
	(1)	(2)	(3)
% migrants: current generation	0.0499**		
	(2.112)		
% Migrant: past generation		0.0914***	
		(3.698)	
% migrants: total			0.0560***
			(3.947)
Village density 2003 (persons/ha)	-0.000643	-0.000216	-0.000236
	(-0.381)	(-0.128)	(-0.139)
Road to district[a]: Tarmac=1	0.0335**	0.0286*	0.0301*
	(2.066)	(1.753)	(1.856)
All-season dirt road=1	0.0432***	0.0343**	0.0347**
	(3.255)	(2.548)	(2.557)
Has right to sell plot=1	-0.0186	-0.0177	-0.0187
	(-1.296)	(-1.235)	(-1.304)
Tenure system[b]: Mailo=1	0.0641***	0.0619***	0.0592***
	(2.933)	(2.819)	(2.715)
Private customary=1	0.0233*	0.0166	0.0193
	(1.797)	(1.295)	(1.516)
Female head=1	0.0332*	0.0337*	0.0315
	(1.655)	(1.676)	(1.572)
Head's age	0.000841*	0.000922*	0.000910*
	(1.727)	(1.896)	(1.873)
Head's grade	0.000409	0.000749	0.000396
	(0.245)	(0.455)	(0.239)
Family size	0.000594	0.00104	0.000834
	(0.348)	(0.605)	(0.486)
Assets log (Uganda shillings)	0.00256	0.000854	0.000531
	(0.469)	(0.158)	(0.0966)
Constant	-0.0397	-0.0407	-0.0435
	(-0.838)	(-0.857)	(-0.917)
Observations	2,278	2,278	2,278
R squared	0.020	0.025	0.025

Notes: In parentheses are t-statistics computed using robust standard errors.

*** is significant at 1%, ** at 5%, and * at 10%.

[a] The reference category for tarmac and road to district is the season-dirt road.

[b] The reference category for Mailo and individual customary is community customary.

Table 8: Proportion of immigrants and land conflict types.

	Eviction conflict		Boundary conflict		Inherit conflict	
	(1)	(2)	(3)	(4)	(5)	(6)
% migrants: current generation	0.0449***		0.00237		-0.00103	
	(3.082)		(0.144)		(-0.120)	
% Migrant: past generation		-0.0101		0.0706***		0.00965
		(-0.953)		(3.540)		(1.019)
Village density 2003 (persons/ha)	0.00109	0.000845	-0.00115	-0.000673	-0.000448	-0.000377
	(1.005)	(0.780)	(-0.962)	(-0.558)	(-0.751)	(-0.636)
Road to district[a]: Tarmac=1	0.0169*	0.0180**	0.00110	-0.00311	0.0166*	0.0160*
	(1.838)	(1.962)	(0.100)	(-0.280)	(1.930)	(1.863)
All-season dirt road=1	0.00785	0.0131	0.0214**	0.0115	0.00187	0.000401
	(1.025)	(1.645)	(2.317)	(1.252)	(0.310)	(0.0621)
Has right to sell plot=1	-0.00352	-0.00274	0.00169	0.00177	-0.00647	-0.00648
	(-0.410)	(-0.320)	(0.188)	(0.198)	(-0.978)	(-0.976)
Tenure system[b]: Mailo =1	0.0384***	0.0435***	0.00471	-0.000480	0.0258**	0.0250*
	(2.659)	(2.984)	(0.385)	(-0.0401)	(2.038)	(1.947)
Private customary=1	-0.00293	-0.00241	0.0255***	0.0205**	-0.0106*	-0.0113*
	(-0.392)	(-0.324)	(3.003)	(2.449)	(-1.769)	(-1.897)
Female head=1	-0.000666	0.00205	0.0233	0.0217	0.0190*	0.0187*
	(-0.0642)	(0.195)	(1.621)	(1.507)	(1.770)	(1.746)
Head's age	0.000525*	0.000489*	0.000344	0.000426	-0.000176	-0.000164
	(1.885)	(1.760)	(1.016)	(1.264)	(-0.837)	(-0.790)
Head's grade	0.000321	0.000588	-0.000258	-0.000214	0.000853	0.000851
	(0.346)	(0.625)	(-0.253)	(-0.212)	(1.099)	(1.106)
Family size	0.000846	0.000844	-6.18e-05	0.000249	0.000213	0.000254
	(0.857)	(0.846)	(-0.0491)	(0.197)	(0.349)	(0.409)
Assets log (Uganda shillings)	-0.00285	-0.00131	0.00367	0.00137	-0.00308	-0.00343
	(-1.034)	(-0.477)	(0.973)	(0.362)	(-1.153)	(-1.269)
Constant	-0.0236	-0.0191	-0.0262	-0.0300	0.0383*	0.0376*
	(-0.827)	(-0.680)	(-0.890)	(-1.018)	(1.718)	(1.691)
Observations	2,278	2,278	2,278	2,278	2,278	2,278
R squared	0.020	0.014	0.011	0.020	0.020	0.020

Notes: In parentheses are t-statistics computed using robust standard errors.
*** is significant at 1%, ** at 5%, and * at 10%.
[a] The reference category for tarmac and road to district is the season-dirt road.
[b] The reference category for Mailo and individual customary is community customary.

Table 9: Migration and conflicts: different thresholds

	Dependent variable takes 1 if there has been conflict over a parcel				
	(1)	(2)	(3)	(4)	(5)
Threshold>70%	0.0494**				
	(2.021)				
Threshold>30%		**0.0589*****			
		(3.933)			
Threshold>20%			0.0383***		
			(2.832)		
Threshold>10%				0.0348**	
				(2.169)	
Threshold>0					0.0288**
					(2.060)
Village density 2003 (persons/ha)	-0.00117	-9.47e-05	0.000543	0.000730	0.000235
	(-0.675)	(-0.0514)	(0.309)	(0.378)	(0.120)
Road to district[a]: Tarmac=1	0.0425**	0.0244	0.0399**	0.0438**	0.0362*
	(2.341)	(1.471)	(2.377)	(2.529)	(1.980)
All-season dirt road=1	0.0442***	0.0356**	0.0442**	0.0516***	0.0486***
	(2.768)	(2.271)	(2.626)	(2.894)	(2.840)
Has right to sell plot=1	-0.0201	-0.0214	-0.0221	-0.0193	-0.0204
	(-1.210)	(-1.306)	(-1.305)	(-1.165)	(-1.211)
Tenure system[b]: Mailo =1	0.0650**	0.0492*	0.0583**	0.0622**	0.0666**
	(2.561)	(1.875)	(2.227)	(2.339)	(2.538)
Private customary=1	0.0230	0.0217	0.0202	0.0227	0.0228
	(1.409)	(1.368)	(1.259)	(1.358)	(1.396)
Female head=1	0.0347	0.0339	0.0354	0.0370	0.0376
	(1.483)	(1.461)	(1.521)	(1.576)	(1.584)
Head's age	0.000836	0.000977*	0.00103*	0.00102*	0.000941*
	(1.606)	(1.830)	(1.900)	(1.881)	(1.734)
Head's grade	0.000546	8.61e-06	0.000285	0.000429	0.000586
	(0.247)	(0.00373)	(0.124)	(0.188)	(0.260)
Family size	0.000991	0.000759	0.00100	0.000811	0.000664
	(0.608)	(0.460)	(0.606)	(0.489)	(0.383)
Assets log (Uganda shillings)	0.00256	0.000332	0.00189	0.00291	0.00425
	(0.421)	(0.0537)	(0.306)	(0.472)	(0.676)
Constant	-0.0346	-0.0404	-0.0605	-0.0771	-0.0744
	(-0.669)	(-0.777)	(-1.120)	(-1.355)	(-1.293)
Observations	2,235	2,235	2,235	2,235	2,235
R squared	0.025	0.030	0.024	0.023	0.022

Notes: In parentheses are t-statistics computed using robust standard errors.
*** is significant at 1%, ** at 5%, and * at 10%.
Community is receiving if the proportion of current or past generation immigrants is above the threshold.
[a] The reference category for tarmac and road to district is the season-dirt road.
[b] The reference category for Mailo and individual customary is community customary.

Table 10: Land conflicts and yield.

	(1)	(2)	(3)	(4)
	Dependent variable: log of yield			
Conflict dummy	-0.0353	-0.167*		
	(-0.575)	(-1.678)		
Conflict type[a]: Eviction =1			0.0660	-0.356**
			(0.660)	(-2.392)
Boundary=1			-0.109	-0.0503
			(-1.196)	(-0.384)
Distance to plot (minutes)	-0.00176***	-0.00147**	-0.00176***	-0.00150**
	(-3.193)	(-2.199)	(-3.187)	(-2.249)
Tenure system [b]: Mailo=1	0.0334	0.0722	0.0255	0.0881
	(0.303)	(0.221)	(0.231)	(0.269)
Private customary	0.0536	0.395***	0.0528	0.394***
	(1.169)	(3.511)	(1.152)	(3.508)
Parcel acquisition mode [b]: Inherited	0.159***	0.164*	0.160***	0.156*
	(2.641)	(1.844)	(2.667)	(1.748)
Walked in	-0.277	1.389	-0.266	1.419
	(-0.882)	(1.543)	(-0.856)	(1.524)
Purchased	0.0496	-0.0497	0.0500	-0.0515
	(0.861)	(-0.559)	(0.868)	(-0.581)
Mailo tenant	0.182**	0.325	0.178**	0.385
	(2.034)	(1.149)	(1.969)	(1.315)
Log of farm size (ha)	-0.0718***		-0.0707***	
	(-2.748)		(-2.699)	
Thompson index	-0.0309		-0.0327	
	(-0.380)		(-0.402)	
Female head	-0.0320		-0.0298	
	(-0.563)		(-0.523)	
Head's age	-0.00407***		-0.00409***	
	(-2.663)		(-2.668)	
Head's years of schooling	-0.00170		-0.00184	
	(-0.311)		(-0.335)	
Family size	-0.00224		-0.00220	
	(-0.397)		(-0.391)	
Dependence rate	-0.0136		-0.0127	
	(-0.601)		(-0.562)	
Assets log (Uganda Shillings)	0.114***		0.115***	
	(5.646)		(5.703)	
Constant	5.721***	5.979***	5.715***	5.971***
	(31.81)	(61.96)	(31.90)	(61.70)
Village*season FE	Y		Y	
Household*season FE		Y		Y
Observations	3,482	3,482	3,482	3,482
R squared	0.260	0.237	0.261	0.237
Number of groups		1,409		1,409

Notes: In parentheses are t-statistics computed using robust standard errors. Standard errors are clustered at the village level in specifications 1 & 3 and on household level for 2 & 4.

*** is significant at 1%, ** at 5%, and * at 10%.

[a] The reference category for eviction and boundary conflict is inheritance conflict.

[b] The reference category for Mailo and individual customary is community customary.

[c] The reference category for parcel inherited, just walked in, and purchased is parcel rented in.

Crop dummies are included in all specifications.

Figure 1: Uganda's population and population growth rate 1950-2010
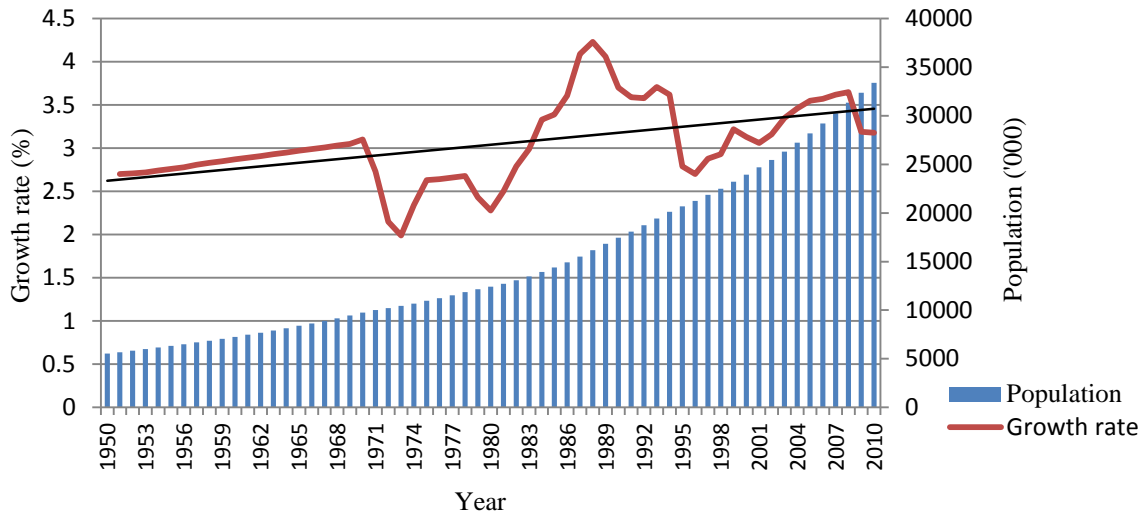
Source: Own compuatation using Penn World Tables data 2013

Figure 2: 3-period - 2-community model