DISSERTATION

AN INQUIRY INTO THE EVOLUTION OF LAND INSTITUTIONS AND ITS IMPLICATIONS FOR LAND TENURE SECURITY, LAND TRANSACTIONS AND AGRICULTURAL PRODUCTIVITY: EVIDENCE FROM RURAL UGANDA

FRANCIS MWESIGYE

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National Graduate Institute for Policy Studies

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Abstract

AN INQUIRY INTO THE EVOLUTION OF LAND INSTITUTIONS AND ITS IMPLICATIONS FOR LAND TENURE SECURITY, LAND TRANSACTIONS AND AGRICULTURAL PRODUCTIVITY: EVIDENCE FROM RURAL UGANDA

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September, 2014

Institutions which strengthen private land rights and tenure security are crucial for promoting agricultural growth. However, customary land tenure institutions, characterized by communal land ownership and high tenure insecurity, are still prevalent in sub-Saharan Africa. While these tenure arrangements are believed to be evolving toward private land ownership, questions about how they have been evolving remain un-answered. Furthermore, the incidence of land-related conflicts have been increasing in sub-Saharan Africa, and despite the escalating conflicts and their indisputably deleterious effects on agricultural performance, empirical studies on their determinants and consequences are exceedingly scant. Using community-, household-, and parcel-level data and by tracing rural migration patterns, this dissertation examines the impact of rural-to-rural migration, ethnic diversity, and population pressure on the evolution of land institutions, and on land conflicts in rural Uganda. This study finds a higher likelihood of private land ownership in immigrant and ethnically diverse communities than in ethnically homogenous non-immigrant communities. The study also finds that communities that receive/host more immigrants (and thus have many coexisting tribes) tend to have more land conflicts than those sending migrants out. As a consequence, we find that private land ownership promotes land transactions and thus improves production efficiency, but land conflicts reduce agriculture productivity. These results suggest that rural-to-rural migration, and the resulting ethnic diversity, weaken customary land institutions which lead to a change from

communal to private land ownership. Through weakening customary land institutions, migration also affects informal conflict resolution mechanisms, which, in the absence of formal institutions, result in land conflicts that, in turn, hurt productivity. In fact, we find that there is a 23% lower probability of consulting informal institutions by households with conflicts in migrant-host communities than their counterparts in migrant-sending communities.

Dedication

To my parents, Alfred and Joy Banywana

Summary

There is a wide consensus that to boost agricultural productivity, sub-Saharan African (SSA) countries need to adopt policies that enhance private land ownership and strengthen land tenure security. However, customary land institutions, characterized by communal land ownership and tenure insecurity, are still prevalent in SSA. While it is believed that these traditional institutions are continuously evolving towards private land ownership in response to population growth and economic dynamics, it is not known how they evolve and what determines this evolution. In addition, recently land conflicts have been increasing in Africa and, given the high and increasing demand for food, this poses a threat to agriculture productivity and food security in the region. Moreover, studies have suggested that food production in SSA has to double by 2050 in order to cope with the region's population growth. Prior studies have suggested that the main causes of these land conflicts are rapid population growth and the weakening of customary institutions, but empirical studies on the causes and consequences of these conflicts are exceedingly scant.

Using community-, household-, and parcel-level data collected from rural Uganda, this dissertation attempts to answer these questions. Uganda presents an interesting case for this study because land is owned by the citizens who can choose how to manage it, either individually or communally in accordance with customary norms and practices. This is unlike some other SSA countries where land is owned by the government and individuals are only granted use rights. In addition, initially the country's population was un-equally distributed across regions and communities and, presumably because of the rapidly increasing population, rural-to-rural migration has increased in the recent past. This study

explores the role of these migrations, ethnic diversity, and population pressure in shaping the evolution of land institutions from communal to private land ownership, and on land conflicts. To shed light on the implication of changes in land tenure arrangements, the study explores how land transactions and production efficiency have responded to changes in land institutions from communal to private land ownership. Lastly, the study analyzes the impact of land conflicts on agriculture productivity in Uganda.

The community, household and parcel data I use are from two sources: Research on Poverty, Environment and Agriculture Technologies (RePEAT) panel data collected by National Graduate Institute for Policy Studies (GRIPS) and Makerere University, and land survey data from the survey on land tenure systems which was conducted simultaneously with the fourth round of the RePEAT survey in 2012/2013. In both surveys, information was elicited, from focus groups and from the households, on community migration patterns, land tenure systems, land conflicts, population density, land transactions plus other household, community and parcel attributes. I also use Uganda population census data to compute district population growth rates.

The community-level data, covering information on migration history for the two generations, current and parents' generations, enables me to categorize communities into migrant-host and migrant-sending communities, and to explore the attributes of these communities such as ethnic composition and the proportion of immigrants in each community. I then examine how community migration patterns and ethnic composition are associated with land ownership status, and with the incidence of land conflicts. I use

household-level data to identify whether a household is an immigrant in a community or an indigenous inhabitant, and use this information to examine how household migration status is associated with whether the land is privately or communally owned. The household-, and parcel-level data also helps me to control for other household and parcel level characteristics and to conduct more detailed analysis such as an analysis of the impact of land conflicts on productivity by comparing yield between parcels with and without conflicts operated by the same household.

The main hypotheses in this study are; (1) rural-to-rural migration and the resulting ethnic diversity, and population pressure lead to the break-down of traditional customary land arrangements which, in turn, leads to a change from communal to private land ownership, (2) the break-down of customary institutions weakens the pre-existing informal conflict resolution mechanism which, in the absence of formal institutions such as land titling and registration, leads to land conflicts. I, therefore, expect to find a higher incidence of private land ownership in communities with many immigrants and are hence ethnically diverse, and those with higher population density. In addition, I expect to find more cases of land conflicts in the immigrant, ethnically diverse communities, and in the communities that have experienced higher population growth rates. To my knowledge, no study has empirically examined the determinants of the evolution of land institutions. In addition, no study has examined how rural-to-rural migration, ethnic diversity and population growth are related to the evolution of land institutions, and land conflicts.

The major findings of this study are as follows. The results reveal that land institutions in Uganda are evolving toward private land ownership. There were more privately-owned parcels in 2012 than there were in 2003, while the number of parcels under communal ownership has decreased significantly over the same period. This study also finds that there are more privately-owned parcels in immigrant and ethnically diverse communities than in non-migrant and homogenous communities. Contrary to what theoretical studies suggest, we do not find a significant effect of population density on private land ownership. We, however, find that population density influences migrations, suggesting that, while population density may not directly affect the evolution of land institutions, it indirectly works through influencing inter-community migrations. We find that land transactions are more common in communities that have privately-owned land as the result of land institution evolution than those with communally-owned land. Also, while we find a significant inverse relationship between farm-size and productivity in communities with more communally owned land, the relationship is insignificant in communities with a higher incidence of private land ownership suggesting that private land ownership promotes production efficiency.

Consistent with my hypothesis, we find that there are more land conflict cases on parcels in migrant host communities and those that are ethnically diverse (with many tribes). We also find more land conflicts in communities that have experienced higher population growth rates. On the impact of land conflicts, the yield is 20% lower on parcels with conflicts than in those without conflicts.

These findings suggest that while rural-to-rural migrations and ethnic diversity have, through weakening customary institutions, led to the evolution of land tenure institutions from communal to private land ownership which enhances land transactions and production efficiency, these migrations also weaken informal conflict resolution mechanisms leading to land conflicts. We find that there is a higher incidence of boundary-, and eviction-related land conflicts in ethnically diverse immigrant-host communities than the homogenous migrant-sending communities. Therefore, the use of better boundary demarcation mechanisms such as survey stones may be a key to reducing boundary related conflicts. This study finds that majority of the farmers use live plants for land boundary demarcation. However, these plants can be uprooted and replanted in a different position and, if found out, this may lead to land conflicts. We also find more land transaction and higher production efficiency in communities where land is privately owned. However, communal land ownership is still common in Uganda. Policies that enhance private land ownership such as extension of infrastructure like roads may be crucial in boosting land transactions and, hence, agricultural performance. Indeed, this study results show a high likelihood of private land ownership in communities that are connected to district headquarters by tarmac road.

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CHAPTER 1

Introduction

Empirical studies have shown that institutions- property rights institutions in particular- do not only have long term impacts on economic development but they are also the main cause of divergences in economic development between countries (Acemoglu, Johnson, & Robinson, 2001; Acemoglu & Johnson, 2005; Acemoglu and Robinson, 2012). Within countries, specifically in developing-country agriculture, it is suggested that institutions which promote private land rights and land tenure security stimulate agricultural development and hence the wellbeing of landholders (Feder & Feeny, 1991; Besley, 1995; Otsuka & Place, 2001; Goldstein & Udry, 2008; Fenske, 2011; Bellemare, 2013). It is believed that private land ownership and tenure security facilitates transactions in land rental and sales markets by reducing transaction costs, stimulate land investment by securing investment returns, and improve credit access as land can be used as collateral (Brasselle, Gaspart, & Platteau, 2002; Otsuka & Place, 2013; Holden & Otsuka, 2014). However, customary land tenure systems, characterized by communal or collective land ownership as opposed to private land ownership, are still prevalent in Africa (Migot-Adholla, et al., 1991; Otsuka & Place, 2001; Goldstein & Udry, 2008; Fenske, 2011). There is, thus, a concern that the current communal land institutions discourage efficient land use, investment in land and productivity growth.

Moreover, 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). Studies have thus suggested 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 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) [2].

Land conflicts increase tenure insecurity and hence reduce land investment and land transactions. Land conflicts also affect the portfolio choice of crops and social capital. Indeed, Voors, et al., (2012), in their study of conflicts impact in Burundi, found that households that had land conflicts were doing more poorly in the shares of cash crops grown in total production, and in measures of social capital than their counterparts without land conflicts. 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).

[1] Studies have suggested that SSA needs to double food production in the next 20 years to match the 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, the population growth rate is 3.2%, second highest in the world. The first is Niger, which is also in SSA (World Bank, 2011).

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-Mensah, 1999; Donge and Pherani, 1999). Other factors such as population pressure; agriculture commercialization, which increases the demand and value for land; across-community migrations and the resulting ethnic diversity; 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, 1999:50). Questions of identity and migration, thus, 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 the property and crops of the new landholders (Platteau, 1996; Donge and Pherani, 1999; Fred-Mensah, 1999). To the extent that the alienation of land to 'strangers' violates social norms, resentment and tensions are aroused in the case of immigration, which can translate into open violence and land conflicts (Platteau, 1996). Across-community migrations, on the other hand, involve the mixing of tribes with their specific values and internal land arrangements. This leads to the breakdown of pre-existing informal institutions, which, in the absence of formal institutions, lead to conflicts in host communities. Indeed, Fred-

[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 (e.g see, Atwood, 1990; Feder and Feeny, 1991; Migot-Adholla, Hazell, Blarel, and Place, 1991; Place and Hazell, 1993; Besley, 1995).

Mensa (1999) argues that host communities in Ghana have been plagued by what he terms "ubiquitous conflicts" in the form of land evictions[4].

The existence of traditional institutions and their negative effects on agriculture performance in Africa is widely recognized among scholars and policy practitioners. It is also believed that these institutions are evolving towards private land ownership. It is, however, not known how these institutions are evolving and the determinants of this evolution. Studies have theorized that land tenure institutions endogenously evolve towards individual land ownership in response to population pressure and economic dynamics. For instance, induced innovation theories of institutional change contend that population pressure, through altering relative factor scarcities, promotes institutional changes toward private property rights institutions (Hayami & Ruttan, 1985; Lin, 1989; Feder and Feeny, 1991). These studies are in line with Boserupian theory of agriculture intensification which argues that population growth leads to the adoption of labor-intensive farming systems to enhance land productivity (Boserup, 1965). Since the adoption of new farming systems requires land investments such as terracing, irrigation and tree planting, secure land rights must be established. Thus, the evolution theory of land rights (ETLR) stipulates that population pressure and market integration in Africa lead to the evolution of land rights towards individualized ownership (Ault & Rutman, 1979; Atwood, 1990; Place & Hazell, 1993; Platteau, 1996; Otsuka & Place, 2001).

[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."

However, our empirical knowledge about the process of the evolution of land institutions in Africa is exceedingly weak. We do not know of any empirical study that has examined the determinants and implications of the evolution of land tenure institutions. Descriptive studies suggest that the incidence of individual land ownership is high in communities with many immigrants in sub-Saharan Africa (Migot-Adholla et al., 1991). Secondly, despite the increasing incidence of land-related conflicts and their undisputable effects on agriculture performance, empirical studies on the determinants and consequences of such conflicts are scant[5]. For instance, despite the recent high population growth rates in sub-Saharan African and the resulting rural-to-rural migrations especially in countries that started with unequal land distribution across regions, no empirical study has examined the relationship between rural-to-rural migration and the evolution of land institutions, and with land conflicts.

This dissertation seeks to fill the gap in the existing literature by (i) exploring the evolution of land institutions in Uganda for the past decade; (ii) tracing the migration history of households in each community and examining whether such migrations are associated with the evolution of land institutions and land conflicts, and the pathways through which they do; (iii) unbundling land-related conflicts by type so as to investigate what causes them and the relative impact of different conflict forms; and (iv) examining the implications of the evolution of land institutions for land transactions and production

[5] We know of only two studies that have quantitatively looked at the 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 do not trace and link land conflicts to rural migrations in the respective countries.

efficiency, and the effect of land conflicts, and different land conflict types, on agricultural productivity in Uganda.

The findings from this dissertation will help shed light on how land institutions are evolving and what the determinants of this evolution, and the implications of the evolution processes on agriculture performance are. Furthermore, the findings will aid in understanding the determinants of land conflicts, and by unbundling these land conflicts by type, the study will shed light on the relative impact of different conflict types on agriculture productivity. From the findings, this dissertation will recommend necessary policy options that will harness the benefits of land institutional evolution, enhance private land ownership in areas where land is communally owned, and curtail land conflicts.

The rest of the dissertation is organized as follows. Chapter 2 provides the background and reviews the existing literature in order to highlight the significance of issues this dissertation sets out to address as detailed in the previous literature, and to identify un-addressed issues with an objective of addressing them in this study. Chapter 3 uses community-, household-, and parcel-level data from Research on Poverty and Agricultural Technologies (RePEAT) surveys and from the survey on Land Tenure systems to examine the relationship between rural-to-rural migration, ethnic diversity, population density and the evolution of land tenure institutions in Uganda. The chapter also examines the implications of land tenure evolution processes on land transactions, and production efficiency.

Chapter 4 uses the same data set as used in chapter 3 and supplements it with the 1991 and 2002 census data from Uganda Bureau of Statistics (UBOS) to analyze how rural-

to-rural migration, ethnic diversity and population growth are associated with land conflicts. The chapter also breaks down land conflicts into three major types: eviction, boundary and inheritance conflicts, and examines the determinants of each conflict type. Finally this chapter examines the impact of land-related conflicts on agriculture productivity, and by unbundling land-conflicts, the chapter examines the differential impact of different land conflict types on agriculture productivity. Chapter 5 wraps up the findings of the empirical analysis conducted in Chapters 3 and 4, and based on these findings, suggests and discusses the policy implications.

CHAPTER 2

Background and Literature Review

2.1 Introduction

Earlier studies have suggested that institutions, especially private property institutions, are essential for economic development (Demsetz, 1967; Alchian & Demsetz, 1973; Acemoglu & Johnson, 2005). It is believed that the poor have the potential, and already possess the assets they need to make a success of capitalism but lack the institutions to represent their property and create capital (de Soto, 2000). The literature has thus identified weak institutions as a major cause of the slow economic progress in many developing countries, and as a determinant for the divergence in economic development between countries (Acemoglu, Johnson, & Robinson, 2001; Acemoglu and Robinson, 2012). This chapter begins by detailing the existing land institutional structure in Uganda. The context is intended to shed light on how land is managed so as to aid in identifying how the status of institutions is associated with the prevailing land tenure issues in the country. This dissertation, based on the understanding of the institutional structure, will identify weaknesses and suggest policy recommendations for improvement. Next, this chapter reviews the literature on the role of institutions, and the evolution of land institutions with a view to identifying important un-addressed issues.

Finally, the chapter reviews the literature that delineates the determinants of land conflicts. Studies, mostly descriptive, have argued that the weakening of customary land

institutions coupled with the absence of formal land institutions is the major cause of land conflicts in sub-Saharan Africa (Fred-Mensah, 1999). I, therefore, review the literature with the aim of shedding light on what is causing the weakening of traditional institutions and how the weakening of such institutions has led to land conflicts in SSA.

2.2 Background

2.2.1 Land use, land tenure systems and migration in rural Uganda

As in other countries in sub-Saharan Africa (SSA), agricultural land is an essential pillar of human development and economic growth in Uganda since agriculture is the 'backbone' of the economy. Agriculture employs 73% of the working population and contributes to 24% of gross domestic product in Uganda (Ministry of Agriculture, 2010). However, communal land ownership and tenure insecurity amidst dwindling agriculture performance have raised concern over rising food insecurity and increasing poverty incidence.[6] It is, therefore, apparent that the country's population growth rate of 3.2%, which is second highest in the world (World Bank, 2012), and the resulting land scarcity calls for agriculture intensification which can be achieved if individual property rights are strengthened and tenure security enhanced.

There are four legally recognized land tenure systems in Uganda; freehold, leasehold, customary and Mailo.[7] The customary system is the dominant land tenure

[6] The yield of major cereals in Uganda has been declining since the early 1990s thereby raising threats of food insecurity (Pender et al., 2004)

[7] The Mailo tenure arrangement was introduced by colonialists. Under 1900 Buganda agreement, 19,600 square miles of land was divided into mile blocks (hence Mailo) and given to chiefs and other officials with their titles in Buganda kingdom (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. We drop parcels under this

arrangement under which individuals' use of land is subject to regulations and sanctions determined by the community, clan or family specific norms and practices. Prior to the Buganda agreement of 1900, the customary land tenure arrangement was the only land tenure arrangement, and it involved communal land ownership where the village chief or king's agents were in charge of allocating and administering land use among community members. Uganda, like may sub-Saharan African countries, is highly ethnically diverse, with about 53 tribes. Initially, each tribe settled in a close setting, headed by a chief at a lower level and a king at a higher level. Land use norms and practices varied by ethnicity and society, but one common characteristic was that land was owned communally (West, 1965; Lastarria Cornhiel, 2003). Community members on customary land were regarded as tenants at sufferance who only had use rights, and land access was by descent clan membership, holding political position or both (West, 1965).

Due to high population growth and increasing land scarcity in regions and communities that started with relatively high population density, inter-community migrations ensued. Land transactions, as a new mode of land acquisition, increased because emigrants had to sell off their occupied land before migrating and as productive farmers purchased land from large land owners to expand their croplands. Indeed, Baland et al. (2007) found that land transactions have been increasing in Uganda. Customary tenure has been evolving towards private land ownership where individuals can transfer and decide on

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externally imposed tenure regime in our analysis since this tenure arrangement is not flexible and has not evolved over time.

land use practices without seeking consent from clan heads. Currently, customary tenure can be categorized into communal and individual customary tenure (Businge, 2002). Private customary arrangement is more efficiency-oriented than communal ownership because it facilitates land investment, land transactions and, where financial institutions, such as micro-finance institutions and Saving and Credit Co-operatives (SACCO), allow untitled land as collateral, use of land for credit access. Communal tenure system is concentrated in northern and far eastern Uganda, while private customary is more common in near eastern and western regions of Uganda. The persistence of communal customary land arrangements in the north can be explained by high level of insecurity due to internal wars in the region. While resettlement programs are on-going, large chunks of communal lands are still un-occupied.

Other tenure systems that exist, though on a very small scale, are leasehold and freehold. Leasehold grants leasehold title and full ownership rights such as use rights, transfer rights and the right to bequeath over the tenure of the lease; usually 49 and 99 years. Land is held in perpetuity and the owner is issued with a title under freehold tenure. A very small proportion of land in Uganda belongs to either freehold or leasehold, so this study does not pay attention to these land tenure systems.

2.2.2. Land institutional arrangements in Uganda

Land is owned by the citizens in Uganda who can choose how to manage their land either individually or communally in accordance with customary norms and practices. This is unlike some other SSA countries where land is owned by the government and individuals

are only granted use rights.[8] Such an arrangement allows farmers to freely develop, transact or bequeath their owned land especially if land is privately owned.

Uganda has experienced a series of land reforms since her independence in 1962.[9] The 1995 Constitution mandates the Uganda Land Commission (ULC) 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 the dispute and the compensation required (Government of Uganda, 1995). 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 the relationship between land-owners and land tenants on Mailo land, the mandated institutions failed to resolve the land conflicts (Ministry of Lands, 2011).

[8] The land reform of 1975 in Uganda had put land in hands of government as stipulated by 1975 land decree where people would only acquire use rights through land leases. This directive was however never implemented as the country was in turmoil with successive wars. The 1995 constitution reversed the stipulations of land decree and put land in hands of the citizens again.

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

2.2.3. Land Conflicts in Uganda

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 over cultivation and the 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 community 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 was given to the chief or king who settled the immigrants. The chiefs also derived much power from having many subjects as it meant higher revenue collections from taxes hence immigrants were welcomed given the land abundance. Over time, with land getting scarce, land markets developed and some individuals started selling land from their native areas at a relatively higher price and acquiring larger land in sparsely populated areas. Others settled on unoccupied land without any permission and, given the land abundance, neither the government nor the absentee owners bothered to evict them.

In the decades following the country's independence in 1962 to date, Uganda's population has grown at a rapid rate (Figure 1) [10]. The current fertility rate is 6.7 children per mother, and the population growth rate is 3.2% (World Bank, 2012), which is second highest 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 are highly ethnically diverse, a consequence of the commingling of immigrants from different ethnic/tribal backgrounds. Ethnic diversity 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, leads to a breakdown of previous ethnic-specific customary land 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 ethnically 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 been in the past in many rural areas in Uganda because of the land abundance. With land getting scarce, cases of trespassing and boundary

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

manipulations have increased recently in 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 the equal sharing of property, many communities still follow traditional practices and deprive women of their rights to inherit land, leading to inheritance-related conflicts.

2.3. Literature review

2.3.1 The Role of Institutions

There is a large and growing body of literature on the role of institutions, and, thus, a wide consensus that better institutions promote economic development (Demsetz, 1967; Alchian and Demsetz, 1973; Acemoglu and Acemoglu and Johnson, 2005; Acemoglu & Robinson, 2012). Generally, it argued that property rights institutions protect citizens against expropriation, and contracting institutions enable contracts between citizens (Acemoglu and Johnson, 2005). In addition, the economic literature suggests that property rights institutions evolve, and aid, to reduce externalities (Coarse, 1960; Demsetz, 1967). For instance, Demsetz (1967) argues that the primary function of property rights institutions is that of guiding incentives to achieve a greater internalization of externalities.

Studies have, further, suggested that the differences in the quality of institutions greatly explain the differences in economic development between countries (Acemoglu,

Johnson, & Robinson, 2001; Acemoglu & Robinson, 2012). Acemoglu, Johnson, & Robinson (2001) argue that countries with better institutions, more secure property rights, and less distortionary policies will invest more in physical and human capital and will use more production factors efficiently, have greater output and produce a higher level of income. To illustrate their point, they note that differences in institutional quality have largely driven the divergent development paths of North and South Korea, or East and West Germany where one part of the country stagnated under central planning and collective ownership, while the other prospered with private property and a market economy.

Within countries, specifically in developing-country agriculture, it is suggested that institutions which promote private land rights and land tenure security stimulate agricultural development and hence the wellbeing of landowners (Feder & Feeny, 1991; Place & Hazell, 1993; Besley, 1995; Platteau, 1996, Otsuka & Place, 2001; Goldstein & Udry, 2008; Fenske, 2011; Bellemare, 2013). The main suggested pathways are the realizabilty and collateralizability effects (Besley, 1995; Brasselle et al., 2002; Jacoby & Minten, 2007). It is believed that private land ownership facilitates land transactions through reducing transaction costs, land investment because it increases the probability that investment benefits will accrue to the investor, also called the realizability effect, and credit access because land can be used as collateral, also called the collateralizability effect (Brasselle, Gaspart, & Platteau, 2002; Jacoby & Minten, 2007; Otsuka & Place, 2013; Holden & Otsuka, 2014).

2.3.2 The Evolution of Land Institutions

While it is widely accepted that good institutions are essential for development, it remains un-clear how appropriate institutions should be developed and shaped so as to boost development. Two general views exist on how institutions are formulated; top down and bottom up (Easterly, 2008). In the top-down approach, the political leadership sets laws and ensures that the set laws are enforced. According to this view, institutions are static, path-dependent and normally constrained by previous institutions, and therefore need to be deliberately altered so as to facilitate development (Kuran, 1987; Bardhan, 1989). The bottom-up view, on the other hand, suggests that institutions evolve spontaneously through evolution rather than revolution (Easterly, 2008). For instance, one of the crucial and mostly researched forms of institutions that conform to this view is the land institution.

Theoretical studies have suggested that land institutions endogenously evolve towards individual land ownership in response to population pressure and economic dynamics. For instance, induced innovation theories of institutional change contend that population pressure, through altering relative factor scarcities, promotes land institutional changes toward private property rights institutions (Hayami & Ruttan, 1985; Lin, 1989; Feder and Feeny, 1991). These studies are in line with Boserupian theory of agriculture intensification which argues that population growth leads to the adoption of labor-intensive farming systems to enhance land productivity (Boserup, 1965). Since the adoption of new farming systems requires land investments such as terracing, irrigation and tree planting, secure land rights must be established. Thus, the evolution theory of land rights (ETLR) stipulates that population pressure and market integration in Africa leads to the evolution of

land rights towards individualized ownership (Ault & Rutman, 1979; Atwood, 1990; Platteau, 1996).

Note, however, that our empirical knowledge about the process of the evolution of land institutions in Africa is exceedingly scant. While prior studies have suggested that population pressure is the major cause of land institutional evolution, it has not been empirically verified. In addition, descriptive studies have suggested that the incidence of individual land ownership is high in communities with many immigrants in sub-Saharan Africa (Migot-Adholla et al., 1991). This may be relevant in Africa because migration across rural communities appears to have increased recently following the rapid population explosion.[11] Since the migration leads to changes in the population density and ethnic composition in host communities, they may affect the costs of establishing private land ownership systems and hence cause a change in land tenure arrangements. This dissertation, thus, aims at filling this gap by empirically examining the role of migrations, ethnic diversity and population growth, on the evolution of land institutions.

2.3.3 Traditional Institutions and Land conflicts

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 literature on land in sub-Saharan Africa widely

[11] Due to initial un-equal distribution of land across communities, rural-rural migration increased following population explosion in recent decades. The population growth in the region is 2.53% higher than the world average of 2.1%.

documents pervasive legal insecurity over land[12]. 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-Mensah, 1999; Donge and Pherani, 1999).

Other factors such as population pressure, agriculture commercialization, which increases the demand and value for land; across-community migrations and the resulting ethnic diversity, and cultural factors cause land conflicts (Fred-Mensah, 1999; Andre and Plateau, 1996). It is believed that land has a greater social value in Africa, which has curtailed the functioning of land markets, and led to persistence of communal land ownership. 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' (Platteau, 1996, P50). Tension and disputes arise in case of land transfers to non-community members. As observed in many African countries, the original inhabitants oppose the transfer of traditionally owned family and community land to 'strangers' by committing acts of sabotage, looting, burning, and theft of the property and crops of new landholders (Platteau, 1996; Donge and Pherani, 1999; Fred-Mensah, 1999). To the extent that the selling or transferring of land to 'strangers' violates social norms, resentment and tensions are aroused in cases of immigration, which can translate into open violence and land conflicts (Platteau, 1996). Across-community migrations, also, involve the mixing of tribes with their specific values and internal land arrangements. This leads to the breakdown of pre-existing informal

[12] 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 (e.g see, Atwood, 1990; Migot-Adholla, Hazell, Blarel, and Place, 1991; Place and Hazell, 1993; Besley, 1995).

institutions, which, in the absence of formal institutions, lead to conflicts in host communities. Indeed, Fred-Mensa (1999) argues that host communities in Ghana have been plagued by what he terms "ubiquitous conflicts" in the form of land evictions[13].

Despite the increasing incidence of land-related conflicts and their undisputable effects on agriculture performance, empirical studies [14] on the determinants and consequences of such conflicts are scant. 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. It is, therefore, one of the objectives of this dissertation to fill this gap.

2.4 Conclusion

This dissertation seeks to address some gaps in the existing literature as presented in this chapter. The gaps to be addressed may be classified into three categories. First, this dissertation expands the scope of past theoretical studies by empirically delineating institutional evolution processes. For instance, theoretical studies have strongly argued that

[13] 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."

[14] We know of only two studies that have quantitatively looked at the 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. However, they both do not trace and link land conflicts to rural migrations in the respective countries.

population pressure influences the evolution of land institutions but this claim has not been empirically tested. This dissertation, therefore, seeks to empirically examine whether population pressure, rural-to-rural migrations and the resulting ethnic diversity play a role in determining the changes in land tenure arrangements.

Second, this dissertation sheds light on the determinants of land conflicts. Furthermore, the study unbundles land conflicts by type and explores the determinants of different modes of land conflicts. Specifically, this dissertation investigates the association between rural-to-rural migrations, ethnic diversity, population growth and land conflicts. Empirical studies on the determinants and consequences of land conflicts are exceedingly scant. In addition, no study has looked at the impact of migrations, ethnic diversity and land conflicts.

Third, this dissertation investigates the implications of land institution evolution on land transactions and production efficiency. Studies suggest that private land rights promote land transactions which, in turn, improve production efficiency and equity (Otsuka, 2007; Songqing & Jayne, 2013). Moreover, studies have suggested that if land markets are well-functioning, the commonly observed inverse relationship between farm-size and yield can be reduced (Heltberg, 1998). This dissertation investigates this claim by comparing the farm size-productivity relationship between communities with a higher incidence of privately-owned land and those with communally-owned land. Lastly, this dissertation also quantitatively examines the impact of land conflicts and land conflict types on agriculture productivity.

CHAPTER 3

Population Pressure, Rural-to-Rural Migration and the Evolution of Land Institutions: Implications for Land transactions and Production Efficiency

3.1 Introduction

As discussed in the previous chapter, there are a number of studies documenting the role of institutions. Generally, it is believed that better institutions promote economic development (Demsetz, 1967; Alchian and Demsetz, 1973; Acemoglu and Acemoglu and Johnson, 2005; Acemoglu & Robinson, 2012). Moreover, studies have suggested that the observed difference in growth rates and economic progress between countries is explained by differences in institutions. Within countries, specifically in developing-country agriculture, it is argued that individualized land ownership enhances agricultural performance. There is, thus, a wide consensus among researchers regarding the positive role of private land rights and land tenure security in stimulating agricultural development (Feder & Feeny, 1991; Besley, 1995; Goldstein & Udry, 2008; Fenske, 2011; Bellemare, 2013).

The existing studies suggest that private land ownership facilitates land transactions, land investment, and credit access because land can be used as collateral (Brasselle, Gaspart, & Platteau, 2002; Otsuka & Place, 2013; Holden & Otsuka, 2014). However,

customary land tenure institutions, characterized by communal land ownership as opposed to private land ownership, are still common in Africa (Migot-Adholla, et al., 1991; Otsuka & Place, 2001; Goldstein & Udry, 2008; Fenske, 2011). There is thus a concern that since these traditional institutions discourage land transactions, land investment and the use of land as collateral for credit, the existing institutions discourage efficient land allocation and impede agriculture productivity.

As detailed in the previous chapter, studies have suggested that these traditional land tenure institutions are endogenously evolving towards individual land ownership in response to population pressure and economic dynamics (Hayami & Ruttan, 1985; Lin, 1989; Feder and Feeny, 1991). Notable is Hayami & Ruttan's (1985) induced innovation theory of institutional change which contends that population pressure, through altering relative factor scarcities, promotes institutional changes toward private property rights, and the evolution theory of land rights (ETLR) which stipulates that population pressure and market integration in Africa leads to the evolvement of land rights towards individualized ownership (Ault & Rutman, 1979; Atwood, 1990; Platteau, 1996). However, despite the existence of theoretical studies, our empirical knowledge about the process of the evolution of land institutions in Africa is exceedingly scant. Some descriptive studies have suggested that the incidence of individual land ownership is high in communities with many immigrants in sub-Saharan Africa (Migot-Adholla et al., 1991), but no empirical study has examined whether migrations are indeed associated with the evolution of land institutions.

In addition, it is not known what the implications of the evolution of land institutions on land transactions and agriculture productivity are. A number of studies have investigated the impact of private land ownership on agriculture productivity but there are no empirical studies examining how land tenure evolution processes affect land markets and productivity.

This chapter explores the evolution of land tenure systems with a particular focus on rural-to-rural migration, ethnic diversity and population density. First of all, I explore if there a higher incidence of private land ownership in ethnically diverse communities with many immigrants than ones with fewer immigrants. Second, I examine whether households in densely populated communities are more likely to own land privately than those in sparsely populated communities. Third, I inquire what the implication of changes in land tenure arrangements is on land transactions and agriculture performance.

Based on the literature review in the previous chapter, and the conceptual framework developed in this chapter, I hypothesize that since migrations and ethnic diversity weaken traditional customary institutions, land tenure systems have evolved from communal to private ownership in immigrant communities. I also hypothesize that high population density increases land scarcity, hence, raises social cost of communally owning land, and, consequently, induces the demand for private land rights. Lastly, I postulate that migrations and population density stimulates land rental and sales markets that in turn enhances production efficiency. Studies have suggested that the commonly observed farm size-productivity relationship is due to pervasive market imperfections in land and labor

markets (Heltberg, 1998). I, therefore, expect to find a weaker or no inverse farm size-land productivity relationship in immigrant communities where land markets are well-functioning than in non-migrant communities where communal land ownership is most common and land transactions are limited.

There are three main findings of this chapter. First, consistent with my hypothesis, there are more privately-owned parcels in immigrant and ethnically diverse communities than in non-migrant and homogenous communities. However, contrary to what theoretical studies suggest, we do not find a significant effect of population density on private land ownership. Secondly, as an implication of land tenure evolution, we found more land renting and purchases in immigrant communities than in non-migrant communities, suggesting that land markets function relatively better in immigrant communities. Third, consistent with my hypothesis, we do not find a significant relationship between farm-size and productivity in communities with a higher incidence of private land ownership but we find a high and significant inverse relationship in communities with more communally-owned land. This suggests that production factor allocation is better in communities with a high incidence of private land ownership than their counterparts with communal land ownership, which in turn leads to production efficiency.

The remainder of the chapter is organized as follows. Section 3.2 discusses the data and the descriptive statistics. Section 3.3 presents a conceptual framework on how rural-rural migration influences changes in land ownership status and derives the testable

hypotheses. Section 3.4 outlines our empirical strategy. The econometric results are presented and discussed in section 3.5, while section 3.6 concludes.

3.2. Data and Descriptive Evidence

3.2.1. Data

I use two data sets from 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 special survey on land tenure systems in Uganda. The latest round of RePEAT survey and the survey of land tenure were simultaneously conducted in 2012/2013. The sample for the RePEAT survey builds upon a 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 areas and areas that were free from wars 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 in the north and northeastern parts of the country, LC1s in this region were excluded from the surveyed samples. Within the study region, communities (LC1's, the lowest administrative unit, usually a single village) were selected using a stratified random sample, with the stratification based on development domains defined by the different agro-ecological and market access zones, and differences in population density.

The RePEAT survey covers 94 Local Council ones (LC1s), which are the smallest administrative units in Uganda.[i] 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.

I supplement the RePEAT data with data from a survey on land tenure systems. For each RePEAT LC1, one of the neighboring LC1s was randomly sampled for the land tenure survey. In both the RePEAT and land tenure projects, community surveys were conducted along with the household surveys. In the household survey, information was solicited on basic household composition and demographics, ethnicity, wealth, and economic activities. Parcel-level information was also collected on land tenure systems, acquisition mode, 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 elicited information on the migration history of the community inhabitants for two generations (current and the parents' generation), the number of tribes in the community and the quality of roads to district headquarters as a measure of market access.

3.2.2. Community Categorization

For the exposition, I classify the study communities into "receiving" and "sending" communities based on the community survey where the information on the proportion of households that immigrated was solicited. This was done for both current generation and

parents' generation. Particularly, the following questions were asked: (i) out of the total households in this village (current generation), how many were not born here (or immigrated)?; (ii) out of those who were born in the village, how many of their parents (parents' generation) were not born in this village? A community is defined as "receiving" if more than 30% of either the current generation or the parent generation households immigrated, and as "sending" if at most 30% of the current and the parents generations households immigrated. I considered two generations because migration induced by land scarcity is a recent phenomenon in Uganda: at least from our focus group interviews and available historical studies, noticeable within-country migrations started in late 1946 in the form of kingdom resettlement arrangements (Ngologoza, 1998). I 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[15]. 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.

3.2.3. Descriptive statistics

Table 3.1 presents the distribution of land tenure systems in Uganda from 2003 to 2012 using the RePEAT data set. The proportion of land under private ownership increased from 40% in 2003 to 46% in 2005 and further to 56% in 2012. Conversely, land under

[15] 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.

communal ownership declined from 46% to 35% and to 25% in 2003, 2005 and 2012 in the same order. There are no systematic changes in other tenure regimes over the same period. However, the number of parcels operated by the household increased from 2.5 to 3.8 between 2003 and 2012. This suggests that land scarcity induces land fragmentation.

Table 3.2 shows the characteristics of sending and receiving communities using data from the survey on land tenure systems in Uganda. Receiving communities are more diverse in terms of tribe composition and the proportions of households belonging to the largest tribe. There are on average 8 tribes and 2 tribes in receiving and sending communities respectively, and 67% of the population belongs to the largest tribe in the receiving communities compared to 93% in the sending communities. Also, there are higher proportions of immigrants for both the current generation and the past generation in receiving than in sending communities. In receiving communities, 43% of the current generation and 52% of the past generation households immigrated, significantly higher than the 6% and 4% of current and parents' generation household immigrants respectively in sending communities. The land size per household is relatively smaller and it became scarce earlier in sending communities. This is also portrayed by the timing of land renting. Most sending communities started land renting before the 1970s while land renting started in the 2000s in most receiving communities.

Table 3.3 presents more community characteristics using the RePEAT data sets. As showed in Table 3.2, there are higher proportions of both current and parents' generation immigrant households in receiving than in sending communities. In receiving communities,

52% of the current-generation and 41% of the parents'-generation households immigrated. In the sending communities, the proportion of current and parents'-generation households that immigrated is 10% and 8%, respectively. The population density is higher in sending communities (5.3 persons per hectare) than in receiving communities (4.6 persons per hectare). This suggests that land is scarcer in sending than in receiving communities.

In Table 3.4, we present basic characteristics of sample parcels and households. The yield is almost the same between sending and receiving communities. The distance to the parcels is longer in sending (19 minutes) than in receiving communities (15 minutes). This is presumably because land scarcity makes households operate on plots far from the homestead in sending communities. Indeed, the land size is smaller (2 ha) and the number of operated parcels larger (4.9 parcels/household) in sending communities than in receiving communities (3 ha and 3.3 parcels/household, respectively). The proportion of privately-owned land is higher in receiving communities, while that under communal ownership is higher in sending communities. In receiving communities, 70% of the parcels are privately owned and 23% are communally owned. On the other hand, in sending communities, the proportion of privately owned land is lower and that of communally owned land is higher than in receiving communities. The main mode of land acquisition in sending communities is inheritance, while it is purchasing in receiving communities. 53% of parcels in sending communities were inherited compared to 32% in receiving communities while 47% of the parcels in sending communities were purchased, less than the 67% in receiving communities. Land renting is twice as high in receiving as in sending communities. At the

household level, 85% of households in sending communities are indigenous or native which is significantly higher than the 60% in receiving communities.

3.3. Conceptual framework

Traditionally, land was owned communally in SSA but land ownership arrangements have been evolving towards private land ownership (Otsuka & Place, 2014). Whereas it is not empirically known what determines this evolution, studies have suggested that increasing population is the major determinant of this evolution. For instance, Hayami and Ruttan (1985) argue that population increase, through changing factor scarcities, induces a change in land ownership arrangements from communal to private land ownership. In addition, some studies have found a high incidence of private land ownership in immigrant communities (Migot-Adholla et al., 1991) suggesting that inter-community migrations may be causing changes in land tenure arrangements.

In my view, rural-to-rural migration plays a big role in the evolution of land institutions from communal to private land ownership. Whereas it is not known how these migrations affect land tenure arrangements, in my conceptual framework, portrayed in Figure 2, I provide the potential pathways through which rural-to-rural migrations and the resulting ethnic diversity affect the evolution of land tenure institutions from communal to private land arrangements. I also detail the mechanisms through which population increase affects land tenure arrangements.

While studies have theorized that population growth induces changes in land tenure arrangements (Hayami & Ruttan, 1985), the role of internal migration is ignored. However, the two factors are closely linked; that is, high population density leads to migration especially if it was unequally distributed across communities. Rural-to-rural migration on the other hand increases the population density in host communities. However, migration can also be influenced by other factors such as natural disasters, conflicts and government resettlement programs.

In customary land tenure arrangements, the powers to administer and allocate land, and resolve conflicts are vested in the hands of the community heads; in African setting these are Kings, chiefs and elders. Individuals have use rights, and the main mode of land acquisition is through inheritance and allocation among family members which is conditional on being a member of the community by descent (West 1965). At the initial stages of the evolution, communities are homogenous in terms of ethnic composition and are closely knit. Moreover, land is abundant, and the expansion of crop land is through clearing forests and other uncultivated land. These characteristics are well documented for most agrarian societies by Boserup (1965). As population increases land gets scarce and land value appreciates. The social cost resulting from the communal land tenure system which does not allow for market transactions increases with increasing land scarcity. Also, when there is no more unutilized land, the need to adopt land-saving technologies and to increase agriculture investment renders communal land ownership inappropriate. People would respond to such situation by demanding for individualized land rights so as to be able to secure investment returns accrued to new farming systems.

The cost of maintaining communal land ownership is higher when communities are ethnically diverse because it is complex to harmonize different tribes' institutional arrangements in a communal setting. Rural-to-rural migration, in addition to increasing population density in the host communities, leads to the mixing of tribes, clans and families from various backgrounds. This diversity in host communities weakens or sometimes leads to the breakdown of pre-existing informal land arrangements. In addition, inter-community migration increases land transactions since immigrants have to purchase or rent in land from the land owners. It is, therefore, likely that land tenure arrangements in host communities are likely to evolve towards land ownership faster than those in non-migrant communities.

3.3.1. Testable hypotheses

From the conceptual framework above, I derive the following hypotheses that can be empirically tested.

Hypothesis 3.1: Ethnically diverse communities with a higher proportion of immigrants have a higher incidence of privately-owned land than those homogenous communities with fewer in-migrants.

Hypothesis 3.2: At the household level, parcels operated by immigrants have a higher likelihood of being privately owned than similar parcels operated by native or indigenous households.

Hypothesis 3.3: There are more privately-owned parcels in densely-populated communities than in their sparsely-populated counterparts.

Private land ownership is expected to activate land transactions through reducing transaction costs. Land transactions in turn equalize factor proportions among farming households which promotes efficiency in land use and production. In addition, when land markets are functioning, the land-poor households acquire land from the land-abundant households through purchase or renting, which promotes equity (Baland et al., 2007; Songqing & Jayne, 2013). Therefore, I expect to observe no relationship between farm size and productivity among households with privately-owned land. On the other hand, we may observe an inverse relationship between farm size and productivity among households with communally-owned land, because of the more intensive use of land by smaller land holders.[16]

Hypothesis 3.4: I expect to observe the inverse relationship between farm size and productivity in communities where communal land ownership prevails but not so in communities where private land ownership dominates.

3.4. Empirical strategy

My empirical analysis consists of two parts. First, I examine how migration, ethnic diversity, and population density affect the incidence of private land ownership. Specifically, I look at how the incidence of private land ownership changes as the proportion of immigrants and the number of tribes in a community, and the communal population density increase. I also use a dummy variable of whether a household is native

[16] According to Larson et al. (2014), the inverse relationship between farm size and land productivity has emerged in sub-Saharan Africa.

or in-migrated in the analysis to identify who among the immigrants and indigenous households are likely to privately own land. Due to potential endogeneity concerns with migration variables, I instrument migrations with sleeping sickness occurrence. I discuss in the following sub-section why I think it is a plausible instrument.

In the second part, I examine the determinants of different land acquisition modes, in particular land inheritance, purchases and renting with the expectation that land markets are better functioning in communities with many immigrants and densely populated communities. Applying fixed effect models, I conclude the second part by analyzing the farm size-productivity relationship. As the hypothesis 3.4 suggests, I expect to find a significant inverse relationship between farm size and productivity in sending communities and those communities with communal land ownership, but a smaller or insignificant relationship in host communities and those communities with a higher incidence of private land ownership.

3.4.1. Rural-to-rural migration, population density and private land ownership

Denote parcel by *p*, household by *i*, and village by *j*. The community in our analysis is the village (LC1) which is the smallest administration unit in Uganda. Let I_{pij} be a dummy variable that takes 1 if parcel *p* is individually or privately owned by household *i* and 0 if it is collectively owned by the clan, or village or extended family. I define private ownership from the household responses regarding various forms of land use and transfer rights over the operated parcels. The parcel is privately owned if the household can sell it, give it away or rent it out without consulting any one. It is communally owned if the

household must seek clan, village or extended family consent before selling, giving away or renting out the accessed parcel. For this analysis, I drop rented and borrowed parcels from the data set since by contractual arrangement the person renting or borrowing a parcel cannot transfer it. In other words, I only analyze land rights status for owned parcels. Formally, I estimate a linear probability equation of the form:

$$\Pr(I_{pij} = 1) = \alpha + \beta PM_j + \gamma Tr_j + \delta Indig_{ij} + \theta pop_j + \vartheta M_{pij} + \partial X_{ij} + \emptyset Z_j + \varepsilon_{pij}, \quad (3.1)$$

where PM_j represents the proportion of immigrants and Tr_j is the number of tribes in community j; $Indig_{ij}$ is a dummy variable that takes 1 if the parcel owner is a native inhabitant in the community and 0 if he or his descendants immigrated[17]; pop_j is the population density in the community; M_{pij} is a vector of parcel controls such as whether the parcel is on public land or under leasehold arrangement; X_{ij} is a vector of household characteristics, including head age, square of head age, gender of the household head, head's years of schooling, squared years of schooling, family size, and household assets (per 1000 Uganda shillings); and Z_j is a vector of other village controls, e.g., whether the road to the district capital is tarmac, all-season dirt, or season dirt road which are expected to capture the impact of accessibility/remoteness on land tenure arrangements. Improved

[17] In the survey, we captured the ethnicity of the households surveyed. We use this information to construct the indicator variable of whether the household is indigenous or immigrant. Historically, in Uganda specific kingdoms and small chiefdoms occupied different areas and regions. To date, regions are referred to by the kingdom they fall in or the original tribe occupying them. For instance Central region is referred to as Buganda because it is under the Buganda kingdom and was historically occupied by the Baganda tribe; western is sub-divided into Bunyoro for Banyoro tribe, Ankole for Banyankole tribe, Kigezi for Bakiga, among others ; while near eastern is Busoga for Basoga plus many other regions.

access to markets has a potential to change land tenure arrangements from communal to individual land ownership, as it increases the value of land. In terms of quality, tarmac road is best, followed by all-season dirt road and season dirt road. As a community variable we also include the average of the principle component one (PC1) collected from each sample household to capture the effect of soil quality on private land rights. It is possible that people may demand for private land rights to protect their fertile parcels. ε_{pij} is the idiosyncratic error term.

The estimate β from equation (3.1) tells us about the relationship between the proportion of migrants in a community and private land ownership but may not offer us sufficient evidence to claim causality. This is because there might be other competing hypotheses: for example, better defined individual land rights may attract migrants to host communities, or host communities may have other attributes that attract immigrants and influence the demand for private land rights. On the other hand, the coefficient on $Indig_{ij}$ (δ) may better capture the causal relationship from migration to land ownership status than the migration coefficient. If we can find that, in the same community, parcels owned by immigrants are more often under private ownership while those accessed by indigenous households are collectively owned, it could be that rural-to-rural migration influences changes in land tenure arrangements. However, there still remains a concern that the impact of migration is underestimated, because native households in host communities may learn the importance of privately owning land from immigrants which will promote private land ownership in migrant communities.

To address endogeneity concerns, I exploit a natural experiment that occurred in eastern Uganda, in the then Iganga district which was later subdivided into Mayuge, Bugiri, Namayingo, Namutumba, and Luuka districts.[18] In 1898, there was an outbreak of sleeping sickness in Iganga district, in Bunya County (currently Mayuge district), killing most of the inhabitants and displacing a few remnants (Picozzi, et al., 2005). From the focus group discussions, it was reported that the first phase of the sickness ended in 1910 but the epidemic later resurfaced in the 1940s killing those people that had returned to their original lands. By 1956, the whole of southern Busoga (mainly Bunya) and some neighboring areas had been greatly affected. It is now more than 50 years since the epidemic was eradicated, and the affected, and the then vacant, communities have been settled by immigrants from many regions of Uganda. Currently the affected areas are fully occupied to the extent that land scarcity is one of the major concerns.

I use sleeping sickness occurrence as an instrument for the proportion of immigrants (PM) in equation (1) above. The key assumption underlying my empirical approach is that sleeping sickness across communities was exogenous to the land tenure arrangements. In other words, sleeping sickness occurrence and private land ownership are linked through migration. I expect to find that communities affected by sleeping sickness attracted many immigrants, which, in turn, led to the emergence of land tenure arrangements that favor private land ownership.

[18] In Uganda, until the population exploded in certain areas and rural-rural migration ensued, regions were homogenous. Iganga district is in Busoga region and was originally occupied by the Basoga. Most parts of the region are now ethnically diverse though with varying levels depending on the proportion of immigrants. Therefore, if we find a Muganda in Ankole it means either he or his ancestors immigrated to that area.

3.4.2. Rural-to-rural migration, population density and land transactions

As discussed in Section 3.3.1, I hypothesize that land rental and sales markets are more active in the immigrant communities and the densely populated areas where private ownership is more common. To test this hypothesis, I use the information on acquisition modes of parcels to which farmers currently have access, and examine their relationship with the migration patterns and population density of the communities. There are three modes of land acquisition: land inheritance, renting, and purchase. I expect that land renting and purchase would be observed more often as the acquisition mode than inheritance in immigrant communities.

I adopt an unordered multinomial probit (MNP) model in the analysis of the determinants of land acquisition modes. The model allows the relaxation of the independence of irrelevant alternatives (IIA) assumption imposed by multinomial logit model. IIA imposes a restriction that the relative odds of two options are independent from other options. For our case, IIA requires that the odds ratio of inheriting land to purchasing land is independent from the third option or renting land. This may not be the case because if a household inherited land, they may not need to buy or rent land and thus the choices are dependent on each other and error terms are correlated. The MNP model we adopt has an advantage of allowing a much more flexible pattern of error correlation (Cameron & Trivedi, 2009, P. 503). Let A denote a categorical variable representing different parcel acquisition modes taking a value, 1, 2 or 3 corresponding to inheritance, purchase, or renting, respectively. Let X denote a set of conditioning variables including the proportion

of immigrants in the community, population density and other household and community controls.

The MNP is obtained from the general additive random-utility maximization (ARUM) model which requires that the individual's choice of an alternative (*m*) is based on utility maximization behaviour. From ARUM, the utility of alternative *m* is given by:

$$U_{im} = X_i\beta_m + \epsilon_{im} \quad \text{for } m \in \{1, 2, 3\}, \qquad (2)$$

where the error terms of the 3 options are assumed to be jointly normally distributed with mean zeros. The probability that the alternative *m* is chosen over other options (*m'* or *m''*) is given by:

$$P_{im} = \Pr(A_i = m) = \Pr\{U_{im} \geq U_{im'}, U_{im} \geq U_{im''}\} \quad \text{for } m', m'' \neq m. \qquad (3)$$

The coefficients are estimated by the maximum likelihood method. The heteroscedasticity robust standard errors are used.

3.4.3. Private land ownership and Farm size-productivity relationship

As hypothesized, we expect the private land rights to enhance efficient land allocation and investment. Land transactions and land investment should be higher in communities with a high incidence of private land ownership. In this sub-section we test the differences in production efficiency between communities with a high incidence of private land ownership and those with a higher incidence of communal land ownership by comparing the farm size-productivity relationship. We expect to find a more significant inverse relationship in sending than in receiving communities. We run the same regressions separately for different community types depending on whether the community

is receiving or sending, and whether all the household land is privately or communally owned.

To test for the farm size-productivity relationship, we look at maize and bean yields, the widely grown cereals in Uganda. We run the community fixed effects regression using a two-season (the second cropping season in 2011 and the first cropping season in 2012) semi-panel data set. Letting Y_{pisj} be the yield from parcel *p*, belonging to household *i* in season *s* and community j, we run the following regression:

$$Y_{pisj} = \alpha + \beta Farmsize_{isj} + \vartheta M_{pisj} + \partial X_{isj} + v_{js} + \mu_{pisj}, \qquad (3.3)$$

where $Farmsize_{isj}$is the farm size in hectares of household i in season s and in community j. M_{pisj} is a vector of parcel controls such as the distance to the parcel from farmers' residence (in minutes), whether the parcel is on a public or leasehold land. X_{isj} is a vector of household controls including household head gender, age, and years of schooling, household assets, Thompson index (a measure of land fragmentation), and the dependence rate (the ratio of family members below 15 and above 65 years to the family work force; those between 15 and 65 years). v_{js} captures the community and season fixed effects, while μ_{pisj} is an error term that may be heteroskedastic and correlated within a community and season. We adjust for this by using the robust standard errors and covariance matrices that allow for the clustering of the error terms at the community and season groups (Wooldridge, 2010, Chapter 20).

For comparative purposes, we run the same regression separately for the receiving and sending communities. We also run the same regression for households with private land ownership and those whose land is communally owned.

3.5. Results

3.5.1. Rural-to-rural migration, population density and private land ownership

Table 3.5 reports the estimation results on the determinants of private land ownership. The results show that there are many privately-owned parcels in immigrant-dominated and ethnically diverse communities. Column 1 suggests that when the proportion of immigrant households in a community increases by 0.8 (which corresponds to the difference in the total proportion of immigrants between receiving and sending communities, presented in Table 3.3) the probability of a household privately owning a parcel increases by about 8 percentage points (which is equivalent to the regression coefficient, 0.101, multiplied by 0.8). In Column 2, an increase in the number of tribes in a community by 1 leads to 2 percentage points increase in the probability of privately owning land. In column 3, I use another proxy for migration: whether a household or its descendants are native or indigenous in the community or whether they immigrated. The results show that the probability of privately owning a parcel is about 8 percentage points lower if the parcel is owned by the native household than if it is owned by an immigrant. The results remain significant even when the proportion of immigrants and the number of tribes are included in the same specification (column 5). In all regressions we include the village population density as of 2003 as an explanatory variable and find no significant

effect on private land ownership. The coefficient has a negative sign and is of small magnitude when migration is not controlled for (column 4). The coefficient, however, remains negative and becomes significant when we control for the proportion of immigrants in a community (columns 1, 5 and 6). We conjecture that the negative sign may capture what we find in the descriptive statistics that sending communities are densely populated and have a high incidence of communal land ownership.

In Section 3.4, I noted the concern that our results may be capturing other competing hypotheses; for instance, communities with tenure arrangements that allow for individual land ownership attract immigrants, and host communities may be having other attributes that attract migrants and influence private land ownership. However, the native household dummy I included in column 3 downplays this concern since native households even in host communities have a lower probability of privately owning land compared to immigrants. To further rule out endogeneity concerns, I use sleeping sickness as an instrument for the proportion of immigrants in a community. The results, shown in column 6, remain consistent with those presented in columns 1 and 5, but the magnitude becomes larger in the instrumental variable (IV) specification: increasing the proportion of immigrants in a community by 0.8 leads to a 46 percentage points (which is equivalent to the regression coefficient, 0.578, multiplied by 0.8) increase in the probability of privately owning land. The instrument passes all tests including the weak instrument test.

While we do not find the positive effect of population density on private land ownership, the first stage regression reveals that population density leads to migration

(column 7). This suggests that whereas we do not find a direct effect of population density on land tenure arrangements (column 4), it works indirectly through influencing rural-to-rural migrations.

Other determinants of private land ownership are accessibility, whether a parcel is on a public or leasehold land, family size and assets. Regarding accessibility, we find about 10 to 18 percentage point higher probability of private land ownership if a community is connected to the district headquarters by the tarmac road than if a community is connected by a season-dirt road. These findings are consistent with prior studies which suggest that better accessibility promotes agriculture modernization that, in turn, induces the demand for private land rights (Platteau, 1996). We also find that parcels on public land and leasehold are less likely to be privately owned. This is because occupants of public land only have use rights but have no right to transfer or carry out large investments without government approval. Larger families are less likely to privately own land. This could be due to the possibility that families are large because they are extended in nature including distant relatives which also increases the likelihood of communally owning land. We also find that in all specifications there is a positive correlation between assets and private land ownership that is significant at 5% level of significance. These findings are consistent with other studies in sub-Saharan Africa. For instance Goldstein & Udry (2008) found that rich households and those that held political positions were more likely to have rights over land than the poor, and those not holding any political position.

The concern with linear probability model is that the estimated probabilities can fall out of the range [0,1]. I examine whether this is not affecting our estimates by using probit model to estimate the coefficients. The results (presented in table A1, in the appendix) are very similar to the ones presented in table 4, suggesting that my results aren't sensitive to the estimation method applied.

3.5.2. Rural-to-rural migration, population density and land acquisition

Table 3.6 reports the average marginal effects computed from the multinomial probit odd ratios. We find that migration is positively and significantly correlated with land purchases and land renting but negatively correlated with land inheritance as modes of land acquisition. Column 1 suggests that a 0.8 increase in the proportion of immigrants in a community is associated with 12 percentage points (which is equivalent to the regression coefficient multiplied by 0.8) lower probability of acquiring land through inheritance. On the other hand, increasing the proportion of immigrants in a community by 0.8 is associated with 6.3 percentage points (column 2) and 5.4 percentage points (column 3) significantly higher probability of acquiring land through purchase and renting, respectively. Although the signs of the coefficient are as expected, we do not find a significant effect of population density on any of the modes of land acquisition, again suggesting that rural-to-rural migration, through diluting social cohesion and weakening informal institutions, enhances land transactions in host communities.

In columns 4 to 6, the estimations are for only indigenous households. This is to examine whether our results are not capturing the fact that immigrants do not have to

choose between inheritance and purchase or renting since they do not inherit land, or the possibility that indigenous households who inherit land do not need to purchase land. Our results, however, are robust even when we consider only indigenous household. Also, while I apply the less restrictive multinomial probit model, the results are almost similar when I apply the restrictive multinomial model (results presented in Table A2 in the appendix).

3.5.3. Private land ownership and Farm size-productivity relationship

Table 3.7 presents the estimates of the relationship between farm size and yield. The results are presented by ownership type: whether the households' parcels are privately or communally owned, and by community type: whether the household is in the sending or receiving community. Since private land ownership is more common in receiving communities, the results should be consistent in the two classification categories. Columns 1 and 3 confirms hypothesis 3.4. We do not find the inverse relationship between farm size and yield in households that have privately owned land and in communities with many immigrants, whereas we find a strongly significant inverse relationship in households that own land communally and in sending communities. Doubling farm size is associated with 19% lower yield lower yield on communally-owned land as shown in column 2 and by 27% in sending communities as shown in column 4. In all specifications, I include crop dummies, community and seasonal fixed effects.

Table 3.8 presents robustness checks where I run the same specifications but define receiving and sending community differently. This is to address the concerns that the way I defined the communities may be influencing our results. So far I defined all communities as

receiving if more than 30% of either the current generation or parents' generation immigrated and as sending if at most 30% of the households immigrated. I adjust the cutoff points to 10%, 20% and 40% and check whether our results are sensitive to these changes. We find that our results remain robust to these modifications. We consistently do not find any inverse relationship in receiving communities and find a strong and significant relationship in sending communities.

3.6. Conclusion

In this chapter, I used community, household and parcel data from rural Uganda to test the hypotheses that (1) ethnic diverse communities have a higher incidence of privately owned land than the homogenous communities with fewer migrants, (2) densely populated communities introduce private land ownership systems than sparsely populated communities and (3) land markets are efficient in immigrant, ethnically diverse and densely populated areas which reduce or remove the commonly observed inverse relationship between farm size and productivity. We found that land tenure systems have evolved in the last decade or so in Uganda. Whereas our results confirm hypotheses 1 and 2, we do not find the evidence to support hypothesis 3.3 on the positive effect of population density on private land ownership. Moreover, when I control for the proportion of immigrants in a community, the coefficient of population density becomes negative and even significant. We found, however, that population density positively and significantly determine out-migrations, suggesting that whereas population density does not directly affect the

evolution of land tenure arrangements towards private land ownership, it indirectly affects it through influencing inter- community migrations.

We also found that the probability of renting and purchasing a parcel is higher and that of land inheritance is lower in the immigrant communities. The functioning of land markets in turn translates into lower and insignificant inverse relationship between farm size and productivity in host communities. In other words, there is a significantly lower yield per hectare on larger-farms in non-immigrant communities (referred to as sending communities) while we did not find such relationship between farm size and yield in immigrant communities (also referred to as receiving/host communities).

The findings suggest that the inter-community migration promotes private land ownership which enhances land transactions. Land transactions, in turn, enhance equity, and production efficiency as land is transferred from less efficient large farms to more efficient small farms (Heltberg, 1998; Otsuka, 2007; Songqing & Jayne, 2013). However, land markets remain inactive if land is owned communally because of high transactions costs due to communal restrictions. It is therefore apparent that to promote efficient and equitable land transactions, deliberate policies should be designed to transform land ownership arrangements from communal to private land ownership. Such policies should include various measures to ease rural-to-rural migration. This will improve the performance of land markets which will in turn increase production efficiency, boost agriculture performance, and reduce poverty in the rural areas.

CHAPTER 4

Population Growth, Rural-to-rural Migration and Land Conflicts: Implications for Agricultural Productivity in Uganda

4.1 Introduction

The escalation of land-related conflicts has attracted attention from researchers and policy practitioners alike. Land conflicts are increasingly becoming a threat to rural economic activities such as agriculture in most sub-Saharan African countries and, as discussed in Chapter 2, studies have suggested that population growth, and the resulting land scarcity, is one of the major causes of these conflicts (Andre and Plateau, 1998; Yamano and Deininger, 2005; Deininger and Castagnini, 2006). However, no study has empirically examined this hypothesis.

Studies have also argued that customary land institutions in Africa are weakening, yet formal institutions are not strong to curb land conflicts' threat. These 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-Mensah, 1999; Donge and Pherani, 1999). It is, however, not known why the traditional land institutions are no longer capable of curbing land conflicts and why these institutions are weakening. Some descriptive studies have suggested that land conflicts are more common in immigrant communities, suggesting that informal institutions are weaker in these communities (Platteau, 1996; Donge and Pherani, 1999; Fred-Mensah, 1999). This is particularly important because SSA has experienced rapid population growth in the recent past. Land

has, thus, become scarce and inter-community migrations from densely to sparsely populated communities are commonly observed in rural areas. This has a potential to affect the functioning of informal institutions and to weaken the pre-existing conflict resolution mechanisms, especially in host communities.

However, despite the increasing incidence of land-related conflicts and their undisputable effects on agriculture performance, empirical studies[19] on the determinants and consequences of such conflicts are scant. 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. In addition, though conflicts take different forms, the available studies have bundled them in the analysis.

This chapter 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, if so, the pathways through which they do; (ii) unbundling land-related conflicts by type so as to investigate what causes them and the relative impact of different conflict forms; and (iii) looking at the impact of land conflicts and conflict types on agricultural productivity in Uganda.

Using community-, household-, and parcel-level data from two simultaneously conducted surveys in 2012, together with the census data from Uganda, this chapter

[19] We know of only two studies that have quantitatively looked at the 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. However, they both do not trace and link land conflicts to rural migrations in the respective countries.

analyzes how rural-to-rural migration, ethnic diversity, and population growth are associated with land conflicts. Based on the reviewed literature and on the theoretical model I develop in this chapter, I hypothesize that rural-to-rural migrations and ethnic diversity weaken informal conflict resolution institutions in host communities which, in turn leads to land conflicts. I, therefore, expect to find more conflict cases in ethnically diverse and immigrant communities[20]. I also hypothesize that there are more conflict cases in communities that have experienced high population growth in the recent past. This is because population pressure leads to land scarcity which induces land conflicts. To gain an understanding on how detrimental land conflicts can be, we analyze the impact of land conflicts on agricultural productivity.

The findings of this chapter are generally consistent with these hypotheses as follows. First, there are more conflict cases on parcels in communities with a larger proportion of immigrants and those that are ethnically diverse (with many tribes). Second, there are more land conflicts in communities that have experienced higher population growth rates. In addition, unbundling land conflicts by type reveals that having many tribes in a community is associated with a higher likelihood of eviction conflicts but not associated with other conflict types. On the impact of land conflicts, the results show that yield is 20% lower on plots with conflicts than in those without conflicts. The impact is even bigger when I break down conflicts by type. Yield is 37% lower on plots with eviction conflicts than those with

[20] The family lineage in Uganda follows a patrilineal system; hence, intermarriages that involve a male from a certain tribe marrying a female 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 the tribal identity of households according to community definitions.

no conflicts, whereas we do not find an impact of boundary and inheritance conflicts on yield.

The rest of the chapter is organized as follows. Section 4.2 describes the data used in this chapter and presents the descriptive statistics, categorized by whether a community is sending or receiving immigrants. Section 4.3 develops the theoretical model from which the testable hypotheses are derived. Section 4.4 specifies the empirical models for the determinants of land conflicts and their impact on productivity. Section 4.5 presents the empirical results, while Section 4.6 concludes.

4.2. Data and Descriptive statistics

4.2.1. Data

I use three data sets in this study. Two are 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 as described in Chapter 3. Both surveys collected data on community, household, and parcel characteristics. The parcel-level data contain information 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 contains information on the migration history of community inhabitants for two generations (current and the parents' generations), the number of tribes in the community, and accessibility in terms of the nature of quality roads to district headquarters and to main markets. We

supplement the survey data sets with 1991 and 2002 census data, from Uganda Bureau of Statics, to compute population growth rates in the covered districts. This helps us to control for the population growth rate which is the most cited cause of land conflicts (Deininger and Castagnini, 2006).

4.2.2. Descriptive statistics

For the exposition, I categorize the study communities into sending and receiving (host) communities as discussed in chapter 3. Tables 4.1 and 4.2 present the community level characteristics of sending and receiving communities using data from the RePEAT and land tenure projects, respectively. In the receiving communities, 52% of the current-generation and 41% of the parents'-generation households immigrated. In the sending communities, the proportion of current and parents'-generation households that immigrated was 10% and 8%, respectively. Due to the influx of many immigrants, receiving communities are highly ethnically diverse as reflected in the average number of tribes (seven tribes) compared with the three tribes in the sending communities. Table 4.2 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 is 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 the 3.5 persons per hectare in receiving communities (Table 4.1). Land transactions started earlier in the sending than in the receiving communities. Land renting started in the 1970s in most of the sending

communities, while it started around year 2000 for most of the receiving communities[21]. This reinforces the argument that the sending communities became densely populated much earlier than the receiving communities, which motivated the migrations across communities. The population growth rate has been high over ten years. Districts where we find sending communities experienced an 87% population growth rate between 1992 and 2002, whereas those where we find receiving communities grew by 80%. These high growth rates are consistent with the high country growth rate of 3.2% which has been higher in the past. Altitude (Table 4.1) is statistically significantly higher in sending communities (1518 meters) than in receiving communities (1271 meters). Historically, people settled on high raised lands that were free from mosquitoes and hence displayed low malaria rates and were also free from other pests and diseases. When the population increased in high altitude area, people out migrated to low lands, which were sparsely populated. This explains the huge divergence in the altitude between sending and receiving communities. In terms of accessibility, 23% of the 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 the 46% in sending communities. In contrast, 39% of the sending communities can access district headquarters using season dirt roads (poor type) compared with 19% of the receiving communities.

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

Table 4.3 presents information on household and parcel characteristics. On average, households in sending communities have smaller land (1.9 hectares) than in receiving communities (2.8 hectares). Land was more fragmented in sending communities with a Thompson index of 0.54 in sending communities compared with 0.37 in receiving communities[22]. The average distance to the parcel was 22 minutes in sending communities, higher than 18 minutes in receiving communities. This may be due to land scarcity, which forces people to operate parcels far away from their homesteads, either through renting or purchase, and is consistent with the high level of land fragmentation in sending communities. In terms of land 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 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 could not find enough land to till. In both community types, a larger proportion of land is under the customary land tenure system. However, the proportion is much higher in sending communities (95%) than in receiving communities (71%).

There were more cases of land conflicts in receiving communities than in sending communities. Households in receiving communities have had conflict concerns on 14% of the parcels they access, while 6% have had similar concerns in sending communities. There

[22] 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 it has infinite parcels.

have been conflicts on 11% of the parcels in receiving communities compared with 4% 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 on 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 experienced eviction, boundary, and inheritance conflicts, in the same order.

The average maize yield was not different between the two community types. The yield was 1231 kilograms per hectare in sending and it was 1181 kilograms per hectare in receiving communities.

4.3 Conceptual framework and Testable Hypotheses

4.3.1 Conceptual framework

I develop a conceptual framework and use it to derive testable hypotheses. In the framework, the occurrence of a conflict on parcel p, in household i and in community *j*, represented by a binary indicator, LC_j, is determined by two factors: land tension denoted by LT_j in a community and the community 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 indicates 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 growth and soil quality and a decreasing function of remoteness:

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

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 the number of immigrants and previous institutions. Thus, the current tension absorption capacity is determined by the past population density. If the past population density was high, there were fewer immigrants and hence informal institutions remained strong in those communities. On the other hand, communities that are ethnically diverse have lower tension absorption capacity because many tribes weaken the functioning of customary institutions as different tribes have different customary practices that are difficult to harmonize. That may be represented by the following equation:[23]

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

In sum, the equation of land tension is given by

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

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

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

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

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

From the likelihood equation, we derive the following hypotheses:

4.3.1 Testable Hypotheses

Hypothesis 4.1: Miguel & Gugerty (2005) suggest that ethnic diversity reduces social cohesion. I thus hypothesize that there are more conflict cases over parcels in communities with higher proportions of immigrants and those that are ethnically diverse than in communities with more non-immigrants and those that are homogenous. This is because ethnic diversity and immigration lowers the tension absorption capacity since it is costly for multi-tribe societies to develop with common land institutions and to establish conflict-resolution mechanisms.

Hypothesis 4.2: I hypothesize that there is a higher probability of having a conflict over a parcel in communities that have experienced higher population growth rates. This is because the population growth rate increases tension over the available land through increasing the demand for land and land value. I, however, expect to find fewer parcels with conflicts in communities with higher past population density. 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. With fewer immigrants, informal customary institutions remained intact in sending communities.

Hypothesis 4.3: Land conflicts create land insecurity, which impedes meaningful land improvements, and this, in turn, results in lower productivity. I hence hypothesize that there is lower yield on parcels with conflicts than on the counterparts without conflicts owned by the same household. Also, since eviction conflicts pose a greater tenure security threat, I expect to find much lower yield on parcels with eviction-related conflicts than in parcels with other conflict types.

4.4 Estimation strategy

4.4.1. Rural-to-rural Migration and Land Conflicts

To assess the impact of rural-to-rural migration on the likelihood of land conflicts, I adopt a linear probability modeling framework. Denote parcel by *p*, household by *i*, village by *j* and district by *d*. Let C_{pijd} be a dummy variable equal to 1 if there has been a conflict on parcel *p* in the past two cropping seasons, owned by household *i* in village *j* and district *d*. We hypothesized that communities with many immigrants and tribes have more conflict cases, holding other factors constant. Formally, we estimate a linear probability equation of the following form:

$$C_{pijd} = \alpha + \beta PM_{jd} + \gamma Tr_{jd} + \varphi PastPop_{jd} + \delta Popgrowth_{d} + \vartheta M_{pijd} + \partial X_{ijd} + \emptyset Z_{jd} + \varepsilon_{pijd}, \quad (4.1)$$

where PM_j is the proportion of immigrants in community j, Tr_j stands for the number of tribes in a community, $PastPop_{jd}$ is the community past population density. This is included to test the hypothesis that communities that were densely populated in the past became sending communities and thus retained strong informal institutions. I therefore

expect to find that this variable is negative and significantly associated to land conflicts. $Popgrowth_d$ is the district population growth rate, M_{pijd} is a vector of parcel characteristics such as whether the parcel is under customary tenure, leasehold, public land or the Mailo tenure system[24]. X_{ijd} is a vector of household characteristics, including head age, gender, years of schooling, family size, and household assets (in Uganda shillings). Z_{jd} is a vector of other village controls: whether the road to the district headquarters is tarmac, all-season dirt, or season dirt road. These variables capture the impact of accessibility/remoteness on land conflicts. The 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_{pijd} is the idiosyncratic error term.

In addition to the linear probability model, I also apply a two-stage instrumental variable method, to estimate the impact of rural-to-rural migration on land. In as much as other competing hypotheses such as soil quality and other attributes can determine both migration and conflicts, the proportion of immigrants variable (PM_{jd}) in Eq. (1) can only be interpreted as a correlation. I use altitude to instrument for the proportion of immigrants on the assumption that altitude is associated with conflicts only through across community

[24] 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 received 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.

migrations. This instrument is plausible given the setting in Uganda and other sub-Saharan African countries. Historically, in rural Uganda, people settled in high altitude areas which had less malaria and other pests and diseases. According to anthropological studies, the high altitude areas of south western and far eastern Uganda became densely populated earlier than other low land areas (Ngorogoza, 1998). Due to population explosion and land scarcity, people migrated to low lands including reclaiming swamps for farming. In addition, the introduction of pesticides and other medicines reduced mosquito and other pests' threat hence enabling people, facing land scarcity, to occupy sparsely populated low lands. Soil quality may vary between low and high lands but this variance will be in favor of high altitude lands which have alluvial and loam soils that are more fertile than the sandy and clay (characterized by water logging) soils in low lands. The fact that conflicts are common in low lands which receive immigrants counters the belief that conflicts occur in areas with fertile soils. I hence do not expect altitude to be associated with conflicts through soil fertility and can consider altitude a plausible instrument.

4.4.2. Land conflicts and yield

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

$$Y_{pis} = \alpha + \beta C_{pis} + \gamma M_{pis} + v_{is} + \mu_{pis}, \qquad (4.2)$$

where C_{pis} is a dummy variable that takes 1 if there has been a conflict on the parcel and zero otherwise. In a different specification, I break down conflicts into eviction, boundary, and inheritance conflicts, so C_{pis}, in this case, is a vector of variables: eviction, boundary and inheritance conflicts. Parcel characteristics, M_{pis}, include distance to the parcel in minutes, whether the parcel is under leasehold, public land or Mailo tenure, evaluated against customary as a reference category, and how the plot was acquired (inherited, just walked in, and purchased using whether it was rented as a reference). 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. I 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). Since all household variables do not change between seasons, all household level variables drop in the above specification. I also run another version of equation (4.2) but with community fixed effects. In this specification, I can control for household variables.

4.5. Econometric Results

4.5.1. Rural-to-rural migration and land conflicts

Table 4.4 presents the results on the determinants of land conflicts. The results show that there are more land related conflicts on parcels in communities with many immigrants, more tribes, and those that have experienced a high population growth rate. From column 1, increasing the proportion of immigrant households in a community by 0.8 (which corresponds to the difference in the total immigrant proportions between the receiving and

sending communities, reported in Table 4.1) is associated with a 5 percentage points (which is equivalent to the regression coefficient, 0.0655, multiplied by 0.8) higher probability of having a conflict on a parcel. The results remain consistent even when we instrument the proportion of immigrants with altitude (Column 7). In the instrument variable specification, increasing the proportion of immigrant households in a community by 0.8 is associated with 7.3 percentage point higher probability of having a conflict over a parcel. In column 2, we report the results of ethnic diversity. Increasing the number of tribes in a community by 1 is associated with 0.7 percentage point higher probability of having a conflict on a parcel. The results on the association between the proportion of immigrants in a community, ethnic diversity and land conflicts remain consistent even when I include both variables in the same specifications (Column 5).

In all specifications where we include the population growth rate variable, we find that there are more conflict cases in districts that have experienced higher population growth rate (Columns 1, 3 & 7). These results are consistent with the previous studies which have suggested that population growth leads to land conflicts (Yamano and Deininger, 2005; Deininger and Castagnini, 2006). As I hypothesized that communities with higher past population density became sending communities and hence retained strong informal institutions, we find negative associations in all specifications, albeit weak, between population density in 2003 and land conflicts. I, however, note that year 2003 may be more recent, and, hence population density for the 2003 variable may not very well capture the past population density. This may partly explain why, even though the sign is negative as expected in all specifications, the magnitudes are small and not significant. This

may suggest that in 2003 there were some immigrant communities that were densely populated which may have a downward bias on our results.

Table 4.5 reports the effect of migrations, ethnic diversity and population growth rate on different types of land conflicts. We find that ethnic diversity is only associated with eviction conflicts but not with other land conflict types. Increasing the number of tribes in the community by 1 is associated with a 0.3 percentage point higher probability of having eviction conflicts over a parcel. Similarly, we find a significantly higher probability of having eviction conflict over a parcel in districts that have experienced a higher population growth rate, but we do not find any significant relationship between the population growth rate and other conflict types. The proportions of immigrants in a community are positively and significantly associated with eviction and boundary conflicts and not with inheritance conflicts. Increasing the proportion of immigrant households in a community by 0.8 is associated with 1.14 percentage point higher probability of having eviction conflicts and a 3% higher probability of having boundary conflicts. These results suggest that ethnic diversity and migrations have influenced eviction conflicts more than the traditionally recognized conflict types: boundary and inheritance conflicts.

In Table 4.6, I break down the proportion of immigrants into proportion of the current and proportion of the parents' generation immigrants. This is to examine whether there are differential effects of different categories of immigrants on land conflicts. We find that parents' generation immigrants have a significantly higher effect on land conflict than current generation immigrants. Increasing the proportion of immigrant households in a community by 0.8 (which corresponds to the difference in the total immigrant proportions

between the receiving and sending communities, reported in Table 4.1) is associated with a 8 percentage point (which is equivalent to the regression coefficient, 0.972, multiplied by 0.8) higher probability of having a conflict over a parcel (Column 4). On the other hand, increasing the proportion of current generation immigrant households in a community by 0.8 is associated 5 percentage point (which is equivalent to the regression coefficient, 0.0639, multiplied by 0.8) higher probability of having a conflict over a parcel (Column 3). These results remain robust even when we do not control for the population growth rate (Columns 1 and 2).

In Table 4.7 I break down conflicts by type and examine whether there is a difference in the relationship between the timing of immigrants and different land conflict types. The results show that communities with a large proportion of current-generation immigrants have more eviction conflicts, while those with a large proportion of past-generation immigrants have more boundary conflicts (Columns 1 and 4). The possible explanation for these findings might be that, due to land scarcity and high land value, current-generation immigrants face strong resistance from the 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. In all specifications in tables 4.5, 4.6 and 4.7, we find a significantly smaller probability of having land conflicts on parcels if it under leasehold tenure arrangements. The land under leasehold

tenure arrangement is surveyed and titled. These findings suggest that land titling and clear boundary demarcation reduces land conflicts.

I hypothesized that migrations and ethnic diversity lead to the breakdown of tribe-specific informal institutions. I thus expect to find that informal institutions do not function well in host communities. Table 4.8 presents the 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 percentage points lower probability of consulting informal institutions to resolve their conflicts than sending communities.[25] This suggests that there is lack of trust in the capacity of customary institutions to handle conflicts in receiving communities. This is not surprising since the receiving communities are very mixed in terms of ethnicity and languages, and hence, traditional institutions of elders are likely to be biased in handling conflicts, especially if local committees are dominated by people from one ethnic group. Also, a 1 percent growth in population reduces the probability of consulting informal institutions by 13 percentage points.

4.5.2 Land conflicts and yield

Table 4.9 presents the impact of land-related conflicts on bean and maize yields, the widely grown annual crops in Uganda. Specifications 1 and 3 control for village and season fixed effects, while 2 and 4 control for household and season fixed effects. Given that my household variables did not change across seasons, controlling for household fixed effects drops all household-level variables from the regression (Column 2 and 4). Similarly,

[25]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.

community characteristics are dropped when I control for community and seasonal dummies (Column 1 and 3). Crop dummies are controlled for in all specifications. Specifications 1 and 2 pool all conflicts together while 3 and 4 look at the relative effects of different conflict types on productivity. From our preferred specifications (Column 2 and 4), we found that yield is 20% significantly lower on parcels with land conflicts than on other parcels without conflicts, owned by the same household. Furthermore, after unbundling conflicts, we find that eviction conflicts hurt productivity more than other conflict types. Parcels with eviction conflicts had 37% lower yield (significant at 5%) compared with those without conflicts. We do not find a significant impact of boundary and eviction conflicts on yield. The results can be explained by the fact that eviction conflicts create 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 is almost twice the impact of all conflict types combined. Note that when I control for village and season fixed effects (Column 1 and 3), we do not find any significant effect of land conflict on yield. This may be due to the fact that immigrants are more productive but more likely to have land conflicts than indigenous households; hence, without capturing the ability variable, we are likely to suffer from the omitted variable bias. This bias is reduced when I control for household and seasonal dummies (Columns 2 & 4) and compare yield on parcels owned by the same household.

4.6. Conclusion

Are rural-to-rural migrations and population growth associated with land conflicts and do land conflicts hurt agricultural productivity? Indeed, they do. Tracing rural-to-rural migration patterns, this study finds that the probability of having land-related conflicts is higher in communities with larger proportions of immigrants. Also, we find that increasing the number of tribes in a community, a measure of ethnic diversity, increases the probability of having conflicts. In addition, we find that there are more conflict cases in the districts that have experienced higher population growth rates. Land conflicts, in turn, reduce productivity by 20%, an impact that increases after unbundling conflicts, by type, to 37% for land evictions.

Our results suggest that rural-to-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. These findings are consistent with studies that suggest that ethnic diversity hinders social cohesion, hence reducing social capita (Miguel & Gugerty, 2005).

I, however, note that our productivity impact of land conflicts can be taken as the lower bound because: (i) I only examine the impact of conflicts on accessed plots and hence do not capture the effect on those plots lost due to conflicts, which is a common

phenomenon in rural Uganda; (ii) a conflict on one plot can have a spillover effect on the perceived security of other owned plots especially if it is of the eviction type. If the output on non-conflicted plots is reduced due to conflicts over own or neighbors' conflicted plots, our results will be biased downwards; and (iii) some farmers hide some conflict information due to the sensitivity of the issue, as observed by Deininger and Castagnini (2006).

This study's findings have key policy implications. The study suggests that to improve agriculture performance, policies should aim at improving land tenure security through curbing land conflicts. Efforts should be particularly geared toward reducing eviction related conflicts which were found to be more hazardous to productivity than other conflict types. In additions, we find more boundary conflict in immigrant communities which might be caused by poor boundary demarcation. Indeed, we find that landholders use live plants to demarcate land and to mark land boundaries on more than 80% of the parcels. Live plants can be uprooted and replanted in a different position which, if detected, leads to land conflicts. Adoption of better land demarcation mechanisms like use of survey stones may be a key to reducing boundary conflicts.

In addition, land titling and surveying can help in reducing land conflicts. Indeed, we find a significantly lower probability of having a conflict if a parcel is under leasehold land tenure arrangement, a tenure system where land is surveyed and titled. While titling programs are expensive especially for developing countries, 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.

CHAPTER 5

Conclusions and Policy Implications

Recent studies on land have suggested that customary land tenure systems in SSA are evolving from communal to private land ownership. While not empirically verified, prior theoretical studies argue that population pressure induces a change in land institutional arrangement from communal to private land ownership. Puzzling, however, is the increasing incidence of land conflicts in SSA. It is more puzzling that these conflicts are more likely to take place in communities where land institutions are believed to have evolved from communal to private land ownership. Many of such communities are immigrant communities and densely populated areas. These observations are intriguing because it is believed that tenure security should increase with a change from communal to private land ownership. It is, therefore, important to understand the processes of land tenure evolution and how these processes are associated with land conflicts. This is the objective of this dissertation. To my knowledge, this dissertation is the first to empirically examine how land institutions evolve from communal to private land ownership and how these evolution processes are associated with land conflicts.

This dissertation analyzes the determinants of evolution of land institutions with a focus on rural-to-rural migration, ethnic diversity and population pressure. The dissertation also analyzes how these factors are associated with land conflicts. These factors are of interest because SSA has experienced a rapid population growth rate in the recent past which has led to inter-community migrations mainly from the densely to sparsely populated

communities. These migrations have created two community types, migrant-host communities and sending communities, where migrant communities are highly ethnically diverse. This dissertation, therefore, analyzes how the changes in community composition in terms of the number of tribes and proportion of immigrants have influenced the changes in land institutions, and whether they are associated with land conflicts. Secondly, this study analyzes the implications of changes in land institutions on land transactions and production efficiency, and the effect of land conflicts on agriculture productivity.

Several findings emerge from this study. First, the findings reveal to what extent land institutions have evolved over the last one decade in Uganda. The proportion of land under private ownership increased from 40% in 2003 to 46% in 2005 and further to 56% in 2012. Conversely, land under communal ownership declined from 46% to 35% and to 25% during the same periods. After exploring the determinants of this evolution, this dissertation finds a higher likelihood of privately owning a parcel in communities with a higher proportion of immigrants and those with many tribes. Contrary to what studies suggest, we do not find a relationship between population density and private land ownership. We, however, find that population density influences migrations, suggesting that, while population density may not directly affect the evolution of land institutions, it indirectly works through influencing inter-community migrations.

Secondly, we find that the privatization of land promotes land transactions and improves production efficiency. Land renting and land purchase, as modes of land acquisition, are more common in communities with many immigrants, while land

inheritance is less common in the same communities. Conversely, we find that land inheritance is the most common mode of acquiring land in non-migrant communities. We also find a lower likelihood of land renting and purchases in non-immigrant communities. As a result of land transactions, production efficiency, tested by examining the relationship between farm size and productivity, is higher in migrant host communities and in households where land is privately owned. Specifically, whereas we do not find an inverse relationship between farm size and productivity in migrant host communities and in households that privately own parcels, we find a significantly higher inverse relationship between farm size and productivity in communities that send migrants out and in households where land is owned communally. These results are consistent with prior studies which suggest that land transactions enhance efficient resource allocation, which in turn improves production efficiency.

Third, the findings reveal that there are more conflict cases in ethnically diverse communities and in communities with higher immigrant proportions. We also find more land conflicts in districts that have experienced higher population growth rates. Unbundling conflicts by type reveals that ethnic diversity is only associated with eviction conflicts but not with boundary or inheritance conflicts. Also, we find more eviction and boundary conflicts in communities with higher proportions of immigrants but not inheritance conflicts. Furthermore, breaking-down immigrant proportions into parents'- and current-generation immigrants reveals that having higher proportions of current-generation immigrants is associated with eviction conflicts but not with other conflict types, while having a higher proportions of parents'-generation immigrants is associated with boundary

conflicts and not with other conflict types. These results suggest that there are differential effects of the timing of immigrants on land conflicts. The possible explanation for these findings is that past generation immigrants paid less attention to boundary demarcations, which mainly consist of live plants, and, because of land abundance, there was less land monitoring which has led to current land conflicts related to trespass and boundary manipulations. The current generation immigrants, on the other hand, face stiff resistance from local communities who oppose the selling of their ancestral lands to immigrants.

Fourth, we find that there is a 20% lower yield on parcels with land conflicts than their counterparts without conflicts. In addition, we find an even much lower yield if there is an eviction conflict on the parcel. There is a 37% lower yield on parcels with eviction conflicts than their counterparts without conflicts operated by the same household. We, however, do not find a significant effect of other conflict types on yield, though the signs are negative as expected.

The dissertation findings suggest that population pressure, rural-to-rural migration and the resulting ethnic diversity weaken traditional land institutions which are mainly built on social cohesion and community connections. This leads to a change in land tenure arrangements from communal to private land ownership. Furthermore, as a result of weakening communal institutions, migrations and ethnic diversity lead to the breakdown of informal conflict resolution mechanisms, which, in the absence of well-functioning formal land institutions, leads to the escalation of land conflicts that, in turn, hurts agriculture productivity.

These findings have key policy implications. The findings suggest that rural-to-rural migration, through weakening traditional social systems, promotes the shift from communal to individual land ownership which, in turn, boosts land transactions and enhance equity, and production efficiency as land is transferred from less efficient large farms to more efficient small farms (Heltberg, 1998; Otsuka, 2007; Songqing & Jayne, 2013). However, land markets remain inactive if land is owned communally because of high transaction costs due to communal restrictions. In order to promote efficient and equitable land transactions, deliberate policies should be designed to transform land ownership arrangements from communal to private land ownership. Such policies should include measures such as the extension of infrastructure e.g., roads to the remote communities so as to enhance accessibility which promotes the commercialization and transformation of agriculture from the extensive-traditional to the intensive-modern farming that, in turn, induces the demand for private land rights. Indeed, we found that there is a higher incidence of private land ownership in communities that are connected to district capital by the tarmac road than communities connected by season-dirt road. In addition, policies that ease rural-to-rural migration may facilitate the privatization of land ownership. This will improve the performance of land markets which will in turn increase production efficiency, boost agriculture performance, and reduce poverty in the rural areas. Nonetheless, they should be implemented with caution so that they do not cause land disputes and conflicts among residents because land conflicts reduce the agricultural productivity.

The study also suggests that to improve agriculture performance, policies should aim at improving land tenure security through curbing land conflicts. Efforts should be particularly geared toward reducing eviction related conflicts which were found to be more hazardous to productivity than other conflict types. In additions, we find more boundary conflict in immigrant communities which might be caused by poor boundary demarcation. Indeed, we found that landholders use live plants to demarcate land and to mark land boundaries in more than 80% of the communities. Live plants can be uprooted and replanted in a different position which, if detected, may lead to land conflicts. Adoption of better land demarcation mechanisms like use of survey stones may be a key to reducing boundary conflicts.

In addition, land titling and surveying can help in reducing land conflicts. We find a significantly lower probability of having a conflict if a parcel is under leasehold tenure system, an arrangement where land is surveyed and titled. This suggests that titling and registration, the two main attributes of leasehold tenure system, help in preventing land conflicts. However, titling programs are expensive especially for developing countries, but our results suggest that titling and formalization efforts can target only those communities, host communities, 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.

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Table 3.1:Changes in land tenure systems over time

Year:	2003		2005		2013	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*
Proportion of parcels under:						
Private ownership	**0.40**	**0.49**	**0.46**	**0.50**	**0.56**	**0.50**
Communally ownership	**0.46**	**0.50**	**0.35**	**0.48**	**0.25**	**0.43**
Mailo tenure	0.13	0.33	0.18	0.39	0.16	0.37
Leasehold/Public land	0.01	0.08	0.01	0.08	0.03	0.18
Number of parcels per household	2.53	2.06	3.09	2.47	3.77	2.66
Total number of parcels (Households)	2378 (940)		2859 (936)		2820 (917)	

Notes: Authors' computation using RePEAT panel data set

Table 3.2: Migrations, ethnic diversity, and land transactions timing by community type

	Sending (S)		Receiving (R)		|S-R|
	Mean	SD	Mean	SD	
Number of tribes	2.179	1.926	7.706	5.994	***
Proportion of immigrants to a community:					
Current generation immigrants	0.06	0.08	0.43	0.25	***
Parents' generation immigrants	0.04	0.06	0.52	0.27	***
Proportion of households belonging to the largest tribe	0.932	0.134	0.665	0.201	***
Average land size per household	1.732	1.551	2.120	1.932	**
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	**
Number of communities	28		51		

Notes: Authors' own computation using land project data, 2012.
***, **, and * are significance levels of the t-test difference in means between the two community types at 1%, 5%, and 10% respectively.

Table 3.3: Migrations, population density and community accessibility, by community type

	Sending (S)		Receiving (R)		|S-R|
	Mean	SD	Mean	SD	
Number of tribes	2.630	1.884	6.565	4.554	***
Proportion of immigrants to a community:					
Current generation immigrants	0.097	0.087	0.522	0.249	***
Parents' generation immigrants	0.082	0.138	0.410	0.264	***
1 if a community was affected by sleeping sickness	0	0	0.095	0.296	***
Community population density in 2003 (persons/ha)	5.304	3.274	4.967	2.368	***
Road condition to district:					
1 if tarmac	0.143	0.356	0.219	0.417	
1 if all-season dirt road	0.464	0.508	0.578	0.498	***
1 if seasonal dirt road	0.393	0.497	0.188	0.393	***
Soil quality: Principle Component 1 (PC1)	0.41	1.54	-0.57	1.00	***
Number of communities	28		62		

Source: Authors computation using 2012 RePEAT data

***, **, and * are significance levels of the t-test difference in means between the two community types at 1%, 5%, and 10% respectively.

Soli quality measure (PC1) ranges from -6 to 6.

Table 3.4: Summary statistics of Parcel and household level variables by community type

	Sending (S)		Receiving (R)		|S-R|
	Mean	SD	Mean	SD	
Parcel level variables					
Maize and Beans yield (Kilograms/ha)	1046.9	963.4	1068.4	965.2	
Time to plot (minutes)	18.6	33.1	14.5	27.2	***
Tenure system					
1 if privately owned	0.642	0.480	0.700	0.459	***
1 if communally owned	0.354	0.478	0.236	0.425	***
1 if leasehold/public	0.003	0.056	0.048	0.214	***
Acquisition mode					
1 if inherited	0.491	0.500	0.288	0.453	***
1 if purchased	0.436	0.496	0.576	0.494	**
1 if rented	0.072	0.258	0.136	0.343	***
Number of parcels	1042		1105		
Household Level variables					
1 if household is native/indigenous	0.85	0.36	0.60	0.49	***
Total farm size (hectares)	2.07	3.46	2.95	4.89	***
Number of parcels	4.98	3.31	3.59	2.24	***
1 if household is female-headed	0.13	0.33	0.15	0.36	
Household head's age	53.34	15.33	52.75	14.00	***
Household head's years of schooling	5.38	3.80	5.91	3.91	***
Family size	7.71	3.84	7.98	3.61	**
Dependence rate	1.19	0.92	1.21	0.88	
Assets value ('000 Uganda Shillings)	698.09	1002.74	1075.42	1380.22	***
Number of Households	262		479		

Authors computation using 2012 RePEAT data

***, **, and * are significance levels of the t-test difference in means between the two community types at 1%, 5%, and 10% respectively.

Table 3.5: Determinants of private land ownership

	Dependent variable takes 1 if the parcel is privately owned						
						IV	First-Stage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Proportion of total immigrants in a community	0.101***				0.0473*	0.578**	
	(4.178)				(1.740)	(1.962)	
Number of tribes in a community		0.0188***			0.0158***		
		(5.829)			(4.688)		
1 if household is native			-0.0825***		-0.0411*		
			(-3.729)		(-1.736)		
Community population density in 2003 (persons/ha)	-0.00940*	-0.00871	-0.00551	-0.00499	-0.0104**	-0.0301**	0.0431***
	(-1.740)	(-1.643)	(-1.045)	(-0.938)	(-1.981)	(-2.099)	(8.027)
1 if tarmac	0.122***	0.0252	0.104***	0.111***	0.0407	0.175***	-0.142***
	(3.479)	(0.671)	(2.955)	(3.133)	(1.067)	(3.573)	(-4.009)
1 if all-season dirt road	0.0512	0.0202	0.0471	0.0576	0.0180	0.0213	0.0534*
	(1.450)	(0.572)	(1.337)	(1.624)	(0.510)	(0.501)	(1.805)
Soil quality measure: PC1	0.00229	0.00897	-0.00600	-0.00839	0.0124	0.0525*	-0.0949***
	(0.259)	(0.975)	(-0.682)	(-0.946)	(1.362)	(1.696)	(-11.02)
1 if leasehold/public	-0.850***	-0.853***	-0.851***	-0.861***	-0.844***	-0.796***	-0.103*
	(-18.58)	(-19.31)	(-18.67)	(-18.79)	(-19.14)	(-12.60)	(-1.753)
1 if household is female-headed	0.0566*	0.0537*	0.0585**	0.0587**	0.0534*	0.0466	0.0268
	(1.908)	(1.811)	(1.996)	(1.981)	(1.809)	(1.308)	(0.759)
Head age	0.00833*	0.00775	0.00570	0.00711	0.00752	0.0141**	-0.0110**
	(1.759)	(1.638)	(1.195)	(1.478)	(1.594)	(2.287)	(-2.155)
Head age squared	-7.57e-05*	-7.46e-05*	-5.20e-05	-6.67e-05	-7.01e-05*	-0.000118**	7.71e-05*
	(-1.885)	(-1.845)	(-1.276)	(-1.626)	(-1.745)	(-2.374)	(1.728)
Head years of schooling	0.00787	0.00779	0.00844	0.00658	0.00913	0.0140	-0.0122
	(1.088)	(1.063)	(1.158)	(0.899)	(1.251)	(1.621)	(-1.458)
Head years of schooling squared	-0.000752	-0.000737	-0.000642	-0.000587	-0.000816	-0.00152**	0.00153***
	(-1.444)	(-1.383)	(-1.235)	(-1.125)	(-1.539)	(-2.144)	(2.874)
Family size	-0.0110***	-0.0110***	-0.0106***	-0.0115***	-0.0104***	-0.00867**	-0.00556*
	(-3.218)	(-3.262)	(-3.074)	(-3.301)	(-3.105)	(-2.305)	(-1.892)
Log of assets value ('000 Uganda SHS)	0.0449***	0.0400***	0.0469***	0.0499***	0.0377***	0.0209	0.0477***
	(4.391)	(3.941)	(4.559)	(4.848)	(3.725)	(1.123)	(4.455)
1 if a community was affected by sleeping sickness							0.223***
							(6.311)
Constant	0.0337	0.0775	0.183	0.0761	0.111	-0.166	0.401***
	(0.234)	(0.546)	(1.266)	(0.525)	(0.763)	(-0.852)	(2.582)
Region dummies	Y	Y	Y	Y	Y	Y	Y
Observations	1,408	1,408	1,408	1,408	1,408	1,408	1,408
R-squared	0.385	0.395	0.383	0.378	0.398	0.239	0.377
Cragg-Donald F Statistic (Weak identification test):							22.082

Numbers in parentheses are t-statistics computed using robust standard errors. *** shows significance at 1%, ** at 5% and * at 10%.
[a] The reference category for tarmac and all season dirt road is season dirt road

Table 3.6:Determinants of land acquisition mode

	Multinomial Probit: Average marginal effects					
	All households			Indigenous households only		
	Inherited=1	Purchased=1	Rented=1	Inherited=1	Purchased=1	Rented=1
	(1)	(2)	(3)	(4)	(5)	(6)
Proportion of total immigrants in a community	-0.147***	0.0788**	0.0680***	-0.109***	0.0313	0.0782***
	(-4.739)	(2.397)	(3.171)	(-2.797)	(0.794)	(3.028)
Community population density in 2003 (persons/ha)	-0.00515	0.00376	0.00139	0.000723	-0.000697	-2.66e-05
	(-0.841)	(0.599)	(0.359)	(0.0892)	(-0.0859)	(-0.00565)
Road condition to district capital[a]						
1 if tarmac	0.125***	-0.167***	0.0426	0.0923**	-0.153***	0.0611*
	(3.264)	(-4.194)	(1.628)	(1.965)	(-3.179)	(1.950)
1 if all-season dirt road	-0.0261	0.00904	0.0171	-0.0133	0.00479	0.00846
	(-0.753)	(0.251)	(0.740)	(-0.323)	(0.115)	(0.339)
Soil quality measure: PC1	-0.00328	-0.000514	0.00379	-0.00143	-0.00374	0.00517
	(-0.309)	(-0.0457)	(0.520)	(-0.115)	(-0.289)	(0.636)
1 if leasehold/public	-0.0458	0.00784	0.0380	0.143	-0.132	-0.0112
	(-0.535)	(0.0899)	(0.699)	(1.299)	(-1.143)	(-0.151)
1 if hh is female-headed	-0.0200	0.0223	-0.00222	-0.0530	0.0816*	-0.0286
	(-0.546)	(0.572)	(-0.0870)	(-1.191)	(1.761)	(-0.923)
Head age	-0.0102*	0.00794	0.00230	-0.00897	0.00565	0.00332
	(-1.760)	(1.262)	(0.555)	(-1.367)	(0.818)	(0.762)
Head age squared	6.80e-05	-2.68e-05	-4.12e-05	5.11e-05	-3.71e-06	-4.74e-05
	(1.345)	(-0.488)	(-1.101)	(0.893)	(-0.0614)	(-1.210)
Head years of schooling	0.0150	-0.0103	-0.00468	0.0160	-0.000452	-0.0155**
	(1.598)	(-1.054)	(-0.734)	(1.409)	(-0.0388)	(-2.131)
Head years of schooling squared	-0.000776	0.000533	0.000242	-0.00116	0.000342	0.000819*
	(-1.247)	(0.820)	(0.584)	(-1.551)	(0.448)	(1.770)
Family size	-0.00667*	0.00200	0.00467**	-0.00979**	0.00378	0.00601***
	(-1.838)	(0.544)	(2.313)	(-2.310)	(0.900)	(2.846)
Log of assets value ('000 Uganda SHS)	-0.0552***	0.0724***	-0.0172**	-0.0767***	0.0850***	-0.00825
	(-4.399)	(5.581)	(-2.276)	(-5.155)	(5.579)	(-1.040)
Region dummies	Y	Y	Y	Y	Y	Y
Observations	1,579	1,579	1,579	1,150	1,150	1,150

Notes: Numbers in parentheses are z-statistics computed using robust standard errors.
*** shows significance at 1%, ** at 5%, and * at 10%.
[a] The reference category for tarmac and all season dirt road is season dirt road

Table 3.7:Relationship between farm-size and yield by ownership status, and by community type

	Dependent Variable: Log of yield			
	Ownership type		Community type	
	Private	Communal	Receiving	Sending
	(1)	(2)	(3)	(4)
Log of farm size (ha)	-0.0729	-0.191*	-0.0519	-0.272**
	(-0.781)	(-1.702)	(-0.719)	(-2.192)
Time to plot (minutes)	-0.00105	-0.00195	-0.00195	-0.000688
	(-0.886)	(-0.657)	(-1.526)	(-0.518)
Acquisition mode[a]: Rented	-0.0117	-0.182	-0.0528	-0.305**
	(-0.0852)	(-0.875)	(-0.406)	(-2.172)
Inherited	0.105	0.0513	-0.0589	0.148
	(1.019)	(0.362)	(-0.573)	(1.519)
1 if household is native	0.0943	0.0382	-0.0422	0.277
	(0.704)	(0.127)	(-0.380)	(0.887)
Thompson Index	0.0460	0.251	0.0822	0.264
	(0.181)	(0.836)	(0.411)	(0.673)
1 if hh is female-headed	-0.277**	-0.132	-0.230*	-0.311
	(-2.268)	(-0.464)	(-1.983)	(-1.670)
Head Age	-0.00779*	-0.00594	-0.00619	-0.00730
	(-1.758)	(-1.068)	(-1.447)	(-1.562)
Head years of schooling	-0.00649	0.000269	-0.00510	-0.00104
	(-0.437)	(0.0139)	(-0.415)	(-0.0734)
Family size	-0.0171	-0.0131	-0.00998	-0.0237**
	(-1.137)	(-0.778)	(-0.602)	(-2.128)
Dependence rate	-0.113**	-0.0492	-0.130**	-0.0531
	(-2.188)	(-0.490)	(-2.577)	(-0.717)
Log of assets value (‘000 Uganda SHS)	0.142**	0.106	0.156**	0.125*
	(2.526)	(1.164)	(2.473)	(1.889)
Constant	6.079***	5.833***	5.906***	5.836***
	(11.36)	(7.667)	(12.22)	(7.944)
Community*Season FE	Y	Y	Y	Y
Observations	1,670	1,006	1,640	1,094
R-squared	0.174	0.171	0.186	0.186

Notes: In parentheses are t-statistics computed using robust standard errors. Standard errors are clustered at the community level. *** is significant at 1%, ** at 5%, and * at 10%. Crop dummies are included in all specifications.

[a] The reference of the parcel acquisition mode is purchased.

Table 3.8: Robustness check: Relationship between farm-size and yield in communities with different immigrant proportions

	Dependent Variable: Log of yield					
	Percentage of current and past generation immigrants in a community					
	>10%	>20%	>40	<10%	<20%	<40%
	(1)	(2)	(3)	(4)	(5)	(6)
Log of farm size (ha)	-0.0523	-0.0256	-0.0291	-0.219*	-0.307**	-0.250**
	(-0.750)	(-0.379)	(-0.407)	(-1.774)	(-2.179)	(-2.509)
Time to plot (minutes)	-0.00167	-0.00169	-0.00155	-0.00109	-0.000281	-0.000862
	(-1.566)	(-1.463)	(-1.206)	(-0.729)	(-0.186)	(-0.686)
Acquisition mode[a]: Rented	-0.158	-0.111	-0.0506	0.143	-0.277	-0.249*
	(-1.487)	(-0.933)	(-0.362)	(0.511)	(-1.442)	(-1.876)
Inherited	0.00992	0.0402	-0.0154	0.190	0.0748	0.132
	(0.115)	(0.433)	(-0.147)	(1.650)	(0.563)	(1.285)
Household is native	-0.0184	-0.00746	-0.0444	0.680	0.256	0.211
	(-0.173)	(-0.0668)	(-0.383)	(0.827)	(0.575)	(0.838)
Thompson Index	0.130	0.169	0.0646	-0.298	-0.144	0.0308
	(0.743)	(0.875)	(0.314)	(-0.626)	(-0.423)	(0.120)
1 if hh is female-headed	-0.183*	-0.223**	-0.226**	-0.625**	-0.343	-0.323
	(-1.843)	(-2.137)	(-2.014)	(-2.774)	(-1.428)	(-1.707)
Head Age	-0.00693*	-0.00636	-0.00592	-0.00930*	-0.00827*	-0.00850*
	(-1.945)	(-1.614)	(-1.402)	(-2.227)	(-1.788)	(-1.888)
Head years of schooling	-0.00359	-0.00834	-0.00814	-0.0350	-0.00421	-3.41e-05
	(-0.354)	(-0.742)	(-0.663)	(-1.795)	(-0.268)	(-0.00240)
Family size	-0.0241*	-0.0262*	-0.0127	-0.0176	-0.0122	-0.0259**
	(-1.921)	(-1.928)	(-0.775)	(-1.307)	(-0.776)	(-2.352)
Dependence rate	-0.0873*	-0.0993**	-0.128**	-0.178	-0.125	-0.0819
	(-1.984)	(-2.104)	(-2.474)	(-1.331)	(-1.208)	(-1.081)
Log of assets value ('000 Uganda SHS)	0.130**	0.143**	0.178***	0.0916	0.0942	0.0719
	(2.618)	(2.641)	(2.904)	(0.656)	(1.063)	(1.123)
Constant	6.115***	5.991***	5.771***	6.430***	6.426***	6.451***
	(14.96)	(13.98)	(12.34)	(6.490)	(7.915)	(12.01)
Community*Season FE	Y	Y	Y	Y	Y	Y
Observations	2,242	1,940	1,620	422	724	1,044
R-squared	0.190	0.205	0.179	0.212	0.168	0.232

Notes: In parentheses are t-statistics computed using robust standard errors. Standard errors are clustered at the community level. *** is significant at 1%, ** at 5%, and * at 10%. Crop dummies are included in all specifications.

[a] The reference for parcel acquisition modes: rented and inherited is purchased.

Table 4.1: Population growth, Migration, ethnic diversity, and accessibility, by Community type

	Sending (S)		Receiving (R)		|S-R|
	Mean	SD	Mean	SD	
Number of tribes	2.63	1.88	6.56	4.55	***
Proportion of current generation immigrants	0.10	0.09	0.52	0.25	***
Proportion of past generation immigrants	0.08	0.14	0.41	0.26	***
Total proportion of immigrants (two generations)	0.18	0.20	0.93	0.29	***
Village density in 2003 (population/total ha)	4.30	1.56	3.53	1.85	***
Road to district: tarmac	0.14	0.36	0.22	0.42	
Road to district: all-season dirt	0.46	0.51	0.58	0.50	***
Road to district: season dirt	0.39	0.50	0.19	0.39	***
Community altitude	1518.15	344.71	1271.28	168.34	***
District population growth rate 1991-2002	87.15	45.81	80.43	38.32	
Number of Local Council 1 (LC1)	27		64		

Note: Authors' computation using RePEAT data: 2012 & 2003.
*** is significant at 1%, ** at 5%, and * at 10%.
LC1 is the lowest and smallest administrative unit in Uganda

Table 4.2: Land holding, transactions, and demarcation methods by community type

	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 land project data, 2012.
*** is significant at 1%, ** at 5%, and * at 10%.

Table 4.3: Parcel and household characteristics by community type

	Sending (S)		Receiving (R)		|S-R|
	Mean	SD	Mean	SD	
Parcel level					
Yield (Kilograms/ha)	1231.75	1383.02	1181.09	1242.19	
Distance to parcel (minutes)	21.86	41.16	17.73	35.87	**
Tenure system					
1 if customary land	0.95	0.22	0.71	0.45	***
1 if mailo land	0.04	0.21	0.24	0.42	***
1 if leasehold land	0.00	0.03	0.01	0.10	***
1 if public land	0.00	0.07	0.04	0.21	***
Parcel acquisition mode					
1 if inherited	0.48	0.50	0.26	0.44	***
1 if purchased	0.43	0.50	0.56	0.50	**
1 if rented	0.07	0.25	0.12	0.32	***
1 if borrowed/walked-in	0.02	0.12	0.05	0.23	***
Land conflicts					
1 if there is a conflict concern	0.06	0.24	0.14	0.35	***
1 if there is a conflict	0.04	0.20	0.11	0.32	***
Conflict type					
1 if there is Inheritance conflict	0.01	0.09	0.02	0.13	*
1 if there is boundary conflict	0.02	0.15	0.05	0.22	***
1 if there is eviction conflict	0.01	0.10	0.04	0.19	***
Conflict resolution mechanism					
1 if used formal mechanisms	0.02	0.15	0.07	0.25	***
1 if used informal mechanisms	0.02	0.13	0.02	0.15	
Observations	1112		1595		
Household Level					
Total farm size (ha)	1.91	1.64	2.82	3.84	***
Thompson index	0.54	0.25	0.37	0.28	***
1 if household is female headed	0.13	0.34	0.18	0.38	
Household head's age	53.22	15.24	52.95	13.89	
Household head's years of schooling	5.45	3.77	5.95	3.84	**
Family size	7.73	3.89	7.88	3.53	**
Dependence rate	1.18	0.87	1.24	0.91	**
Asset values (per 1000 Uganda Shilling)	722.4	1017.2	1040.5	1351.4	**
Observations	277		605		

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

Table 4.4: Rural-to-rural migration, population pressure and land conflicts

	Dependent variable takes 1 if there has been conflict over a parcel						
	(1)	(2)	(3)	(4)	(5)	(6)	IV (7)
Proportion of total immigrants in a community	0.0655***				0.0494***	0.0518***	0.0912***
	(4.262)				(3.161)	(3.260)	(3.116)
Number of tribes		0.00699***			0.00563***	0.00496**	
		(3.196)			(2.678)	(2.191)	
District population growth rate (1991-2002)	0.000793**	0.000228	0.000693*			0.000442	0.000830**
	(2.124)	(0.566)	(1.854)			(1.085)	(2.228)
Community population density in 2003 (persons/ha)	-0.000875	-0.00130	-0.00141	-0.000813		-0.000912	-0.000623
	(-0.484)	(-0.730)	(-0.789)	(-0.464)		(-0.506)	(-0.339)
Road condition to district[a]							
1 if tarmac	0.0487***	0.0339*	0.0533***	0.0455***	0.0305*	0.0359**	0.0472***
	(2.865)	(1.885)	(3.099)	(2.820)	(1.884)	(2.002)	(2.764)
1 if all-season dirt road	0.0363***	0.0381***	0.0522***	0.0533***	0.0301**	0.0296**	0.0304**
	(2.667)	(2.844)	(4.054)	(4.111)	(2.201)	(2.135)	(2.035)
Land tenure system[b]							
1 if mailo	0.0509**	0.0337	0.0581***	0.0510**	0.0293	0.0351	0.0475**
	(2.394)	(1.500)	(2.800)	(2.499)	(1.334)	(1.524)	(2.190)
1 if leasehold	-0.0862***	-0.0864***	-0.0760***	-0.0703***	-0.0880***	-0.0915***	-0.0902***
	(-5.629)	(-6.485)	(-5.706)	(-5.610)	(-6.356)	(-6.239)	(-5.400)
1 if public	-0.0791***	-0.0773***	-0.0508*	-0.0546**	-0.0948***	-0.0919***	-0.0902***
	(-2.779)	(-2.681)	(-1.905)	(-2.051)	(-3.255)	(-3.102)	(-2.939)
1 if household is female headed	0.0345*	0.0321	0.0389*	0.0390*	0.0304	0.0307	0.0326
	(1.684)	(1.570)	(1.897)	(1.908)	(1.482)	(1.497)	(1.589)
Household head's age	0.000903*	0.000650	0.000794	0.000728	0.000724	0.000780	0.000945*
	(1.850)	(1.328)	(1.625)	(1.494)	(1.485)	(1.588)	(1.940)
Household head's years of schooling	-0.000453	-0.000815	-3.15e-05	0.000271	-0.000820	-0.000932	-0.000597
	(-0.269)	(-0.489)	(-0.0190)	(0.163)	(-0.483)	(-0.552)	(-0.357)
Family size	0.000218	-0.000204	-2.89e-05	0.000549	0.000359	4.81e-05	0.000313
	(0.122)	(-0.113)	(-0.0160)	(0.314)	(0.202)	(0.0266)	(0.174)
log of asset values (per 1000 Uganda Shilling)	0.00117	0.00181	0.00507	0.00403	-0.00111	-0.000353	-0.000367
	(0.209)	(0.324)	(0.923)	(0.737)	(-0.198)	(-0.0626)	(-0.0619)
Constant	-0.0720	-0.0207	-0.0575	-0.0291	-0.0260	-0.0427	-0.0781
	(-1.427)	(-0.399)	(-1.137)	(-0.600)	(-0.559)	(-0.825)	(-1.555)
Observations	2,186	2,202	2,202	2,202	2,186	2,186	2,186
R-squared	0.029	0.027	0.020	0.018	0.032	0.033	0.028
Cragg-Donald F statistic (weak identification test):							**422.713**

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 is custom

Table 4.5. Rural migration, ethnic diversity, population pressure and land conflicts types

	Eviction Conflict=1		Boundary Conflict=1		Inheritance conflict=1	
	1	2	3	4	5	6
Proportion of total immigrants in a community	0.0160**		0.0354***		0.00290	
	(2.164)		(2.911)		(0.443)	
Number of tribes		0.00321**		8.38e-05		0.00110
		(2.171)		(0.0702)		(1.390)
District population growth rate (1991-2002)	0.000536**	0.000291	-0.000139	-0.000198	0.000327*	0.000254
	(2.462)	(1.262)	(-0.511)	(-0.691)	(1.919)	(1.341)
Community population density in 2003 (persons/ha)	0.000497	0.000535	-0.000681	-0.000977	-0.000695	-0.000782
	(0.426)	(0.465)	(-0.530)	(-0.772)	(-1.082)	(-1.194)
Road condition to district						
1 if tarmac	0.0216**	0.0148	0.00729	0.00946	0.0175*	0.0141
	(2.246)	(1.507)	(0.628)	(0.755)	(1.896)	(1.490)
1 if all-season dirt road	0.00654	0.00525	0.0187*	0.0271***	-0.000652	-0.00301
	(0.849)	(0.697)	(1.933)	(2.794)	(-0.105)	(-0.515)
Land tenure system						
1 if mailo	0.0479***	0.0367**	-0.0208*	-0.0171	0.0362***	0.0338***
	(3.407)	(2.419)	(-1.698)	(-1.337)	(3.092)	(2.971)
1 if leasehold	-0.0236***	-0.0256***	-0.0379***	-0.0325***	-0.0159**	-0.0174***
	(-3.295)	(-3.489)	(-4.146)	(-3.924)	(-2.530)	(-2.796)
1 if public	-0.00489	-0.0103	-0.0642***	-0.0492***	0.00484	0.00198
	(-0.242)	(-0.493)	(-6.981)	(-6.243)	(0.270)	(0.109)
1 if household is female headed	0.000530	-0.00125	0.0232	0.0257*	0.0193*	0.0178*
	(0.0496)	(-0.117)	(1.579)	(1.758)	(1.760)	(1.648)
Household head's age	0.000574**	0.000487*	0.000447	0.000387	-0.000178	-0.000214
	(2.044)	(1.823)	(1.328)	(1.139)	(-0.810)	(-0.937)
Household head's years of schooling	0.000190	-2.30e-05	-0.000491	-0.000289	0.000868	0.000739
	(0.196)	(-0.0250)	(-0.479)	(-0.280)	(1.068)	(0.933)
Family size	0.000630	0.000507	1.75e-06	-0.000131	0.000200	0.000138
	(0.577)	(0.465)	(0.00134)	(-0.100)	(0.308)	(0.218)
Log of asset values (per 1000 Uganda Shilling)	-0.00203	-0.00275	0.00253	0.00456	-0.00402	-0.00416
	(-0.717)	(-0.975)	(0.647)	(1.199)	(-1.440)	(-1.548)
Constant	-0.0460	-0.0264	-0.0196	-0.0111	0.0206	0.0274
	(-1.532)	(-0.949)	(-0.618)	(-0.327)	(0.852)	(1.087)
Observations	2,186	2,202	2,186	2,202	2,186	2,202
R-squared	0.018	0.021	0.016	0.010	0.019	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 is customary

Table 4.6: Current and past generation immigrants and land conflict cases

Dependent variable takes 1 if there has been conflict over a parcel				
	(1)	(2)	(3)	(4)
Proportion of current generation immigrants in a community	0.0595**		0.0639**	
	(2.362)		(2.532)	
Proportion of parents' generation immigrants in a community		0.102***		0.0972***
		(3.954)		(3.757)
log of district population growth rate (1991-2002)	0.0187*	0.0267**		
	(1.662)	(2.369)		
Road condition to district[a]				
1 if tarmac	0.0531***	0.0491***	0.0453***	0.0383**
	(3.072)	(2.836)	(2.836)	(2.390)
1 if all-season dirt road	0.0489***	0.0384***	0.0481***	0.0384***
	(3.669)	(2.859)	(3.642)	(2.860)
Land tenure system[b]				
1 if Mailo	0.0531**	0.0574***	0.0458**	0.0482**
	(2.478)	(2.783)	(2.178)	(2.379)
1 if leasehold	-0.0780***	-0.0858***	-0.0733***	-0.0782***
	(-5.756)	(-5.277)	(-5.692)	(-5.238)
1 if public	-0.0639**	-0.0718***	-0.0682**	-0.0752***
	(-2.296)	(-2.646)	(-2.449)	(-2.761)
1 if household is female headed	0.0373*	0.0377*	0.0363*	0.0367*
	(1.823)	(1.850)	(1.775)	(1.804)
Household head's age	0.000810*	0.000894*	0.000763	0.000816*
	(1.657)	(1.841)	(1.563)	(1.680)
Household head's years of schooling	-0.000460	-0.000210	-0.000129	0.000285
	(-0.272)	(-0.128)	(-0.0756)	(0.172)
Family size	1.65e-05	0.000295	0.000554	0.00104
	(0.00915)	(0.164)	(0.318)	(0.592)
Asset values (per 1000 Uganda Shilling)	0.00313	0.00193	0.00218	0.000952
	(0.558)	(0.350)	(0.389)	(0.173)
Constant	-0.106*	-0.137**	-0.0375	-0.0381
	(-1.699)	(-2.222)	(-0.810)	(-0.826)
Observations	2,186	2,202	2,186	2,202
R-squared	0.023	0.029	0.022	0.026

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 is community customary

Table 4.7: Current and past generation immigrants and land conflict types

	Eviction Conflict=1		Boundary Conflict=1		Inheritance conflict=1	
	(1)	(2)	(3)	(4)	(5)	(6)
Proportion of current generation immigrants in a community	0.0460***		0.0129		-0.00162	
	(2.933)		(0.734)		(-0.174)	
Proportion of parents' generation immigrants in a community		-0.00950		0.0785***		0.00692
		(-0.838)		(3.743)		(0.693)
Road condition to district[a]						
1 if tarmac	0.0157*	0.0179*	0.0126	0.00651	0.0146*	0.0134
	(1.687)	(1.949)	(1.179)	(0.597)	(1.715)	(1.563)
1 if all-season dirt road	0.00659	0.0132*	0.0265***	0.0153*	0.00116	-0.000926
	(0.890)	(1.719)	(2.823)	(1.649)	(0.202)	(-0.143)
Land tenure system[b]						
1 if Mailo	0.0391***	0.0422***	-0.0147	-0.0166	0.0336***	0.0345***
	(2.785)	(3.139)	(-1.225)	(-1.482)	(2.919)	(2.981)
1 if leasehold	-0.0212***	-0.0172***	-0.0332***	-0.0396***	-0.0121**	-0.0130**
	(-3.480)	(-3.006)	(-4.258)	(-3.662)	(-2.160)	(-2.330)
1 if public	-0.0125	2.11e-05	-0.0493***	-0.0638***	0.00524	0.00347
	(-0.621)	(0.00110)	(-6.702)	(-7.109)	(0.286)	(0.196)
1 if household is female headed	-0.000760	0.00204	0.0253*	0.0239	0.0198*	0.0188*
	(-0.0718)	(0.191)	(1.725)	(1.644)	(1.793)	(1.723)
Household head's age	0.000527*	0.000499*	0.000411	0.000476	-0.000215	-0.000218
	(1.880)	(1.800)	(1.223)	(1.432)	(-0.978)	(-0.998)
Household head's years of schooling	0.000260	0.000563	-0.000455	-0.000357	0.00103	0.00100
	(0.267)	(0.585)	(-0.439)	(-0.353)	(1.266)	(1.255)
Family size	0.000980	0.000954	-0.000279	0.000108	0.000464	0.000477
	(0.949)	(0.917)	(-0.218)	(0.0847)	(0.758)	(0.766)
Asset values (per 1000 Uganda Shilling)	-0.00320	-0.00173	0.00457	0.00241	-0.00429	-0.00434
	(-1.125)	(-0.609)	(1.191)	(0.628)	(-1.583)	(-1.575)
Constant	-0.0196	-0.0167	-0.0269	-0.0296	0.0320	0.0317
	(-0.724)	(-0.627)	(-0.928)	(-1.022)	(1.439)	(1.432)
Observations	2,186	2,202	2,186	2,202	2,186	2,202
R-squared	0.019	0.013	0.010	0.021	0.017	0.018

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 is community customary

Table 4.8: Rural-rural migration and conflict resolution mechanisms

Dependent variable takes 1 if farmer used informal means to resolve land conflict				
	(1)	(2)	(3)	(4)
Receiving community=1	-0.230***			
	(-2.804)			
Proportion of total immigrants in a community		-0.101		
		(-1.288)		
Number of tribes			-0.00326	
			(-0.448)	
log of district population growth rate (1991-2002)				-0.104*
				(-1.750)
Road condition to district[a]				
1 if tarmac	0.0549	0.0494	0.0261	-0.000158
	(0.547)	(0.488)	(0.258)	(-0.00161)
1 if all-season dirt road	-0.0126	-0.00946	-0.0355	-0.0191
	(-0.143)	(-0.106)	(-0.408)	(-0.221)
Land tenure system[b]				
1 if Mailo	0.00186	-0.0475	-0.0342	-0.0740
	(0.0258)	(-0.668)	(-0.484)	(-1.001)
1 if Public	0.0384	0.0115	-0.0114	-0.0536
	(0.176)	(0.0519)	(-0.0517)	(-0.275)
1 if household is female headed	-0.00424	0.0242	0.0179	-0.00302
	(-0.0536)	(0.307)	(0.223)	(-0.0372)
Household head's age	-0.00370	-0.00288	-0.00251	-0.00284
	(-1.627)	(-1.279)	(-1.098)	(-1.229)
Household head's years of schooling	0.000798	0.00131	0.00171	0.00441
	(0.0904)	(0.148)	(0.195)	(0.491)
Family size	0.00111	0.000787	0.000289	0.00239
	(0.144)	(0.0985)	(0.0357)	(0.299)
Asset values (per 1000 Uganda Shilling)	0.0265	0.0196	0.0202	0.0108
	(0.785)	(0.572)	(0.565)	(0.306)
Constant	0.448**	0.348	0.290	0.690**
	(2.029)	(1.600)	(1.350)	(2.325)
Observations	222	221	222	222
R-squared	0.053	0.019	0.012	0.026

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 4.9 : Land conflicts and Yield

	Dependent Variable: Log of yield			
	(1)	(2)	(3)	(4)
Conflict dummy	-0.0265	-0.196*		
	(-0.430)	(-1.904)		
Conflict type[a]: Eviction =1			0.0533	-0.368**
			(0.532)	(-2.421)
Boundary=1			-0.102	-0.0764
			(-1.133)	(-0.571)
Inheritance=1			-0.103	-0.155
			(-0.681)	(-0.712)
Distance to plot (minutes)	-0.00179***	-0.00132*	-0.00180***	-0.00134*
	(-3.265)	(-1.843)	(-3.275)	(-1.876)
Tenure system[b]: Mailo	0.220**	0.364	0.221**	0.420
	(1.968)	(1.419)	(1.963)	(1.612)
Private customary	0.0621	0.383***	0.0616	0.381***
	(1.258)	(3.033)	(1.246)	(3.015)
Leasehold	-0.362*	0.0692	-0.338*	0.0860
	(-1.785)	(0.247)	(-1.662)	(0.310)
Public land	0.364**	0.689	0.361**	0.684
	(2.546)	(1.492)	(2.534)	(1.472)
Parcel acquisition mode[b]: Purchased	-0.106**	-0.219***	-0.109**	-0.214***
	(-2.433)	(-3.455)	(-2.509)	(-3.367)
Rented-in	-0.187***	-0.239**	-0.192***	-0.239**
	(-2.579)	(-2.098)	(-2.653)	(-2.092)
Walked-in	-0.540*	0.927	-0.534*	0.940
	(-1.756)	(1.389)	(-1.751)	(1.393)
Borrowed-in	-0.114	-0.0454	-0.119	-0.0476
	(-1.246)	(-0.342)	(-1.296)	(-0.354)
Log of farm size (ha)	-0.0846***		-0.0841***	
	(-3.220)		(-3.198)	
Thompson index	-0.0199		-0.0259	
	(-0.242)		(-0.315)	
Female head	-0.0355		-0.0321	
	(-0.616)		(-0.558)	
Head's age	-0.00409***		-0.00409***	
	(-2.648)		(-2.636)	
Head's years of schooling	-0.00288		-0.00289	
	(-0.525)		(-0.526)	
Family size	-0.00302		-0.00292	
	(-0.532)		(-0.516)	
Dependence rate	-0.0157		-0.0158	
	(-0.681)		(-0.685)	
Assets log (Uganda Shillings)	0.114***		0.115***	
	(5.680)		(5.713)	
Constant	5.878***	6.126***	5.879***	6.114***
	(34.39)	(67.57)	(34.44)	(67.30)
Village*Season FE	Y		Y	
Household*Season FE		Y		Y
Observations	3,462	3,462	3,462	3,462
R-squared	0.260	0.237	0.260	0.238
Number of groups		1,405		1,405

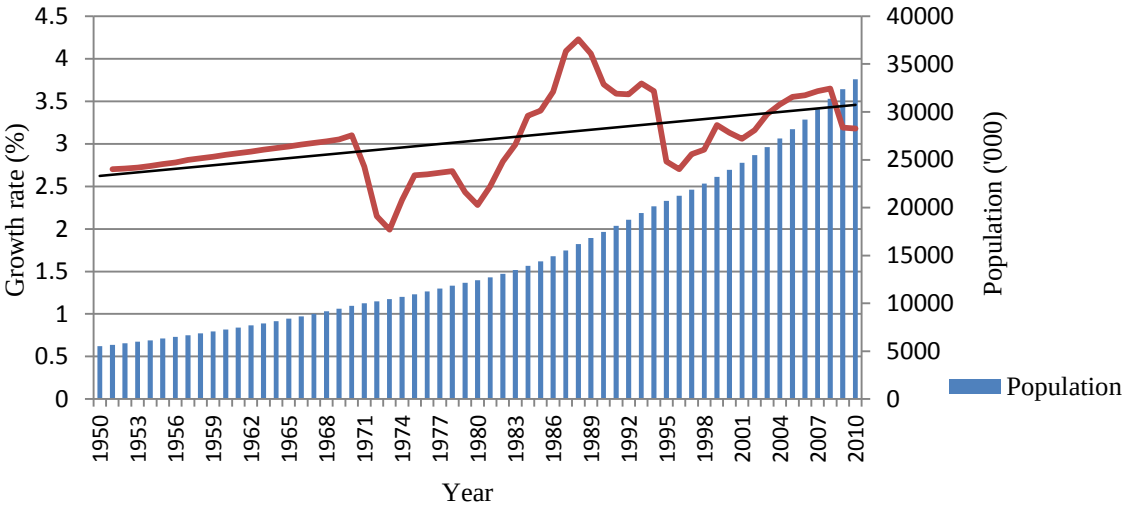
Notes: In parentheses are t-statistics computed using robust standard errors. Standard errors are clustered at the village level in specifications 1 & 3 and on household level for 2 & 4. *** is significant at 1%, ** at 5%, and * at 10%. Crop dummies are included in all specifications.

[a] The reference category for eviction, boundary & Inheritance conflict is no conflict.

[b] The reference category for Mailo and individual customary, Leasehold and Public land is community customary.

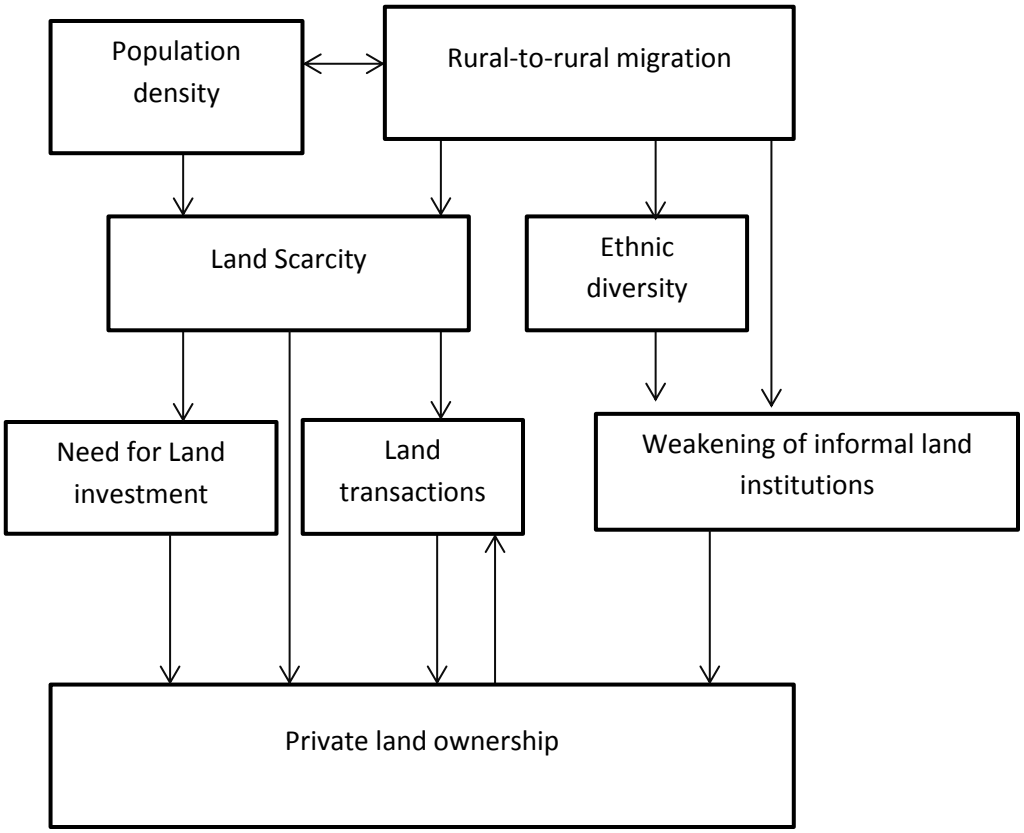
[c] The reference category for parcel borrowed-in, walked in, purchased and rented-in is inherited.

Figure 2.1: Uganda's population and population growth rate 1950-2010



Source: Own compuatation using Penn World Tables data 2013

Figure 3.1: Conceptual Framework



Appendix Table A1: Determinants of private land ownership using non-linear estimation techniques

	Dependent variable takes 1 if the parcel is privately owned				
	Probit regressions: Marginal effects				
	(1)	(2)	(3)	(4)	(5)
Proportion of total immigrants in a community	0.149***				0.109***
	(4.091)				(2.899)
Number of tribes in a community		0.0179***			0.0121***
		(3.992)			(2.615)
1 if household is native			-0.0956***		-0.0628**
			(-3.506)		(-2.148)
Community population density in 2003 (persons/ha)	-0.0114*	-0.00719	-0.00385	-0.00381	-0.0118**
	(-1.896)	(-1.288)	(-0.697)	(-0.694)	(-1.994)
Road condition to district capital[a]					
1 if tarmac	0.0857**	-0.0249	0.0568	0.0622*	0.0213
	(2.443)	(-0.530)	(1.552)	(1.690)	(0.464)
1 if all-season dirt road	0.0144	-0.0163	0.00276	0.0106	-0.00937
	(0.490)	(-0.533)	(0.0923)	(0.350)	(-0.314)
Soil quality measure: PC1	0.0124	0.00873	-0.00549	-0.0109	0.0231*
	(1.077)	(0.776)	(-0.540)	(-1.066)	(1.948)
1 if hh is female-headed	0.0558	0.0574*	0.0588*	0.0653*	0.0484
	(1.644)	(1.652)	(1.768)	(1.940)	(1.414)
Head age	0.0125**	0.0112**	0.00912*	0.0112**	0.0108**
	(2.263)	(2.052)	(1.649)	(2.025)	(1.985)
Head age squared	-0.000117**	-0.000107**	-8.35e-05*	-0.000104**	-0.000103**
	(-2.440)	(-2.245)	(-1.726)	(-2.150)	(-2.162)
Head years of schooling	0.000786	0.00289	0.00350	0.00138	0.00330
	(0.0823)	(0.290)	(0.359)	(0.140)	(0.342)
Head years of schooling squared	-0.000646	-0.000688	-0.000598	-0.000551	-0.000745
	(-1.002)	(-1.018)	(-0.907)	(-0.831)	(-1.135)
Family size	-0.0102***	-0.0110***	-0.0105***	-0.0116***	-0.00945***
	(-3.249)	(-3.421)	(-3.261)	(-3.602)	(-2.985)
Log of assets value ('000 Uganda SHS)	0.0520***	0.0476***	0.0555***	0.0592***	0.0434***
	(4.367)	(3.920)	(4.628)	(4.922)	(3.640)
Region dummies	Y	Y	Y	Y	Y
Observations	1,408	1,408	1,408	1,408	1,408

Numbers in parentheses are z-statistics computed using robust standard errors. *** shows significance at 1%, ** at 5% and * at 10%.
[a] The reference category for tarmac and all season dirt road is season dirt road

Appendix Table A2: Determinants of different land acquisition modes using multinomial logit model

	Multinormial logit: Average Marginal effects					
	All households			Indigenous households		
	Inherited=1	Purchased=1	Rented=1	Inherited=1	Purchased=1	Rented=1
	(1)	(2)	(3)	(4)	(5)	(6)
Proportion of total immigrants in a community	-0.147***	0.0783**	0.0687***	-0.108***	0.0325	0.0758***
	(-4.770)	(2.366)	(3.121)	(-2.775)	(0.837)	(2.885)
Community population density in 2003 (persons/ha)	-0.00614	0.00448	0.00166	-6.48e-05	-0.000631	0.000695
	(-0.982)	(0.709)	(0.427)	(-0.00782)	(-0.0773)	(0.144)
Road condition to district capital[a]						
1 if tarmac	0.122***	-0.167***	0.0446	0.0877*	-0.156***	0.0684**
	(3.213)	(-4.156)	(1.644)	(1.873)	(-3.212)	(2.135)
1 if all-season dirt road	-0.0274	0.0100	0.0174	-0.0170	0.00407	0.0130
	(-0.790)	(0.279)	(0.736)	(-0.412)	(0.0979)	(0.525)
Soil quality measure: PC1	-0.00391	-0.000234	0.00415	-0.00216	-0.00342	0.00558
	(-0.371)	(-0.0205)	(0.550)	(-0.174)	(-0.259)	(0.664)
1 if leasehold/public	-0.0397	0.000449	0.0393	0.161	-0.138	-0.0223
	(-0.435)	(0.00503)	(0.667)	(1.464)	(-1.227)	(-0.293)
1 if hh is female-headed	-0.0169	0.0234	-0.00654	-0.0472	0.0807*	-0.0336
	(-0.462)	(0.600)	(-0.249)	(-1.073)	(1.745)	(-1.018)
Head age	-0.0106*	0.00754	0.00302	-0.00897	0.00531	0.00366
	(-1.845)	(1.184)	(0.680)	(-1.371)	(0.760)	(0.783)
Head age squared	7.23e-05	-2.34e-05	-4.88e-05	5.22e-05	-7.66e-07	-5.14e-05
	(1.449)	(-0.419)	(-1.188)	(0.910)	(-0.0125)	(-1.196)
Head years of schooling	0.0151	-0.0105	-0.00465	0.0165	0.000361	-0.0168**
	(1.606)	(-1.067)	(-0.698)	(1.441)	(0.0308)	(-2.223)
Head years of schooling squared	-0.000773	0.000542	0.000230	-0.00119	0.000280	0.000914*
	(-1.234)	(0.832)	(0.540)	(-1.572)	(0.366)	(1.914)
Family size	-0.00614*	0.00210	0.00405**	-0.00948**	0.00402	0.00546***
	(-1.679)	(0.569)	(2.082)	(-2.186)	(0.944)	(2.688)
Log of assets value ('000 Uganda SHS)	-0.0561***	0.0726***	-0.0165**	-0.0772***	0.0847***	-0.00756
	(-4.377)	(5.508)	(-2.157)	(-5.081)	(5.470)	(-0.946)
Region dummies	Y	Y	Y	Y	Y	Y
Observations	1,579	1,579	1,579	1,150	1,150	1,150

Notes: Numbers in parentheses are z-statistics computed using robust standard errors.
*** shows significance at 1%, ** at 5%, and * at 10%.
[a] The reference category for tarmac and all season dirt road is season dirt road

HHID: _____

Section 7-a. Land Tenure of the Parcels Accessible by the Household in 2009 and Now

Make sure to include all the parcels owned/operated (owned-and-operated, owned-but-not-operated, and not-owned-but-operated parcels) by the HH. ***Check code sheet for tenure system definitions. Copy Parcel names and IDs from 2009 survey and add new ones.***

Parcel Name	Parcel ID	If currently no access to this parcel, why? Code below **(If not accessed ask only L7 and go to next page)**	Size of this parcel in acres?		Reason for change in size (See code)	Year of Acquisition?	How did you acquire this Parcel? See code below	Tenure System code		Tenancy See code below	Walking time in minutes from home-stead?	Currently, do you (as a HH) have the following documents? 1=Yes, 2=No			Do you have the right to Sell this parcel? See Code below	If you were to buy/rent-in this parcel w/o homestead,	
			By 2009 survey **(Copy from 2009)**	Now				At 2009 Survey **(For parcels listed in 2009)**	Now			Title or Certificate	Transaction agreement endorsed by Council	Transaction agreement without Council's endorsement		How much are you willing to pay to buy?	How much are you willing to pay to rent in per season?
Pname	**PID**	**L1**	**L2**	**L3**	**L4**	**L5**	**L6**	**L7**	**L8**	**L9**	**L10**	**L11**	**L12**	**L13**	**L14**	**L15**	**L16**

Code for L1 & L4:

1= Sold land/bought land
2= Sold/ acquired use rights
3= Bequeathed or inherited
4= Gave away as gift
5= Returned to the owner
6= Borrowed-out for a long-term
7= Lost due to disputes
8= Was a wrong record
9= Taken away by the land owner (incl. Mailo owner)
10= Other (specify)

Code for L6:
1= Purchased
2= Received as gift or inheritance
3= Rented-in
4= Sharecropped-in
5= Borrowed-in
6= Just walked in
7= Other (specify)

Code for L7&L8:
1= Freehold
2= Leasehold
3= Mailo
4= Customary
5= Other (specify)

Code for L9:
1= Owner
2= Occupant
3= Tenant
4= Mailo Tenant

Code for L14:

1= No right to sell
2= With approval from HH head
3= With approval from Spouse of head
4= With approval from Head's parents
5= With approval from Spouse's parents

6= With approval from Head's other relatives

7= With approval from Spouse's other relatives
8= With approval from Mailo owner
9= With approval from Seller
10= Can sell land without approvals
11=With approval from clan members
12=With approval from all household members
13=Other (specify)

HHID: _____

Section 7-c. Land Disputes

Ask the following questions on every single accessed **parcel identified in previous sections in the same order. Make sure that tables match across sections.**

Parcel Name	Parcel ID	Have you been **concerned** about disputes over this parcel 1=Yes 2=No (Go to LD4)	If **LD1=Yes** Main cause? ***See Code below***	With whom? ***See Code below***	Have you **had** any land disputes over this parcel 1=Yes: resolved 2=Yes: pending 3=No ***(go to next row)***	If you have had any land disputes before (**LD4=1 or 2)**, In which year, did this dispute start?	Main cause? ***See Code below***	With whom? ***See Code below***	Have you resorted to **informal** institutions (e.g., elders)? 1=Yes 2=No	Have you resorted to **formal** institutions? 1=Yes 2=No	If resolved (**LD4=1**), in which year was this dispute resolved? **Go to LD11**
	PID	**LD1**	**LD2**	**LD3**	**LD4**	**LD5**	**LD6**	**LD7**	**LD8**	**LD9**	**LD10**

Code for LD2 and 6
1= Inheritance
2= Boundaries
3= Compensation
4= Land sales
5= Trespass
6= User rights
7= Illegal settlement
8= Evictions
9= Resettlement
10= Other (Specify)

Code for LD3 and 7
1= Husband's Family members
2= Wife's family members
3= Landlord
4= Squatters/ Migrants
5= Other relatives
6= Tenant
7= Brothers/Sisters/Parents
8= Other (Specify)

LD11
1= Use community informal courts
2=Through formal courts
3= Through extended family
4= Through clans
5. Religious institutions
6. consulted witch doctors
7=others (Specify)

LD11. **What is the common method of resolving conflicts in this LC1? (List 5 common methods from code above)**

1_____ 2_____ 3_____ 4_____ 5_____

[i] We use "LC1", "village", or "community" interchangeably.