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Is There a Merit to the Continuum Tenure Approach?

A Case of Demand for Land Rights Formalization in Rural Mozambique

By

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Abstract: *Despite the general consensus on the need for land reforms to boost agricultural development, the lack of blueprint on required actions to safeguard land rights forces many countries to pilot various policy measures with mixed results. Using the TIA (Trabalho de Inquérito Agrícola) 2008 household and parcel level data from Mozambique, this study shows how demand for formalization of individual land rights depends on the source and type of tenure security risks. Empirical results reveal that demand for individual titles (DUAT) is higher among households where tenure insecurity is associated with private/idiosyncratic tenure risks and lower among those with higher collective tenure risks (such as eviction by the government).*

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1. Introduction

Poor agricultural productivity and food insecurity are persistent features of many less developed countries. Governments and international development agencies have therefore rightly considered agricultural intensification as the primary means for inducing technological change in developing countries that have high population pressure and low agricultural productivity. Integral to this growing global interest in agricultural intensification is the issue of land tenure security (Holden, Deininger, & Ghebru, 2008). Because of the conventional view that traditional or "customary" land rights impede agricultural development (Johnson, 1972; Gavian & Fafchamps, 1996), many developing countries and major multilateral organizations have promoted formalization of land rights (in the form of registration and certification of land) as a top priority in their economic development agendas (Atwood, 1990; International Fund for Agricultural Development [IFAD] 2001; Bonfiglioli, 2003; Deininger, 2003).

In theory, there are three major factors given as a rationale behind formalization of property rights so as to influence agricultural productivity. The first channel is by encouraging long term land investment and adoption of new technologies (Barrows & Roth, 1990; Besley, 1995; Sjaastad & Bromley, 1997; Deininger & Jin, 2006). According to this hypothesis, afraid of not recouping the investment made on land to which the user has access but no secure property rights, the user hesitates to spend resources on land-improving technologies (conservation, manure, fertilizer, etc.). As a result, the demand for productivity-enhancing investment declines and aggregate agricultural productivity suffers. Secondly, secure property rights also are thought to influence agricultural productivity because such rights encourage efficient resource use (factor intensity). This is so since the establishment of clear ownership of land lowers the cost and risk of transferring land, which improves factor intensity such that land will be reallocated to more efficient producers. Thirdly, it has also been claimed that secure property rights can stimulate efficient resource use as such rights should reduce land related disputes (Deininger & Castagnini, 2006; Holden et al., 2008) and may contribute to better access to credit if land can be used as collateral.

Against this backdrop, land tenure reform towards individual freehold has long been seen as a prerequisite for development in sub-Saharan Africa. However, the impact of traditional land tenure systems in the region on agricultural investment and productivity continues to be the subject of intense scrutiny mainly because of the mixed nature of the effects of past land titling

interventions on credit access, smallholder agriculture transformation, and overall production. Recent food security crises in Africa have revived the debate over whether current land tenure systems constrain farmer innovation and investment in agriculture. Recognizing the importance of good land governance, in 2009 the African Union (AU) heads of state agreed to a framework and guidelines for land policy initiatives in Africa which has led an increasing number of countries (including Mozambique) to implement far-reaching programs to improve land tenure security.

In the case of Mozambique, as the associated cost and complexity in implementation caused the slow progress in surveying and registering individual arable lands (issuance of DUAT), the Government of Mozambique has realized the need to establish lower-cost options of land rights formalization in the form of the community land delimitation (CLD) program. In line with this, in 2003, the CLD program was established by group of international donors as a means of supporting the registration of a community's land rights, with the ultimate objective of creating local accountability in protecting the interests and rights to land of the rural poor (such as women and other vulnerable groups) against the non-inclusive approaches of recent foreign interests in Mozambique land.

Using the case of past and ongoing land tenure reforms in Mozambique, this paper aims at assessing the determinants of tenure security for households and the implications of such tenure security on their observed behavior in demanding for formalization of land rights in the country. In an attempt to investigate factors that explains household perceived tenure insecurity, distinguish is made between source of risk of tenure insecurity as: (i) effective risk (mainly dependent on past experiences of households); and (ii) potential risk (i.e., long-term perception of tenure security). The data used in this analysis also allows us to investigate how perceived tenure insecurity of households affect household demand for formalization of farm land rights – looking at the willingness to pay for DUAT. By documenting factors that are associated with demand for individual DUAT, this study, thus, attempts to document under what circumstances the CLD approach (as compared to the DUAT approach) could become a cost effective and pro-poor policy action in addressing tenure insecurity issues in the country. Beyond its relevance to the context of Mozambique, findings of this study may also feed into the ongoing Africa-wide debate on how tenure security can be enhanced in a cost-effective, pro-poor and participatory ways.

Using the TIA (Trabalho de Inquérito Agrícola) 2008 household and parcel level data from Mozambique, this study sets out to analyze the determinants of various forms of household perceived tenure insecurity (namely, private versus collective tenure risks) and, thereby, investigate how each type of perceived tenure risk influence the demand for formalization of individual land rights (DUAT) in Mozambique. Results show that the type of perceived tenure insecurity (whether private or collective tenure risks) households encounter dictates their demand and willingness-to-pay for formalization of their individual land rights (DUAT). The study also confirmed that land registration is an uncommon practice in the country with less 2% of households included in the survey possess DUAT. Asked about their willingness to pay for a DUAT, the study revealed that the majority of households (regardless of the gender of the head or the family structure of the household) have shown significant demand for documentation to safeguard their rights over the land. However, a more demand-driven approach to the ongoing land registration (DUAT) program seems to be more appropriate way forward to accommodate the household and intra-household variations in the sources of tenure insecurity and, thereby, demand and willingness-to-pay for the DUAT that our results show.

The rest of the paper is organized as follows. Review of relevant literature on evolution of land tenure reforms and a conceptual framework on the links between tenure security and demand for land rights formalization with particular relevance to Mozambique is presented in Section 2. Section 3 discusses the data and key descriptive results while Section 4 is dedicated for presenting the econometric methods applied in this study. Section 5 is devoted to the descriptive analysis and discussion of key econometric results, while the last section (Section 6) draws policy implications and further research.

2. Background and Motivation

2.1. Discourse on Land Tenure Reforms and the Mozambique Context

Land tenure has long been a thorny issue. In the 1960s and 1970s, the main concern was equity and security as the debate mostly concerned bringing justice in land allocation in countries that emerged from colonialism. Since the collapse of the Soviet Union in the context of transitions from a socialist mode of production towards a more market oriented system, a different kind of debate has emerged about land tenure centered on efficiency issues and sustainability of resource use (Cotula, Toulmin, & Hesse, 2004). The purpose of this sub-section is not to look at these

debates in any detail. Instead, an attempt is made to briefly summarize the theoretical issues surrounding land tenure security and the evolution of property rights. Although there is wide recognition about the desirability of tenure security for agrarian development, there is no clear and universally applicable blueprint as to the most appropriate property rights regime, as this depends on underlying socio-cultural and geographic factors.

Land tenure reform towards individual freehold system has long been seen as a prerequisite for development in sub-Saharan Africa (Feder & Noronha, 1987; Migot-Adholla, Place, & Oluoch-Kosura, 1994). The arguments in favor of reforming customary African land tenure systems were mainly based on the neoclassical economic theory of property rights (Demsetz, 1967; Barzel, 1997) that predicts greater productivity as land tenure becomes more secure and individualized.

However, empirical evidence on the effects of past land titling programs on access to credit, smallholder investment, and overall production is mixed. Studies in Kenya and Burkina Faso found no effects of land titling on access to credit (Carter & Wiebe, 1990 and Brasselle, Gaspard, & Platteau, 2002). Earlier cross-sectional research in Ghana, Kenya, and Rwanda on land tenure did not show increased investment in land or improved agricultural yields when comparing restrictive land laws to more flexible policy allowing land transfers (Migot-Adholla, Hazzel, Blarel, & Place, 1991). A study in a rice growing area in Madagascar suggests that formal title had no effect on plot-specific investment and little impact on productivity (Jacoby & Minten, 2007). In Uganda, by contrast, the likelihood of new investment on titled land was found to be twice that of investments on merely occupied plots by owner-cum-occupants (Deininger & Ali, 2008).

A comprehensive review of the literature by Holden and Ghebru (2013) shows such controversies and conflicting empirical outcomes of land reforms partly come from the diverse definition of “land reform”, “tenure security” and “impacts”, and the complex relations linking them. Notably, large differences exist among past and ongoing land reform programs implemented in various countries, not only in their legal basis (institutions, rules and legal registration system created or renewed) but also in their processes of implementation (Bruce & Migot-Adholla (eds.), 1994; Benjaminsen and Lund (eds.), 2003). The assumption that ‘land reform enhances tenure security which in turn induces impacts – such as access to credit, increase in investments, reduction of conflicts’ is quite different from the realities on the ground (Deininger & Feder, 2009).

The new wave of land policy reforms and the ‘tenure continuum’ Other literature on land property rights (Larson & Bromley, 1990; Bromley, 1991; Schlager & Ostrom, 1992; Janvry, Gordillo, Platteau, & Sadoulet, 2001) acknowledges that privatization and individualization is not a priori the most efficient means of achieving tenure security. This was the basis for the revision of the 1975 World Bank land policy, which called for the introduction of private land rights in Africa, acknowledging the fact that communal tenure systems can increase tenure security and provide a basis for land transactions that are more cost-effective than freehold titles (Deininger & Binswanger, 1999). Although few African countries have gone through revolutionary land reforms or government-induced (land titling) tenure changes, there is evidence to indicate that tenure regimes are evolving towards individualized land rights in response to increased demand for secured land rights over scarce land resources (Peters, 2004; Udry, 2011).

After the land redistributive reforms dominating the land tenure debate during the last decade of the 20th century, there is now a renewed global interest in land policy and legal reforms, in part due to rapidly increasing population pressure and high food and fuel prices (IFAD, 2001; Bonfiglioli, 2003; Deininger, 2003). Against this backdrop, there is a growing consensus that, even in rural African contexts where individual titling of land may not be desirable or feasible, simple recognition of the different breadth of rights individuals and communities have under the existing customary tenure system can yield significant benefits (Deininger, Ali, Holden, & Zevenbergen, 2008). This can be done simply by providing poor land owners or users with options to have their rights in land documented.

With this recognition, a new and innovative approach is found in the continuum of land rights, rather than a narrow focus on individual land titling. In this approach, a range of possible forms of tenure are considered as a continuum from informal tenure systems (customary, occupancy rights) towards more formal land rights (leases or freehold rights), where each step in the process of securing the tenure can be formalized (UN-Habitat, 2008). This approach has gained momentum in the last decade due to the recognition of the aforementioned limitations of past land titling programs and the argument that, where population density is low and land is relatively abundant, the usufructuary rights given under customary tenure rights system do not impose large losses as long as markets for output, capital and insurance are poorly developed, which generally is the case in the sub-Saharan Africa context. Rather than a narrow focus on individual land titling,

this approach involves a form of localized recording and documentation of rights (including secondary or derived rights to land), adapting and expanding existing tenure and land administration systems, where possible, and introducing new ones selectively (Augustinus & Deininger, 2005).

Since the turn of the new millennium, experience with implementation of the continuum of land rights approach has moved ahead in many sub-Saharan African countries, including Mozambique.

2.2 Mozambique's Land Policy and Governance Issues

Customary land systems in Mozambique were first threatened under Portuguese colonial rule. In order to accommodate colonial interests and encourage investment while still protecting indigenous rights, cultivated land was concentrated in large Portuguese plantations, trading enterprises, and smaller commercial farms, while native Mozambicans were often relocated to more marginal land (Burr, 2004). As result of this, land became the focus after the Independence War Conducted by Mozambicans against the Portuguese domination, seeking source of livelihood for the majority of the rural population, recognizing land as main means of production, important as the producer of national wealth, supplier of food to cities and raw materials for domestic and export markets. This was culminated with Mozambique gaining its independence in 1975, where virtually all of the Portuguese fled the country.

After Mozambique gained independence in 1975, virtually all of the Portuguese fled the country and successive efforts in establishing land legislation were implemented, which culminate with the 1995's Land Policy and the 1997's Land Law and Regulations. The Mozambican Land Policy and legislation aims to achieve three main objectives, namely: (i) Community security of land tenure, through community land delimitation; (ii) Community participation in decisions to allocate land to external parties (especially investors), through community consultations; and (iii) Community benefit sharing with investors and the State, through private-community partnerships.

As stated in the 1997 Land Law (Article 3, Chapter 2), the land is the property of the State and cannot be sold or otherwise alienated, mortgaged or encumbered. According to the Land Law, the exclusive right of the state is established by the constitution of the Republic of Mozambique (CRM) which incorporates all rights of ownership, as well as the power and the ability to determine

the conditions of its use and benefit by individual or corporate persons. In the same line, Burr (2004) describes “the 1997 Land Law of Mozambique (“Land Law”) as embracing customary African law in its innovative land tenure strategy, giving substantial control to local authorities in the delimitation and allocation of land use rights, the resolution of disputes, and the subsequent management of resources” (p. 1). Some critiques argue that although the Land Law generously protects various human rights interests, such as women’s rights, customary land use claims to uncultivated fields and rights of way, and the rights of internally displaced persons, it does not permit the sale of land, vesting ultimate ownership in the State (Burr, 2004)

One of the salient feature of the 1997 Land Law is the fact that although the state still owns all land, it grants use rights to individuals, communities, and companies in the form of leases that can last up to 100 years (known as *direito de uso e aproveitamento dos terras or DUAT*). These leases can be transferred, but not sold or mortgaged. Use rights emerge either through occupancy or by a specific grant through the state. The government can issue use right title documents to individuals, companies, or entire communities and groups, although those who occupy the land for more than ten years acquire permanent use rights without the need for title documents. However, conflict among small landholders remains an issue in the country. The Land Tenure Center observed that, although the July 1997 Land Law did much to protect the interests of small landholders against the competing interests of large landholders, it did not contain enough provisions that addressed existing competing land claims among peasants. This is a sensitive topic; particularly in light of the policy desires to resolve land conflicts at the local level with customary authorities, and new legal provisions were enacted to address some of these issues as discussed below.

A far-reaching innovation in the Land Law of 1997 is the recognition of the local communities with ability to provide the DUAT through their customary systems of land management. In this case, all existing rights acquired through customary law are granted automatically to an equal standing as the DUAT and enjoy the same constitutional and legal guarantees. A citizen may likewise exert a spontaneous occupation of the land and can apply and acquire a DUAT after a certain period, provided that the land has not been legally assigned to another person or entity or there about it a legal reserve (Article 111 the Constitution). This is a principle of free access to land and is well established and experienced by all Mozambicans.

However, concerns regarding this principle are related to the fact that Mozambique is a growing economy pursuing market-led development strategies and the growing demand for land will lead to inequality in land access land between domestic and foreign interests with consequent violation of local rights and increasingly threatening the principle of free access and use.

The Ministry of Agriculture noted that under the 1997's Land Law, it continues to be difficult for smallholder farmers to enforce their rights in the midst of competing large landholders and outside investors. Another weakness of the Land Law is the failure to acknowledge inheritance rights of widows and divorced women by protecting them against eviction from lands they worked for more than ten years. Additionally, there are conflicts over which small landholders should use the limited amount of fertile land available to peasants. In 1999, the Land Tenure Center reported that land access was still linked to wealth-related factors. Cases of fraudulent land expropriation still continued after implementation of the new Land Law, further disrupting peasants' access to lands (Ministry of Agriculture, 2010).

As a result of such dynamics in the rural economy (growing threat of foreign and domestic large scale land acquisition) coupled with the associated high cost and complexity in implementation issuance of DUAT, the Government of Mozambique has realized the need to establish lower-cost options of group land rights formalization in the form of the community land delimitation (CLD) program. In line with this, in 2003, the CLD program was established by group of international donors as a means of supporting the registration of a community's land rights, with the ultimate objective of creating local accountability in protecting the interests and rights to land of the rural poor (such as women and other vulnerable groups) against the non-inclusive approaches of recent foreign interests in Mozambique land.

In the past, the community land delimitation in Mozambique was undertaken by NGOs in order to protect the local community's land from the speculators and to promote community-paced natural resources management initiatives. From the mid-2000s onwards, while still continuing to be largely donor- driven, community land delimitation started to be considered as a means of attracting investment. In line to this, in 2003, the iTC (Iniciativa Terras Comunitarias) Fund was established by group of international donors as a means of supporting the registration of local community's rights on their land with the ultimate objective of promoting local economic development opportunities through a balanced community-investor partnership. Furthermore,

delimitation is also seen as means of creating local accountability for the protection of fragile environmental resources such as parks, conservation areas and community lands (De Wit & Norfolk, 2010).

The delimitation process in Mozambique can be said “supply - driven” in the sense that it is mainly financed by NGOs. However, it can also be said “external demand-driven” since most of the community lands are delimited to be granted to investors (Åkesson, Calengo, & Tanner, 2009; De Wit & Norfolk, 2010).

With regard to the extent of the delimitation process - after ten years of community land delimitation- what is achieved is little. However, mainly due to lack of coordination between different actors – namely, the National Directorate of Lands and Forestry (DNTF), provinces and NGOs – involved in the delimitation process, it is difficult to provide accurate figures that tell the status of the process. An inventory that was made based on cadastral information revealed that, by early 2009, probably less than 10 percent of Mozambican rural communities that equally cover less than 10 percent of the national territory were delimited. The major reasons for such low performance are, first, the process continued to be external demand-driven; secondly, the process was driven by the NGO sector and has never been government’s high priority; and, finally, the capacity of both the public and NGO sectors was weak. Although, since 2003, the iTC makes available resources for grassroots activities related to land and natural resources management, with a major focus on community land delimitation, this facility has also been slow in becoming fully operational (De Wit & Norfolk, 2010). Recently, however, the issue of land has moved higher up the political agenda of Mozambique, with the direct interventions of the President, Council of Ministers, communities, and donors in Mozambique. After it had been stopped in 2007, the community land delimitation has been resumed since 2010 with the support of the donor community (Mozambique Political Process Bulletin - MPPB, 2011).

Thus, by documenting factors that are associated with demand for individual DUAT, this study attempts to document under what circumstances the CLD approach (as compared to the DUAT approach) could become a cost effective and pro-poor policy action in addressing tenure insecurity issues in the country. Beyond its relevance to the context of Mozambique, findings of this study may also feed into the ongoing Africa-wide debate on how tenure security can be enhanced in a cost-effective, pro-poor and participatory ways.

2.3. Conceptual Framework

Tenure security: Concept and measurement issues. Before analyzing the effects of tenure (in)security (such as investment and credit impacts), the concepts of tenure (in)security and its measurement is worth exploring as its effects depend of the adopted definitions and ways of measuring tenure (in)security. Land tenure insecurity and tenure security have been defined in several ways, and in this paper, we adopt two alternative definitions, namely:

- a) Effective risk of being evicted or losing land rights
- b) Potential risk of losing land rights

In the first case, households sense of tenure (in)security may come from the perception that someone may challenge their land rights and eventually make them lose their rights to the land which can be affected by past or on-going threats either: (i) due to hazard of expropriation by the government (Jacoby, Li, & Rozelle, 2002); or (ii) encroachment or eviction by other individuals. However, a household's sense of tenure (in)security may not be strictly proportional to the number of land disputes or expropriation the household experienced in the past. The conditions that may increase their perception of risk could be global (foreign interest in land) or related to socio-economic trends of the locality (urban expansion, rural population growth, etc.). This refers to the potential risk of losing land right. Therefore, in addition to the effective risk of losing land rights due to past and on-going land disputes or expropriation by government, the sense of tenure security of households may result from such global or local phenomenon as well, conditioned by the degree of protection the government offers against such risks.

Hence, in this paper, tenure (in-)security is defined as a perception variable where the beliefs are formed on the basis of past events – definition (a) above – and/or expectations about the future – definition (b) above – where in both cases information and knowledge about rights, legal restrictions, and various types of threats and protection opportunities really matter. These two definitions illustrate that the government may be the source of the risk or the source of protection against the risk depending on the setting or the formal land rights recognized by government that the land rights claimer has.

Land tenure (in-)security can be measured at farm plot, individual, household, group, or community levels. With conflicting claims over land, the increase in the (in-)security of one party

may imply a reduction in the (in-)security of another party or parties. The strength of (in-)security can depend on traditional rights (customs, norms), modes of land acquisitions, legal protection (laws and law enforcement), duration of possession, social networks, political connections and power structure, the degree of scarcity (competition) and value of the land, and individual and group abilities.

To be able to investigate the determinants of tenure (in)security, two proxies can be used to capture the two types of sources of tenure insecurity discussed above, namely:

- a. Tenure (in)security as a result of *private tenure risk*: We measure this source of tenure (in)security using a plot level perception of farmers' response to a question as to "whether they think their land rights might be challenged by individuals within a community – such as ownership, inheritance, and border related disputes".
- b. Tenure (in)security as a result of *collective tenure risk*: Alternatively, we measure this source of tenure (in)security using a plot level perception of farmers' response to a question as to "whether they think their land rights might be challenged by individuals/entities outside their communities – such as expropriation by the government or land concession by the private sector or enterprises".

There is no guarantee that households' willingness-to-pay for legal documents is directly correlated with the number of land disputes or expropriation they experienced in the past. To test whether or not this is the case, proper comparisons are made by comparing the correlations of the two proxy variables for tenure (in)security.

Merits and alternative means of improving property rights. The two alternative definitions of tenure security adopted in this study do not depend on who "owns" land, but rather analyzes the formal and informal provisions that determine who has a right to enjoy *benefit streams* that emerge from the use of assets and who has no such rights (Libecap, 1989; Eggertsson, 1990; Bromley, 1991). Regardless of the various combinations or 'bundles' of rights to the land (such as access, appropriation of resources and products, exclusion of others, and alienation by selling or leasing), these rights need to be sanctioned by a collective in order to constitute effective claims.

Reflecting the neoliberal thinking on private property rights and its impact on development of agricultural productivity, farm households' involvement in practices that enhance the long-term

viability of agricultural production hinges significantly on expectations regarding the length of time over which the investor (farmer) might enjoy the benefits, which mostly are long-term. These expectations depend on the sense of tenure (in)security (caused via either ownership or border disputes, eviction or expropriation by the government). Measures to minimize/eliminate landholder's risk of tenure insecurity may, therefore, boost incentives to invest in such practices that enhance long-term sustainability of agricultural production (such as land improvements, conservation practices, and adoption of new technologies) which ultimately may increase farm productivity (Gavian & Fafchamps, 1996; Hayes, Roth, & Zepeda, 1997; Gebremedhin & Swinton, 2003; Deininger & Jin 2006; Deininger et al., 2008; Holden, Deininger, & Ghebru, 2009).

However, while it is commonly agreed that tenure security can stimulate investment, following the continuum tenure approach, we argue that the type of intervention (mechanisms) required to enhance property rights of individuals is far from uniform as it depends on the types of sources of perceived insecurity of tenure. This means that the type of demand for interventions to ascertain individual's claims to the land depends on whether the risk being faced either individual/specific or systematic/shared risk of tenure insecurity.

Based on the theory and empirical literature discussed, a simple conceptual model for the determinants of tenure insecurity and how varying sources of tenure insecurity may affect land rights and, thus, demand for the type of interventions to enhance security of tenure holding is outlined in Figure 1 below.

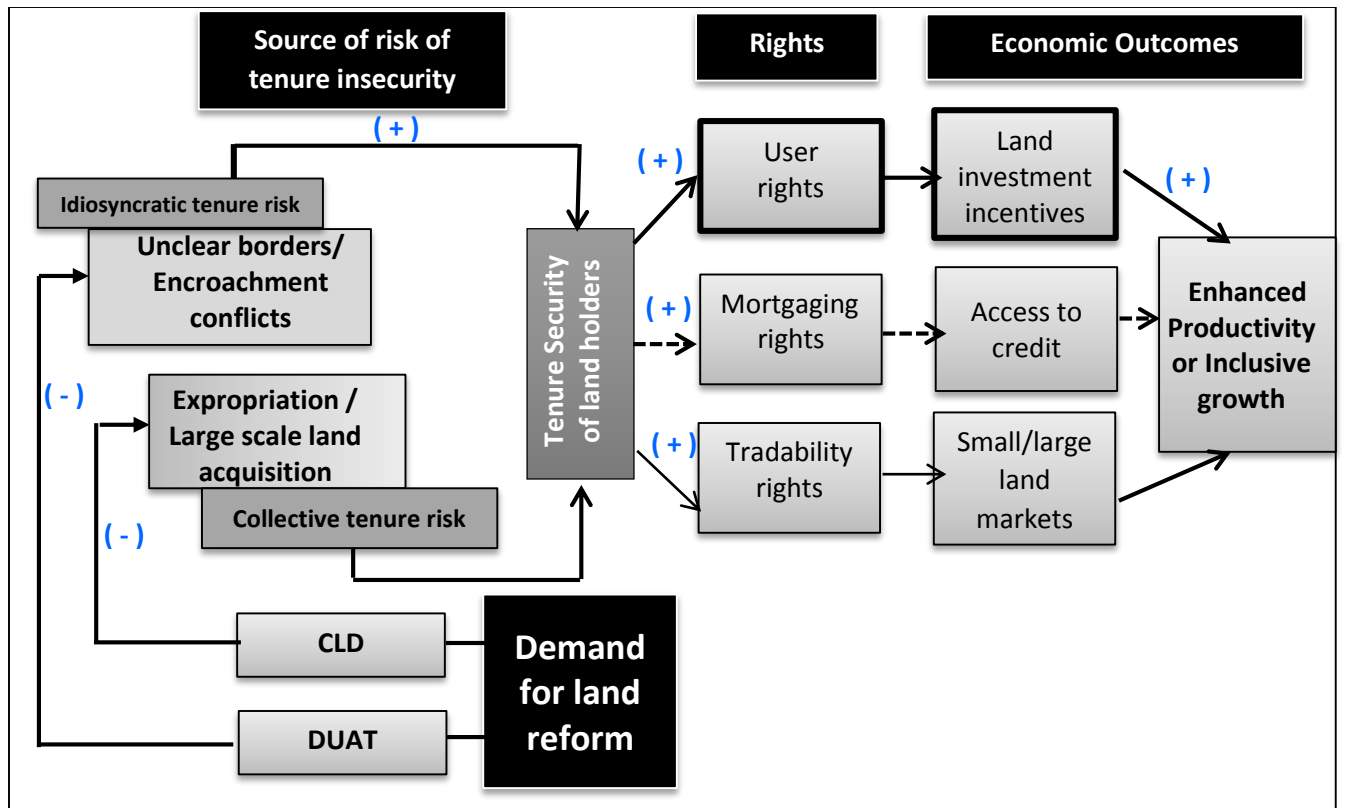


Figure 1: Conceptual model showing the relationship between tenure insecurity and demand for formalization of land rights

In this study, we primarily focus on these alternative policy tools by disaggregating potential sources of risk of tenure insecurity into two, namely: (i) Idiosyncratic risk of tenure insecurity; and (ii) collective/systematic tenure. In our attempt to analyze the determinants of demand for land rights formalization in Mozambique (i.e., willingness-to-pay for DUAT, we focus our empirical analysis on showing how these two sources to tenure insecurity dictates the type of demand individuals have for alternative means of land rights formalization:

- a. **Source – 1:** Unclear borders/encroachment/border conflicts → **Idiosyncratic** or specific risk of Tenure insecurity → **Demand for recognition of individual land rights** (e.g., **DUAT** in Mozambique) → Positive economic outcomes (e.g., higher incentive to land investment or facilitation in small-scale land transfers) → enhanced land productivity
- b. **Source – 2:** Land expropriation by government or private sector acquisition → **systematic or collective risk of Tenure insecurity** → **Demand for recognition**

of group land rights (e.g., **CLD** in Mozambique) → Positive economic outcomes (e.g., higher incentive to land investment or facilitation in pro-poor large-scale land transfers → inclusive growth.

Motivation of the study. We use our conceptual framework to investigate factors that explains the demand for alternative policy actions that are required to enhance tenure security and, thereby, increase the propensity for land holders to make productivity-enhancing investments. As shown in Figure 1 above, we assume that the effectiveness of government policy interventions – for instance, the issuance of a DUAT or implementation of the CLD – depends on how effective the policy action is in addressing the very source of tenure insecurity of land holders. Therefore, we argue that, due to the idiosyncratic nature of the tenure risk, the DUAT approach is more effective should tenure insecurities be more explained by lack of clarity in ownership or parcels boundaries (which may cause incidences of parcel border or encroachment conflicts) while the CLD approach could be effective for insecurities due to uncompensated confiscation or expropriation of one’s property or parcel by public authorities or acquisition by the private sector. The effects of the DUAT versus CLD approaches are shown in the diagram by the positive effect of these intervention might have on the idiosyncratic/specific versus collective/systematic risks of tenure insecurity, respectively. By documenting factors that are associated with demand for individual DUAT, this study, thus, attempts to document under what circumstances the CLD approach (as compared to the DUAT approach) could become a cost effective and pro-poor policy action in addressing tenure insecurity issues in the country. Beyond its relevance to the context of Mozambique, findings of this study may also feed into the ongoing Africa-wide debate on how tenure security can be enhanced in a cost-effective, pro-poor and participatory ways.

3. Data and Descriptive Analysis

The data used in this analysis come from the 2008 “Trabalho de Inquérito Agrícola” known as TIA-2008 survey, which was designed to be representative of rural zones at provincial and national levels. The TIA survey (collected by the Ministry of Agriculture) includes detailed field production information and rich demographic and infrastructure information for each household and community from 80 districts of the 10 provinces in Mozambique. Within each district, households were selected randomly. This yielded a sample size of 5,968 households operating 11,164 parcels. In addition to standard household characteristics, the survey contains results from

various modules on land documentation, land tenure practices, perceived tenure insecurity, conflicts, investment, and land transactions for all households' plots including information on land ownership and transfer rights, soil quality, and production at the plot level.

Table 3.1: Descriptive summary – Parcel level

Variables	Perceived tenure insecurity (Household fear of land related dispute)						
	Pooled sample		Household with no fear of loss of land		Household with fear of loss of land		significance
	mean	St. Err.	mean	St. Err.	mean	St. Err.	
Age of household head	44.443	(44.443)	44.417	(0.144)	44.806	(0.536)	
Male household head	0.789	(0.789)	0.787	(0.004)	0.812	(0.014)	
Adult equivalent family size	4.728	(4.728)	4.702	(0.026)	5.081	(0.110)	****
Head is salary employed	0.522	(0.522)	0.512	(0.008)	0.656	(0.034)	****
Number of years since plot ownership	10.402	(10.402)	10.436	(0.090)	9.912	(0.339)	*
Farm size per consumer unit	0.66	(0.660)	0.654	(0.007)	0.748	(0.042)	****
Land dispute in the past	0.035	(0.035)	0.027	(0.002)	0.146	(0.013)	****
Household is willing to pay for DUAT	0.166	(0.166)	0.146	(0.003)	0.451	(0.018)	****
Household has Proof of ownership	0.012	(0.012)	0.011	(0.001)	0.027	(0.006)	****
Plot is borrowed	0.049	(0.049)	0.048	(0.002)	0.065	(0.009)	**
Plot is purchased	0.058	(0.058)	0.055	(0.002)	0.087	(0.010)	***
Plot acquired from formal authorities	0.035	(0.035)	0.034	(0.002)	0.050	(0.008)	**
Plot is acquired via inheritance	0.227	(0.227)	0.229	(0.004)	0.209	(0.015)	
Plot is acquired via individual occupation	0.254	(0.254)	0.259	(0.004)	0.186	(0.014)	****
Plot is acquired via gift from family/relatives	0.264	(0.264)	0.262	(0.004)	0.289	(0.016)	
Plot is rented	0.006	(0.006)	0.006	(0.001)	0.005	(0.003)	
Plot acquired from traditional authorities	0.100	(0.100)	0.100	(0.003)	0.100	(0.011)	
Plots with conservation investment	0.082	(0.082)	0.083	(0.003)	0.065	(0.009)	*
Plots with demarcation investment	0.040	(0.040)	0.038	(0.002)	0.075	(0.010)	****
Plot had conservation investment	0.031	(0.031)	0.092	(0.003)	0.086	(0.010)	
Plot had demarcation investment	0.092	(0.092)	0.051	(0.002)	0.100	(0.011)	****
Distance to parcel	0.054	(0.054)	20.955	(0.621)	21.949	(1.972)	
Agricultural potential (length of growth period – LGP) – (district level)	189.8	(1.478)	189.5	(0.335)	193.3	(1.145)	***
Population density (district level)	54.7	(6.275)	52.4	(1.596)	86.0	(9.976)	****
Cultivated area per capita (district level)	1.377	(0.092)	1.411	(0.022)	0.900	(0.053)	****
Uncultivated area per capita (district level)	3.154	(0.148)	3.242	(0.048)	1.944	(0.100)	****
Number of observations	11,164		759		10,405		

Source: Author's computation from TIA 2008 survey

Note: * significant at 10%; ** significant at 5%; *** significant at 1%; and **** significant at 0.1%; Robust standard errors (St. Err) are in parentheses.

Key statistics for characteristics of the sample households and their property ownership disaggregated by their tenure security status, as reported in Table 3.1, yield a number of insights.

Summary results show that, on the overall, households own 2.5 parcels with an average per capita farm size of 0.66 ha. Transfer of land among relatives represents the dominant mode of land access (26.4 percent of the parcels were gift transfers from relatives while 22.7 were inherited parcels). Perhaps a direct outcome of the existing land law in Mozambique that recognized occupied parcels as legitimate acquisitions, a quarter of the parcels in the sample (25.4 percent) were acquired through occupation by farm households. On average, the level of participation in the land rental market is very low with less than one percent the parcels were transacted (either leased-in or leased-out). The low level of land transactions is also shown as less than 6 percent of land in the studied districts was acquired through purchase.

Only 1.2 percent of the parcels in the studied area had formal titles or any documentation as a proof of ownership while the summary results show that households' willingness-to-pay for documents of right validation remained high. Almost 17 percent of the parcels were reported as parcels where households had shown interest in their willingness-to-pay for land rights documentation. Consistent with previous studies (Uaiene & Arndt, 2009), farm households' decision to engage in long-term land related investment was poor. Long-term investment in the form of soil and water conservation measures was undertaken in only 3.1 percent of the plots in the studied area while investment in boundary demarcation was slightly higher (9.2 percent of the plots). The low percentage of investment in conservation structures as compared to a relatively higher percentage of investment in boundary demarcation can be an indication of a higher sense of perceived tenure insecurity in the study area.

Vindicating our choice of this variable (fear-of-loss-of-land) as a proxy for capturing tenure (in)security of households, results shows that households willingness-to-pay for documents that strengthen tenure security (willingness-to-pay for DUAT) is significantly higher on plots with self-reported risk of loss as compared to those with relatively higher degree of tenure security. Though results from the study area shows low level of willingness-to-pay for DUAT (only 16 percent of the parcels were reported to be parcel that households are willing-to-apply for DUAT), the proportion is significantly higher for parcels that households fear losing their rights (45 percent). On the other hand, the willingness-to-pay for acquiring a DUAT for parcels that households reported to have a relatively higher degree of tenure security is only 14.6 percent.

Table 3.2: Descriptive summary – Household level

Variables	Perceived tenure insecurity (Household fear of land related dispute)				
	Fear		No fear		signifi- cance
	mean	St. Err.	mean	St. Err.	
Male household head	0.788	(0.043)	0.773	(0.019)	
Age of household head	43.568	(1.783)	44.071	(0.588)	
Years of schooling for household head	2.947	(0.331)	2.643	(0.146)	**
Household head with formal employment	0.308	(0.057)	0.266	(0.020)	*
Household head with self-employment	0.414	(0.056)	0.360	(0.020)	**
Family size	5.782	(0.339)	5.382	(0.118)	**
Agricultural potential and land abundance					
Farm size per adult equivalent, ha	0.722	(0.265)	0.608	(0.028)	***
Population density	89.002	(39.992)	61.455	(7.286)	**
Cultivable area per capita, ha	2.764	(0.871)	4.809	(0.325)	****
District level length of growing period	193.3	(4.326)	188.6	(1.607)	**
Market access (walking hrs to urban center)	327.129	(21.82)	356.377	(7.313)	****
Adoption and long-term investment					
Investment in demarcation of parcels	0.066	(0.022)	0.030	(0.008)	****
Investment in conservation	0.048	(0.026)	0.048	(0.010)	
Long-term land related investment	0.149	(0.035)	0.092	(0.014)	****
Adoption of fertilizer	0.040	(0.013)	0.018	(0.006)	
Adoption of manure	0.080	(0.029)	0.047	(0.008)	
Modes of land acquisition					
Acquired land by occupying	0.162	(0.033)	0.254	(0.013)	****
Acquired land by cash purchase	0.064	(0.033)	0.033	(0.013)	***
Acquired land from inheritance	0.178	(0.047)	0.194	(0.017)	
Number of observation	377		4756		

Source: Author's computation from TIA 2008 survey

Note: * significant at 10%; ** significant at 5%; *** significant at 1%; and **** significant at 0.1%; Robust standard errors (St. Err) are in parentheses.

Household level results of summary statistics of key household and parcel characteristics are reported in Table 3.2. Results show that households with relative abundance of land have higher level of perceived tenure insecurity. The average per capita farm size of those households who reported to have fear of losing at least one of their land holdings is 0.722 hectare, while it is 0.608 hectare for those with no fear of losing their land. Perceived tenure insecurity is also higher among those households who reside in communities with densely populated and land scarce areas as well as in areas with better access to market and higher agricultural potential.

Similar to the findings from the parcel level analysis, farm households' investment in making their parcel boundary marks clearer is higher for those with fear of loss of land. On the other hand, comparing households' by their status of tenure (in)security, there is no significant difference in making investments in conservation structures and adoption of fertilizer/manure.

Comparing the gender of heads of the households in Table 3.3 below, the level of knowledge of the existing land law in Mozambique is higher among male-headed households than female-headed households. Such difference is also witnessed in terms of households' willingness-to-pay for improved land rights. Results show that while 18.1 percent of the households headed by males are willing-to-apply for DUAT, only 11.5 percent of female-headed households have reported to have any interest in applying for documentations of improving land rights.

Table 3.3: Tenure security, disaggregated by gender of head of household

Tenure security indicators	Female		Male		significance
	mean	St. Err.	mean	St. Err.	
Knowledge of the land law	0.120	(0.009)	0.185	(0.006)	****
Land related dispute in the past	0.047	(0.006)	0.060	(0.004)	*
Fear of future loss of land	0.069	(0.007)	0.081	(0.004)	
Willingness-to-pay for DUAT	0.115	(0.009)	0.181	(0.006)	****
Has proof of ownership (DUAT)	0.010	(0.003)	0.017	(0.002)	*
Total number of plots	1.760	(0.027)	1.981	(0.016)	****
Farm size per consumer unit	0.568	(0.017)	0.613	(0.011)	**
Number of observations	1386		4582		

Source: Author's computation from TIA 2008 survey

Note: * significant at 10%; ** significant at 5%; *** significant at 1%; and **** significant at 0.1%; Robust standard errors (St. Err) are in parentheses.

Results from Table 3.4 below show that the average age of heads of households who accessed land via family gift is significantly lower than those who accessed land from traditional authorities with 41.7 and 47 years old, respectively. On the other hand, results from the same table also show that the dominant mode of land access for female-headed households is inheritance while family gift is so for younger heads of households. As an evidence of potential pitfall of the traditional land tenure system in protecting land rights of vulnerable groups, such as women, almost one out of four households with access to land via inheritance were female-headed households while the proportion of female-headed households among those having access to land via traditional authorities and individual occupation is significantly lower, 21.4 percent and 16.5

percent, respectively. The findings are similar when comparing female land ownership rights based on the various modes of land acquisitions. While 42.1 percent of parcels acquired via inheritance are owned by women, only 25.9 percent of the parcels acquired by individual occupation are under women ownership.

Table 3.4: Key parcel characteristics, disaggregated by major modes of land acquisitions

Variables	Modes of Parcel Acquisition			
	Traditional Authorities	Family Gift	Occupation	Inheritance
Household level characteristics				
Male household head	0.786 (0.012)	* 0.779 (0.008)	0.835 (0.007)	**** 0.762 (0.008)
Age of household head	47.001 (0.446)	** 41.544 (0.265)	*** 45.572 (0.271)	45.699 (0.295)
Adult equivalent family size	5.128 (0.085)	4.525 (0.044)	**** 4.451 (0.047)	**** 5.004 (0.064)
Landlord household	0.039 (0.006)	**** 0.043 (0.004)	*** 0.050 (0.004)	0.071 (0.005)
Tenant household	0.017 (0.004)	**** 0.033 (0.003)	** 0.022 (0.003)	**** 0.043 (0.004)
Years of plot ownership	11.651 (0.277)	** 10.212 (0.151)	**** 9.417 (0.128)	**** 12.633 (0.280)
Farm size per capita, ha	0.717 (0.023)	* 0.624 (0.011)	** 0.719 (0.014)	**** 0.664 (0.017)
Head is salary employed	0.595 (0.028)	0.540 (0.016)	**** 0.369 (0.013)	**** 0.596 (0.019)
Head is self-employed	0.568 (0.022)	*** 0.544 (0.013)	**** 0.579 (0.014)	**** 0.623 (0.016)
Total number of plots	2.213 (0.037)	**** 2.499 (0.024)	**** 2.501 (0.024)	**** 2.717 (0.032)
Land rights and tenure security				
Plot jointly owned	0.002 (0.001)	0.002 (0.001)	0.001 (0.000)	0.002 (0.001)
Plot owned by female	0.373 (0.015)	*** 0.396 (0.009)	* 0.259 (0.008)	**** 0.421 (0.010)
Plot owned by male	0.584 (0.015)	*** 0.566 (0.009)	*** 0.717 (0.008)	**** 0.531 (0.010)
Has proof of ownership (DUAT)	0.008 (0.003)	0.006 (0.001)	0.006 (0.001)	0.006 (0.001)
Willingness to pay for DUAT	0.17 (0.011)	0.164 (0.007)	** 0.137 (0.006)	**** 0.19 (0.008)
Land dispute in past	0.031 (0.005)	0.037 (0.003)	0.030 (0.003)	0.030 (0.003)
Fear of future loss of land	0.068 (0.008)	0.074 (0.005)	** 0.05 (0.004)	* 0.063 (0.005)
Plot characteristics				
With conservation investment	0.138 (0.01)	**** 0.099 (0.006)	*** 0.059 (0.004)	0.062 (0.005)
With demarcation investment	0.038 (0.006)	0.033 (0.003)	** 0.043 (0.004)	0.044 (0.004)
Had conservation investment	0.144 (0.011)	**** 0.064 (0.005)	**** 0.109 (0.006)	** 0.081 (0.005)
Had demarcation investment	0.049 (0.006)	**** 0.049 (0.004)	*** 0.049 (0.004)	*** 0.066 (0.005)
Distance to parcel	21.471 (1.744)	* 21.043 (1.248)	* 19.17 (0.807)	17.952 (1.209)
Community level characteristics				
Length of growth period – (LGP) – (district level)	186.2 (1.2)	**** 187.9 (0.596)	**** 188.0 (0.698)	**** 194.3 (0.582)
Population density (district)	77.812 (7.995)	*** 44.311 (2.263)	*** 46.635 (1.517)	** 53.958 (3.47)
Cultivated area per capita (district)	1.303 (0.063)	1.554 (0.042)	*** 1.45 (0.042)	**** 1.238 (0.042)
Uncultivated area per capita (district)	3.897 (0.227)	**** 3.093 (0.082)	**** 3.651 (0.091)	**** 2.59 (0.074)
Number of observations	1,112	2,947	2,834	2,538

Source: Author's computation from TIA 2008 survey

Note: * significant at 10%; ** significant at 5%; *** significant at 1%; and **** significant at 0.1%; Robust standard errors (St. Err) are in parentheses.

Table 3.4 above also compares willingness-to-pay for DUAT of households based on the various modes of land acquisitions. As compared to parcels acquired via individual occupation,

willingness-to-pay for DUAT is significantly higher on parcels accessed through inheritance. Consistent with this findings, perceived tenure insecurity (which is measured hereby reported fear of loss of land) is significantly higher on parcels acquired via inheritance as compared parcels accessed via individual occupation (which is direct reflection of the existing land law of Mozambique that gives full recognition of rights to the land acquired via individual occupation). Getting access to land from traditional authorities remained to be the most dominant mode of land acquisition in areas with high population density and communities with relative higher land abundance. Comparing land access from traditional authorities with access via individual occupation, on average, parcels acquired from traditional authorities are located in communities with a population density of 77 persons per square kilometer while the figure is only 46.6 persons per square kilometer for parcels acquired via individual occupation.

4. Estimation Strategy

The available rich dataset allow us to disaggregate tenure security in to effective risk of losing land and potential risk of losing land (and the later, further disaggregate into potential dispute of private nature versus that of public nature) while we are also able to disaggregate demand for DUAT as conditional as well as unconditional demands. Using these disaggregation, estimation methods for the determinants of tenure insecurity (Section 4.1) and, thereby, demand for formalization of land rights (Section 4.2) are detailed below.

4.1. Tenure (In)security Model

In addressing our major research question, three parcel-level dichotomous outcome variables have been utilized to identify the determinants of household perceived tenure (in)security: (i) whether or not the household had experienced land related dispute as a proxy for tenure insecurity; (ii) whether or not the household has indicated a perceived risk of potential disputes of private nature (idiosyncratic tenure risk – such as ownership, border, inheritance disputes); and (iii) whether or not the household has indicated a perceived risk of potential disputes of collective nature (systematic tenure risk – such as expropriation or land concession by private sector). Following the discussion under the conceptual framework in Section 2.3, we model households' perceived tenure (in)security as binary choice model (with left-hand side variables equal to 1 if the household indicates the experience or perception of either the three tenure insecurity proxies, and 0 otherwise) by treating these three types of definitions of tenure

(in)security as alternative model specifications for the estimation of tenure insecurity of households. With a potential major problem of non-normality of the error term concerning the standard OLS estimation of such models, we utilize the maximum likelihood binary response model – probit model (Wooldridge, 2000; Gujarati, 2003; Green, 2000).

In making responses to their experience of dispute in the past or perceived fear-of-losing land, we assume there is unobserved factor (utility index) R_i^* that explains why farm households fear losing their land or are willing-to-pay for DUAT. We postulate this variable R_i^* (latent variable) is a function of vector of exogenous variables with the relationship specified as:

$$R_i^* = \gamma' Z_i + \varepsilon_i \quad (1)$$

where R_i^* is a latent variable (unobserved) that shows the perceived tenure (in)security; Z_i is a vector of exogenous variables (household demographic variables, asset and physical endowment variables and other village level factors such as distance to major market and population density) that influence perceived tenure security; γ' is a vector of parameters; and ε_i is independent of Z_i which represents factors unobserved by the researcher but known to the farmers (sample respondents). We further assume the random disturbance term ε_i is normally distributed with zero mean and variance equal to one ($\varepsilon_i \sim N(0, 1)$).

Instead of observing the latent variable R_i^* (perceived risk of tenure insecurity), we only observe a dichotomous variable (indicator variable) R_i which follows the sign of the latent variable R_i^* . When the perceived risk is positive ($R_i^* > 0$), the farm household is observed as tenure insecure with $R_i = 1$.

Therefore, for farm household 'i', the observed binary response can be given as:

$$R_i = 1 \quad \text{if } R_i^* = \gamma' Z_i + \varepsilon_i > 0 \quad (2)$$

$$R_i = 0 \quad \text{if } R_i^* = \gamma' Z_i + \varepsilon_i \leq 0 \quad (3)$$

Thus, the distribution of R_i given Z_i can be obtained as:

$$\begin{aligned}
P(R_i = 1|Z_i) &= P(R_i^* > 0|Z_i) \\
&= P(\gamma'Z_i + \varepsilon_i > 0|Z_i) \\
&= P(\varepsilon_i > -\gamma'Z_i|Z_i) \quad (4)
\end{aligned}$$

Denoting θ^1 as the standard normal cumulative distribution function (*cdf*), equation (4) yields:

$$\begin{aligned}
P(R_i = 1|Z_i) &= 1 - \theta(-\gamma'Z_i) \\
P(R_i = 1|Z_i) &= \theta(\gamma'Z_i) \quad (5)
\end{aligned}$$

4.2. Demand Models

To be able to assess the demand effects of perceived tenure (in)security, two approaches were used to distinguish the effective demand from conditional demand for DUAT. In a response to parcel specific question whether or not households are willing-to-pay (apply) for DUAT, the survey data records four response: (i) yes, willing to apply for DUAT; (ii) Yes, willing to apply but only if cheaper; (iii) Yes, willing to apply for DUAT but once they are more aware of the procedures of application; (iv) No willingness to apply for any DUAT. Using these responses, three alternative parcel-level dichotomous outcome variables have been utilized to identify determinants of demand for formalization of individual land rights (DUAT). These are:

- 1) **Conditional demand – money (HDD_{hp}^{CM}):** Using a dummy equals to one if the respondent has indicated willingness-to-apply for DUAT at lower price and zero otherwise;
- 2) **Conditional demand – awareness (HDD_{hp}^{CA}):** Using a dummy equals to one if the respondent has indicated willingness-to-apply for DUAT only if they are made to be aware of the procedure and zero otherwise;
- 3) **Unconditional demand (HDD_{hp}^{UC}):** Using a dummy equals to one if the respondent has indicated willingness-to-apply for DUAT regardless of the price or level of awareness and zero otherwise.

¹ $\theta(R_i^*) = \theta(\gamma'Z_i) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\gamma'Z_i} e^{-k^2} dk$, where k is the standard normal variable i.e., $k \sim N(0, \delta^2)$

Capturing the demand for DUAT on parcel ‘p’ by household ‘h’, the general reduced form specification of the estimated probability (demand) model is presented below. The signs above the coefficients of the regression equation indicate the relationship between the covariates in question and the outcome variable.

$$\begin{aligned} \text{HDD}_{hp} = & \beta_0 + B_1^{(+)}AD + B_2^{(+)}PD_pr + B_3^{(-)}PD_pub + B_4^{(+/-)}OWNER_f \\ & + B_5^{(+/-)}OWNER_joint + B_6^{(-)}YEAR + B_7^{(+)}A + B_8^{(-)}D + B_9^{(+/-)}PARCEL \\ & + B_{10}^{(+/-)}HH + B_{11}^{(+/-)}VILLAGE + \varepsilon_{hp} \end{aligned}$$

Where HDD_{hp} : could be captured as demand for DUAT for either of the three demand model specifications above (namely, $\text{HDD}_{hp}^{\text{CM}}$, or $\text{HDD}_{hp}^{\text{CA}}$ or $\text{HDD}_{hp}^{\text{UC}}$);

AD: Experience of land related dispute in the past;

PD_pr: A proxy for perceived risk of tenure insecurity of private nature, such as border dispute, ownership dispute, inheritance dispute, contract dispute, etc.;

PD_pub: A proxy for perceived risk of tenure insecurity of collective nature, such as expropriation by the government or concession of land by a private investor/enterprise;

OWNER_f: Parcel is owned by female member of the household;

OWNER_joint: Parcel is owned jointly by the head and spouse;

YEAR: Number of years since parcel acquisition;

A: Area size of the parcel;

D: Parcel has clear boundary marks;

PARCEL: Other parcel specific variables, such as mode of land acquisition, whether or not irrigated, distance from the residence of the household, etc.;

HH: Other household specific variables, such as location of the household, age and gender of the head of household, etc.; and

VILLAGE: Village level variables, such as land scarcity, population density, market access, etc.

As thoroughly discussed in our conceptual framework and review of empirical evidences under Section 2, two variable of interest in understanding the effects of tenure insecurity on demand for formalization of land rights are PD_pr and PD_pub with expected signs of positive and negative, respectively. To show gender differential effects tenure insecurity might have on demand for DUAT, similar analysis was also conducted by disaggregating the data in to two depending on the gender of the head of household. Results of the probit estimates from the general and gender-disaggregated demand analysis are presented in Table 5.3 and Table 5.4, respectively, under Section 5.

5. Econometric Results

5.1. Correlates of Perceived Tenure Insecurity of Households

Before we investigate the relationship between the various sources of tenure security and demand for formalization of land rights (willingness-to-pay for DUAT), we first investigate drivers of perceived risk of tenure insecurity. As discussed in Section 4, perceived tenure insecurity is measured by household's fear of future potential land disputes of either: (i) private nature (presented as Model 2 in Table 5.1 and Table 5.2 next) – i.e., idiosyncratic or specific tenure risk, such as border, ownership or inheritance disputes; or (ii) public nature (presented as Model 3 in Table 5.1 and Table 5.2) – i.e., systematic or collective tenure risk, such as expropriation by government or concession of land by a private sector. Alternatively, experience of land related disputes in the past was also used as a proxy for tenure insecurity of households (estimates of such tenure insecurity measure are presented under Model 1 in Table 5.1 and Table 5.2). Table 5.1 presents estimates of tenure insecurity at general household level while Table 5.2 is dedicated for gender-disaggregated analysis of sources of perceived tenure insecurity. In addressing our major research question of explaining the drivers of demand for DUAT, probit estimates at general/household level are presented under Section 5.2 in Table 5.3 while Table 5.4 presents gender-disaggregated analysis of the drivers of demand for DUAT. In both tables, Models 1, 2 and 3 represents probit estimates for unconditional(HDD_{hp}^{UC}), conditional – money(HDD_{hp}^{CM}), and conditional – awareness 1 (HDD_{hp}^{CA}) demand for DUAT, respectively.

Table 5.1 Probability estimates of determinants of perceived tenure insecurity – Pooled sample^z

Variables	Model-1 ⁺	Model-2 ⁺⁺	Model-3 ⁺⁺⁺
	b/(se)	b/(se)	b/(se)
Plot is purchased	0.619**** (0.16)	0.295** (0.13)	0.072 (0.31)
Plot acquired via occupation	0.243** (0.11)	-0.156 (0.10)	0.368**** (0.14)
Farm size (hectare)	0.095*** (0.03)	-0.01 (0.03)	0.057* (0.03)
Plot is irrigated	-0.134 (0.16)	0.269* (0.14)	0.192 (0.19)
Parcel has proof of ownership	0.121 (0.28)	0.558** (0.23)	0.499 (0.41)
Plot is owned jointly	-0.352 (0.32)	1.532**** (0.29)	0.186 (0.25)
Peri-urban location	0.021 (0.12)	0.327**** (0.10)	0.377**** (0.14)
Household is polygamous	0.016 (0.20)	0.281* (0.16)	-0.216 (0.19)
Household is a new settler	-0.279** (0.12)	0.17 (0.11)	0.128 (0.18)
Uncultivated area per capita (district level)	-0.014 (0.01)	-0.039** (0.02)	0.017* (0.01)
Constant	-1.653**** (0.47)	-2.080**** (0.48)	-2.681**** (0.57)
R_squared	0.273	0.369	0.351
Number of Observations	8275	8295	8234

Source: Author's computation from TIA 2008 survey

Note: * significant at 10%; ** significant at 5%; *** significant at 1%; and **** significant at 0.1%; Robust standard errors (St. Err) are in parentheses.

⁺ **Model specification** where dependent variable is a dichotomous variable equals to 1 if household has *past experiences* of land related dispute and zero if otherwise.

⁺⁺ **Model specification** where dependent variable is a dichotomous variable "*Idiosyncratic tenure risk*" equals to 1 if household fears land related dispute associated with either ownership, inheritance, border or disagreement with neighbors and zero if otherwise.

⁺⁺⁺ **Model specification** where dependent variable is a dichotomous variable "*systematic/collective tenure risk*" equals to 1 if household fears loss of land due to either expropriation by the government or concession by private investor/enterprise.

On the basis of results reported under Model 2 in Table 5.1 below, the probability of perceived tenure insecurity (of private nature) is positively correlated with parcels/properties under joint ownership as compared to parcels owned by male members of the household. Similar to the findings from the descriptive summary, our empirical results also show that the probability of a household's perceived tenure insecurity of private nature (herewith captured by fear of future loss

of land) is higher on parcels acquired via market means (purchased parcels) while the probability of perceived tenure insecurity of public nature is highly correlated with parcels acquired via individual occupation. Perhaps showing the positive impact that plot's economic value plays in dictating the households' sense of tenure insecurity, results show that the probability perceived tenure insecurity (private nature) is higher when the economic value of the plot is higher – i.e., when the parcel is irrigated or is located in peri-urban areas .

Furthermore, contrasting evidence on the impacts of village level land abundance on the two types of tenure insecurity proxies (namely, private and public tenure risks) is of particular importance to the core objective of this study. As empirical evidence from Table 5.1 shows, district level land abundance (herewith captured by per capita uncultivated land in a district) is negatively correlated with (reduces) private (idiosyncratic) tenure risk (see under Model-2) while it positively affects (increases) tenure insecurity of public nature (such as, tenure risks associated with land expropriation by the government or concession by the private sector. This finding is in line with the literature that tension within a community or potential dispute among farmers within a community (i.e., idiosyncratic tenure risk according to our definition) is expected to be lower in land abundant areas. On the other hand, fear of loss of land or tenure risk associated with land acquisition by a private sector or enterprise (i.e., systematic or collective tenure risk according to our definition) is likely to be higher in land abundant areas as these are areas normally targeted for large-scale land takings or investment by the private sector.

In an attempt to investigate gender-disaggregated analysis on the drivers of the two types of household perceived tenure insecurity, results in Table 5.2 below reports the prevalence of systematic difference when parcels controlled by a male-headed household were compared with parcels controlled by female-headed households. As reported under Model-2, results show that female household heads feel less private or idiosyncratic tenure risks when parcel is owned jointly with male member of the household while the opposite is true for male heads of households. In the case of the latter, when compared to sole-owned parcels (parcels owned by the male), male heads of households feel more private/idiosyncratic tenure risk when parcel is jointly owned with female counter part in the household.

Table 5.2 Probability estimates of determinants of perceived tenure insecurity – Gender-disaggregated[¥]

Variables	Female-headed Household			Male-headed Household		
	Model-1 ⁺ b/(se)	Model-2 ⁺⁺ b/(se)	Model-3 ⁺⁺⁺ b/(se)	Model-1 ⁺ b/(se)	Model-2 ⁺⁺ b/(se)	Model-3 ⁺⁺⁺ b/(se)
Plot acquired from formal authorities	0.369 (0.53)	0.581 (0.40)	0.013 (0.01)	0.630*** (0.21)	-0.503** (0.22)	0.594** (0.24)
Plot acquired from traditional authorities	0.549** (0.28)	-0.518* (0.30)	0.557* (0.32)	0.255* (0.15)	-0.159 (0.14)	0.083 (0.19)
Plot is irrigated	-0.056 (0.17)	0.484 (0.36)	-0.862* (0.46)	-0.057 (0.16)	0.193 (0.15)	0.335 (0.21)
Parcel has proof of ownership	1.398** (0.63)	1.476** (0.63)	0.007 (0.37)	-0.121 (0.37)	0.476* (0.28)	0.693** (0.35)
Plot is owned jointly	-0.216 (0.34)	-1.301**** (0.27)	0.182 (0.25)	0.073 (0.13)	2.045**** (0.40)	0.066 (0.80)
Peri-urban location	-0.09 (0.26)	-0.145 (0.25)	0.098 (0.27)	0.025 (0.14)	0.386**** (0.10)	0.539*** (0.15)
Household is a new settler	0.011 (0.35)	-0.317 (0.38)	1.428*** (0.38)	-0.325** (0.13)	0.274** (0.11)	0.007 (0.18)
Uncultivated area per capita	0.016 (0.02)	-0.124** (0.05)	0.001 (0.02)	-0.020* (0.01)	-0.028* (0.02)	0.025** (0.01)
Constant	-2.203** (1.03)	-0.592 (1.05)	-5.891*** (1.57)	-1.767** (0.56)	-2.517*** (0.56)	-1.698*** (0.62)
R_square	0.497	0.419	0.538	0.213	0.347	0.426
Number of Obs.	1377	1434	1397	6805	6770	6771

Source: Author's computation from TIA 2008 survey

Note: * significant at 10%; ** significant at 5%; *** significant at 1%; and **** significant at 0.1%; Robust standard errors (St. Err) are in parentheses.

⁺ **Model specification** where dependent variable is a dichotomous variable equals to 1if household has *past experiences* of land related dispute and zero if otherwise.

⁺⁺ **Model specification** where dependent variable is a dichotomous variable "*Idiosyncratic tenure risk*" equals to 1if household fears land related dispute associated with either ownership, inheritance, border or disagreement with neighbors and zero if otherwise.

⁺⁺⁺ **Model specification** where dependent variable is a dichotomous variable "*systematic/collective tenure risk*" equals to 1if household fears loss of land due to either expropriation by the government or concession by private investor/enterprise.

[¥] Full regression results are provided under Appendix 2

In line with the general household level results from Table 5.1, results from the analysis on subset of the parcels controlled by male heads of households show that the probability perceived tenure insecurity (private nature) is higher when the economic value of the plot is higher – i.e., when the parcel is located in peri-urban areas. Moreover, as shown in Table 5.2, the positive and negative signs on the coefficient of the variable “parcel acquired from traditional authorities” under

Model-2 and Model-3, respectively, shows that female-headed households that acquired land from the customary/traditional feel more protected from any source of private tenure risks while the opposite is true as far as tenure risks associated with expropriation or land concession by the private sector is concerned. Stated otherwise, for female-headed households, the probability of collective tenure risk is higher when parcel is acquired from traditional/customary sources while this means of land acquisition protects such group (female-headed households) from tenure risk of private nature (such as rights of ownership or control over the land).

This empirical finding is in line with the growing consensus on perhaps the customary tenure system could be well-equipped to protect women's land rights while the same can't be said when the customary land is growingly exposed to (under threat by) foreign interest in land as women (in the household or community) could be the residual claimants any compensation in the event of land loss.

5.2. Drivers of Demand for Protection of Individual Land Rights (Willingness-To-Pay for DUAT)

Tables 5.3 and 5.4 below present results of the probit regression models to investigate the determinants of willingness-to-pay for formalization of land rights (DUAT) at general/household and gender-disaggregated level, respectively.

Consistent with our theory and conceptual framework discussed under Section 2.3, empirical evidence from Table 5.3 (given below) points towards a significant impact the two sources of perceived tenure insecurity (namely, private versus public tenure risks) play in dictating household demand for protection of individual land rights (i.e., willingness-to-pay for DUAT). While the positive coefficient on "private tenure risks" variable indicate that demand for DUAT (both conditional and unconditional demand) is higher when households expect private disputes (such as ownership, inheritance or boundary disputes) as major source of tenure risks, the negative coefficient on "collective tenure risk" indicates the willingness-to-pay for DUAT is lower when sources of potential land-related dispute is characterized by either expropriation risks or fear of loss of land due to land concessions from a private sector or enterprise.

Table 5.3 Probability of determinants of demand for land rights formalization – pooled sample[¥]

Variables	Model-1⁺ b/(se)	Model-2⁺⁺ b/(se)	Model-3⁺⁺⁺ b/(se)
Idiosyncratic tenure risk	0.853**** (0.10)	-0.104 (0.14)	0.399**** (0.09)
Collective tenure risk	-0.895**** (0.15)	0.247 (0.20)	-0.551**** (0.14)
Farm size (hectare)	0.060*** (0.02)	-0.144*** (0.05)	0.043** (0.02)
Parcel is fallowed	0.163** (0.07)	0.257*** (0.10)	-0.114* (0.06)
Parcel has clear borders	-2.352**** (0.29)	0.439* (0.24)	-1.239**** (0.19)
Plot is owned Female	0.220**** (0.06)	0.198*** (0.07)	-0.004 (0.04)
Peri-urban location	0.349**** (0.08)	0.225** (0.09)	-0.344**** (0.07)
Household is aware of land laws	0.405**** (0.06)	0.132* (0.08)	-0.387**** (0.05)
Population density (district level)	0.041** (0.02)	0.050** (0.02)	-0.043**** (0.01)
Uncultivated area per capita (district level)	-0.024**** (0.01)	-0.008 (0.01)	0.007 (0.01)
Constant	-1.439**** (0.34)	-1.762**** (0.38)	1.434**** (0.28)
R_squared	0.285	0.148	0.277
Number of Observations	8295	8295	8318

Source: Author's computation from TIA 2008 survey

Note: * significant at 10%; ** significant at 5%; *** significant at 1%; and **** significant at 0.1%; Robust standard errors (St. Err) are in parentheses.

⁺ **Model specification** where dependent variable is a dichotomous demand variable "unconditional demand for DUAT- HDD_{hp}^{UC} " is equal to one if the household is willing to pay for DUAT and zero if otherwise.

⁺⁺ **Model specification** where dependent variable is a dichotomous demand variable "conditional demand – HDD_{hp}^{CM} " is equal to one if household is willing to pay for DUAT only if cheaper and zero if otherwise.

⁺⁺⁺ **Model specification** where dependent variable is a dichotomous demand variable "conditional demand – HDD_{hp}^{CA} " equal to one if household willing to pay for DUAT only if it is aware of it and zero otherwise.

[¥] Full regression results are provided under Appendix 3

As shown in Table 5.4 below, these results remain robust for the gender-disaggregated analysis. Strengthening such linkages on how the sources of perceived tenure insecurity (private versus collective tenure risks) dictate the demand for formalization of individual land rights (the

DUAT), further empirical evidence from Table 5.3 shows that the demand (both conditional and unconditional) is higher for parcels located in densely populated areas while such willingness-to-pay for protection of individual land rights is minimal for parcels located in areas with relative land abundance.

Table 5.4 Probability estimates of determinants of demand for land rights formalization – Gender-disaggregated [¥]

Variables	Female-headed Household			Male-headed Household		
	Model-1 ⁺ b/(se)	Model-2 ⁺⁺ b/(se)	Model-3 ⁺⁺⁺ b/(se)	Model-1 ⁺ b/(se)	Model-2 ⁺⁺ b/(se)	Model-3 ⁺⁺⁺ b/(se)
Idiosyncratic tenure risk	1.009**** (0.26)	0.133 (0.33)	-0.12 (0.22)	0.890**** (0.11)	-0.086 (0.15)	0.474**** (0.10)
Collective tenure risk	-0.740** (0.31)	0.229 (0.32)	-0.648 (0.43)	-0.934**** (0.17)	0.297 (0.25)	-0.602**** (0.15)
Parcel is fallowed	0.394** (0.17)	0.288 (0.26)	-0.182 (0.15)	0.106 (0.08)	0.240** (0.10)	-0.074 (0.07)
Plot is owned Female	0.062 (0.23)	0.760*** (0.26)	0.093 (0.17)	0.220**** (0.07)	-0.126 (0.08)	0.026 (0.05)
Peri-urban location	0.887**** (0.19)	0.464** (0.22)	-0.617**** (0.16)	0.257*** (0.09)	0.193* (0.10)	-0.279*** (0.07)
Farm size (hectare)	0.143 (0.38)	0.393 (0.29)	-0.261 (0.19)	0.402**** (0.10)	0.014 (0.09)	-0.299*** (0.07)
Household knows land laws	0.372** (0.18)	0.314 (0.23)	-0.595**** (0.14)	0.405**** (0.06)	0.116 (0.08)	-0.358*** (0.06)
Household is polygamous	0.245* (0.13)	-0.453** (0.18)	-0.057 (0.11)	-0.337** (0.16)	0.048 (0.16)	-0.375*** (0.13)
Population density (district level)	0.021 (0.04)	0.029 (0.07)	0.135**** (0.03)	0.044** (0.02)	0.058**** (0.02)	0.029** (0.01)
Uncultivated area per capita (district level)	-0.002 (0.01)	-0.028 (0.02)	-0.020** (0.01)	-0.030*** (0.01)	-0.016 (0.01)	-0.006 (0.01)
Constant	-0.724 (0.81)	-1.239* (0.75)	1.092 (0.69)	-1.283*** (0.38)	-1.922*** (0.44)	1.685*** (0.33)
R_squared	0.339	0.408	0.264	0.295	0.231	0.197
Number of Observations	1456	1380	1487	6817	6805	6831

Source: Author's computation from TIA 2008 survey

Note: * significant at 10%; ** significant at 5%; *** significant at 1%; and **** significant at 0.1%; Robust standard errors (St. Err) are in parentheses.

⁺ **Model specification** where dependent variable is a dichotomous demand variable "unconditional demand for DUAT- HDD_{hp}^{UC} " is equal to one if the household is willing to pay for DUAT and zero if otherwise.

⁺⁺ **Model specification** where dependent variable is a dichotomous demand variable "conditional demand – money - HDD_{hp}^{CM} " is equal to one if the household is willing to pay for DUAT only if it is cheaper and zero if otherwise.

⁺⁺⁺ **Model specification** where dependent variable is a dichotomous demand variable "conditional demand –

The empirical finding from Table 5.4 implies, with particular relevance to the motivation of this paper, in areas where there is relative land abundance or lower population density, thereby very little demand for protection of individual land rights, perhaps recognition or protection of group land rights (such as the case of the Community Land Delimitation in Mozambique) could be sufficient and cost-effective in addressing the potential collective/systematic tenure risks – especially since earlier results from the analysis of tenure insecurity show that such features (low population density and relative land abundance) are highly associated with the prevalence of collective/systematic tenure risks.

Other results from Table 5.3 show that household's willingness-to-pay for formalization of individual land rights (the DUAT) is higher for parcels that have relatively higher economic value (parcels located in peri-urban areas) as well as those parcels that are owned by households with relative land abundance (i.e., households with higher farm size per consumer unit). On the other hand, the probability of willingness-to-pay for DUAT is lower on parcels households identified as having clear boundary markings (such as fences, walls or other natural boundaries). Similar to the effect of female ownership of land on fear of loss of land, the willingness-to-pay for DUAT (both in terms of the conditional and unconditional demands) is higher if the parcel is owned by female member of the household when compared to demand for DUAT of parcels owned by male member of the household.

Furthermore, similar to the results from general household level demand analysis presented in Table 5.3, the positive and statistically significant coefficient on household's knowledge of the land law (regardless of the gender of the head of household) suggests that better knowledge of land related legal provisions increase the likelihood of willingness-to-pay for DUAT. Such empirical finding implies that, in addition to introducing low-cost and less complex land policy and land administration reforms, interventions in creating public awareness of such reforms will have significant effects on sense of tenure security.

Comparing the gender-differentiated effects of being a member of a polygamous family on the demand for DUAT, results from Table 5.4 also show that female-headed household in a polygamous households have higher demand for DUAT (individual right protection) while the opposite is true for a male-headed polygamous households – i.e., male heads in polygamous

households are less likely to pay for DUAT when compared to female heads in polygamous households.

6. Conclusion

Although issues of land rights and tenure security are high on the national policy agenda in Africa, in general and Mozambique, in particular, comprehensive studies on how such new land reforms of protecting individual land rights can be designed to have maximized impact and reachability are scarce. Taking advantage of a detailed plot-specific household survey from Mozambique (TIA 2008 household survey), this study sets out to analyze the determinants of various forms of household perceived tenure insecurity (namely, private versus collective tenure risks) and, thereby, investigate how each type of perceived tenure risk influence the demand for formalization of individual land rights (DUAT). Results show that the type of perceived tenure insecurity (whether private or collective tenure risks) households encounter dictates their demand and willingness-to-pay for formalization of their individual land rights (DUAT).

The study confirmed that land registration is an uncommon practice in Mozambique with less than 2% of the sampled households possess DUAT. Asked about their willingness-to-pay for a DUAT, the study revealed that the majority of households (regardless of the gender of the head or the family structure of the household) have shown significant demand for documentation to safeguard their rights over the land. However, a more demand-driven approach to the ongoing land registration (DUAT) program seems to be more appropriate way forward to accommodate the household and intra-household variations in the sources of tenure insecurity and, thereby, demand and willingness-to-pay for the DUAT that our results show. The fact that households have higher willingness-to-pay for legal documentation of their rights (DUAT) on some types of land parcels (such as parcels with higher perceived tenure insecurity of private nature) than others implies that the ongoing individual land rights formalization (DUAT) program should avoid a blanket solution approach and be tailored in a sufficiently flexible manner to better recognize existing customary land rights and target parcels where perceived tenure insecurity is relatively higher, such as parcels from more densely populated and less land abundant areas.

Therefore, it may not be ill-advised direction for the government of Mozambique to adopt a more pragmatic approach by intensifying/prioritizing the DUAT approach in areas where tenure insecurity is associated with private or idiosyncratic tenure risks (such as ownership or inheritance

related disputes) since our empirical results show that demand for such policy measure is found to be highly associated with households prone to private tenure risks while recognition/protection of group land rights (in the form of Community Land Delimitation) could be sufficient and more cost-effective in addressing tenure insecurity associated with collective/systematic tenure risks (such as large-scale land acquisitions by the private sector/enterprise or land expropriation by the government).

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