



SCHOOL OF
ECONOMICS AND
MANAGEMENT

Master's Programme in Economic Development and Growth (MEDEG)

Do Formal Institutions Drive Land Security?

Evidence from a Micro-Level Analysis in Ghana

by

Sara Alhola

sa7500al-s@student.lu.se

The need for land security continues to be urgent for economic development in Africa. Central governments are implementing large-scale land reforms, yet the effects of land title formalisation are still not thoroughly understood. The growing evidence by macro-level empirical studies of the importance of property rights has not been sufficient for understanding the factors that determine property right security within countries. Facing the variety of consequences of formalisation and the increasing attention on local institutions, this paper contributes by disentangling the question of formalisation through providing micro-level evidence of the linkages between land title formality and land security. By utilising household data from Ghana, I find that a formal land title improves the owner's rights to transfer land. However, this relationship is heavily dependent on the regional characteristics. Although formalisation holds potential in gaining wider land security, the results imply that land reforms must be designed conditional to efficiencies of the local systems.

Key words: Property Rights, Land Reform, Formalisation, Institutions, Ghana

Programme code: EKHS42
Master's Thesis (15 ECTS)
June 2021
Supervisor: Abel Gwaindepi
Examiner: Erik Green
Word Count: 15 167

Table of Contents

1	Introduction	1
2	Literature review	4
2.1	Theory	4
2.1.1	Property Rights and Development	4
2.1.2	Land Reform	6
2.2	Land Rights in Ghana	9
2.2.1	Property Rights in International Comparison	9
2.2.2	History of Land Reforms in Ghana	10
2.2.3	The Question of Formalisation	13
3	Data and Methodology	15
3.1	Data	15
3.1.1	Source	15
3.1.2	Sample	16
3.1.3	Variables	16
3.2	Empirical Method	17
4	Empirical analysis	19
4.1	Descriptive statistics	19
4.2	Results	21
4.2.1	Drivers of Land Security	21
4.2.2	Drivers of Formality	25
4.3	Robustness	28
4.4	Discussion	29
5	Conclusion	32
	References	33
	Appendix A	38
	Appendix B	42

List of Tables

Table 1. Statistics of survey responses to land security, initial contract formality and ownership title.....	20
Table 2. Share of land plots with security, formal initial contract and registered title.....	20
Table 3. Pairwise correlation of Land Security with Contract Formality and Land Title.....	21
Table 4. Probit Estimates for Land Security.....	22
Table 5. Probit Estimates for Land Security with sample restriction to MiDA Zones.....	23
Table 6. Marginal Effects based on Probit Estimates in Table 4 and 5.....	24
Table 7. Probit Estimates for Contract Formality and Land Title.....	25
Table 8. Probit Estimates for Formal Land Title in Communities.....	27
Table A1. List of Districts by Region and MiDA Zone.....	38
Table A2. List of variables.....	40
Table B1. Pairwise correlations of the household dataset variables.....	42
Table B2. Marginal effects based on Probit Estimates on gender restricted samples.....	43
Table B3. Marginal effects based on Probit Estimates in Table 7.....	43
Table B4. Marginal effects based on Probit Estimates in Table 8.....	44
Table B5. Logit Estimates of land security.....	45
Table B6. Marginal Effects based on Logit Estimates in Table B5.....	45
Table B7. Robustness: Probit Estimates with individual as a unit of observation.....	46

List of Figures

Figure 1. Land security with respect to initial contract formality (upper panels) and land title (lower panels).....	20
Figure A1. Map of districts included in the GLSS5+ dataset located in the Intervention Zones.	39
Figure B1. Marginal effects based on Probit Estimates in Table 6.....	42
Figure B2. Predicted probabilities of land title based on Probit Estimates in Table 7.....	43

Abbreviations

AAP	Average Adjusted Prediction
AME	Average Marginal Effect
GDP	Gross Domestic Product
GLSS	Ghana Living Standards Survey
GSS	Ghana Statistical Service
IPRI	International Property Rights Index
ISSER	Institute of Statistical, Social and Economic Research of University of Ghana
LAP	Land Administration Project
MEM	Marginal Effects at Means
MiDA	Millennium Development Authority
NLP	National Land Policy
OLS	Ordinary Least Squares estimator
PNDCL 152	Provisional National Defence Council Law 152 (Land Title Registration Law)
SSA	Sub Saharan Africa
V-Dem	Varieties of Democracy

1 Introduction

The impact of property rights on economic performance has been well established (Knack & Keefer, 1995; Hall & Jones, 1999; Acemoglu, Johnson & Robinson, 2001). Consequently, inadequate property right protection has been identified as one bottleneck for economic growth in Sub-Saharan Africa (SSA). International cross-country correlations reveal a positive relationship between estimated measures of property rights institutions and income per capita (IPRI, 2020a). A theoretical explanation originates from institutional economics, where property rights are defined as one of the key economic institutions (North, 1991). Insecurity over the ownership of property creates inefficiencies that hinder economic activity and therefore the ability of the country to reach higher levels of development. Weak property rights also trigger conflicts over assets and amplify the vulnerability of individual asset holders with low income levels.

One of the main focuses in the property rights research on Africa has been land tenure systems. As the majority of the countries in SSA continues to rely on agriculture as an employment provider and a contributor to GDP (World Bank, 2021a), the role of land is obvious. In addition to being important for the economy as a whole, land also matters as a crucial resource for rural development and poverty reduction. Land reform theories suggest that improving the security of land ownership fosters development by promoting agricultural productivity and investments (Zarin & Bujang, 1994; Besley, 1995; Besley & Ghatak, 2010). In addition, it is argued that a secure title over one's land is essential for improving the livelihoods of poor rural households. The relationship between the risk of poverty and having agriculture as a main source of income makes land an important aspect from a socioeconomic perspective too. If land is a relatively more important asset for people with lower income, weak land security can reinforce inequality. This effect could be amplified if the access to secure land titles also depends on the level of income. Consequently, the role of property rights institutions on land is central for developing countries.

The history of land tenure systems in Africa dates long back to precolonial times. These systems have further been affected by colonial and post-independence policies, as the countries have implemented various land reforms in order to improve land security. Yet, the success of such reforms has often been inadequate (Toulmin, 2008). A central question brought in the discussion is how to implement institutional change in an environment where traditional institutions have existed for a long time. Moreover, it is evident that different countries across the continent have formed their property rights systems very differently, let alone in comparison to countries in other regions. This implies that the success of a land reform is likely to be location specific and determined by the historical paths. This should, however, not come as a surprise as research on institutions provides prominent evidence of path dependency (Acemoglu, Johnson & Robinson, 2005; La Porta, Lopez-de-Silanes & Shleifer, 2008). Another central aspect is that it remains unclear whether the type of property rights systems that function well in the early developed countries, provide the same purpose in countries with very different

traditional and social institutions. Thus, a property rights reform might not only be difficult and time consuming but also unsuitable for African countries with different histories if it is based on a top-down reform without grounds in the local systems.

One rather common aspect across countries in SSA is that current land tenure systems still largely rely on traditional institutions and customs (Toulmin, 2008). Within the land reform debate, there has been a continuous discussion on implementing policies that would bring a legal recognition for the land ownership, often referred as land tenure formalisation. In the line of institutional theories, such formal recognition would be essential for fostering investment and economic activity as well as by bringing security over the assets for those with lower income. Sometimes however, such formalisation occurs in expense of the traditional institutions, causing adverse effects on security. What has followed is a continuous discussion of an increased recognition of the traditional property rights when transforming the system. Due to the observed unsuitability of top-down land reforms in most cases in Africa, increasing attention has been put on recognising local institutions within the reform process.

Despite of progress made in macro-level empirical studies on the role of institutions, such cross-country research can be at disadvantage as it lacks the ability to account for differences in local institutions. Furthermore, as both, formal and informal property rights regimes can be very different between countries, simplifying them into comparable measures bears the risk of missing crucial local aspects. The purpose of this thesis is therefore to study land rights on a micro level. By carrying a case study analysis, the aim is to contribute on the understanding of the mechanisms of property rights in developing countries. The interlinkages between the formality of property rights and the security of land ownership form the central questions of this analysis.

Ghana offers a suitable case study to analyse the questions of formalisation, as it has gone through various land reforms since its independence, as an attempt to improve land security and to obviate from bottlenecks of development. Despite the attempts to formalise land ownership, traditional institutions largely dominate the land title systems. An important characteristic in the case of Ghana is the existence of legal pluralism, as both customary and statutory land ownerships are recognised by law (Edwin, Glover & Glover, 2020). Customary systems therefore have a strong role in the institutional structures. Moreover, also the traditional land systems differ between locations within the country. The differences between traditional institutions originate from different pre-colonial customs and from the way these institutions have responded to colonial policies and post-independence land reforms. Despite the reforms, the number of land title registrations have remained rather low, although an upward trend has been identified since the latest reforms (Ehwi & Asante, 2016). In a global comparison, property right protection in Ghana is still lacking behind although a gradual trend of an improvement can be identified there as well (Coppedge et al., 2021). The aim of this paper is thus to carry out an exploratory analysis of Ghanaian land security in order to provide insights of possible local and individual determinants or impediments for the development of secure property rights. On a larger scale, this thesis analyses the relevance and applicability of institutional theories.

By using cross-sectional household and community data from the Ghana Living Standards Survey 5+ collected in 2008, a two-fold empirical analysis will be carried out. Firstly, the main part of the analysis focuses on answering the question on whether formality of the property

rights system improves the security of the land ownership. Starting from a descriptive analysis and then proceeding to a regression analysis, the empirical part of this paper attempts to disentangle the relationship between land title formality and land security. Additionally, it discloses other determinants that might impact security and further the formality-security relationship. The data utilised in this section is based on the household part of the aforementioned survey. The second part of the empirical analysis detects possible drivers of formal property rights, utilising both household and community level data. In addition to detecting how the location of the land and the individual specific determinants affect formality, the community dataset allows to study how institutional aspects in a community are related to land title formality.

The main result from the analysis is that in Ghana, formality increases the probability of secure land and those with a formal title are more likely to be able to sell their land or use it as collateral. This is largely in line with the institutional theory. However, the regional differences in both, land security and access to formal titles, are persistent in Ghana. In the Northern region, an impact of formal title on land rights cannot be identified. As the land security in this regions is still relatively strong, this suggests that informal customs have been successful in providing a secure land ownership while formal titling is less common. The results also indicate that a gender gap of land rights continues to exist and that there is some potential for narrowing this gap through formalisation. Lastly, analysis based on community data provides suggestive evidence of the relationship between a prevalence of formal land titles and the perceptions of state versus traditional institutions' abilities to solve a land-related conflict. This implies that perceptions in a community are aspects to consider in the process of land reforms.

This paper is structured as follows. The second chapter provides an overview of the central literature on property rights and land reforms. Moreover, Ghanaian history of land reforms is summarised. The third chapter presents the data and methods on which the empirical analysis is based. The fourth chapter presents the results, which is followed by a discussion. The final chapter concludes.

2 Literature review

2.1 Theory

2.1.1 Property Rights and Development

In order to understand the divergent development paths of the past and the large income differences seen today, development economists have increasingly attempted to unpuzzle the determinants of economic growth. The connection of property rights to this discussion originates from the literature branch of institutional economics. Often in these theories, the interest is not on the property rights per se but on the institutional quality they represent and which they channel further to economic outcomes. Institutions can be defined as a set of rules, norms and constraints that structure economic activity by determining the level of uncertainty of exchange and affecting the incentives of economic activity (North, 1990; 1991). Through theoretical frameworks, institutional economists have explained the relationship between economic and political institutions and long-run economic growth. Furthermore, a number of empirical studies has provided supporting evidence for these theories by empirically detecting a link between institutions and current development (Acemoglu, Johnson & Robinson 2001, 2005; Kerekes & Williamson 2008; Scully 1988; Leblang 1996). A typical caveat in the literature of institutions however is that the definition of institutions often remains vague and rather abstract. One common way of tackling this is to divide the concept into smaller units, such as informal and formal institutions. While there are various social and cultural norms under the set of informal institutions, one central aspect used as a measure of formal institutions is property rights (North, 1991). A property right in its simplicity refers to a right for an individual to use a resource, while the system of property rights can be understood as an enforced code of conduct that assigns and protects the owner's authority over the given resource (Alchian, 1965).

One way in which the relationship between property rights and economic growth has been explained in the institutional economics is by transaction costs. According to this theory, the security of asset ownership reduces uncertainty of impersonal transactions, and thus removes inefficient constraints of economic activity (North, 1991; Williamson, 1975; Williamson 1981). In addition, secure property rights provide incentives for economic activity and innovation. Based more on the agency theory side of property rights, this is because economic agents can be more certain that the possible profits accrue to and are to be owned by themselves instead of arbitrarily being taken by someone else (Williamson, 1990). Similar theoretical links between property rights and investment incentives have been demonstrated in the case of land ownership too (Besley, 1995). Moreover, if we think of a modern capitalistic economy, property rights can also be considered a mechanism that translates tangible assets into capital, which itself can be invested further. Property rights as a well-functioning institution thus not only reduce

transactions costs and create economic incentives by giving asset holders a secure ownership but also enable the release of asset's value into capital by allowing its sale or a use as collateral.

This particular mechanism is also placed in the centre of the work by Hernando de Soto (2000), a prominent scholar in the field of property rights and development, who argues that a large part of inadequate economic development can be explained by the lack of formal property rights. It is important to note that although it was already explained how property rights are often considered a central part of formal institutions, it does not imply that property rights itself are always formally arranged. Instead, they can be and have been in history constructed in both, informal and formal ways. In fact, the legal recognition is only one part of property rights, as they ought to be supported by the prevailing etiquette and social customs within a society in order to be obeyed (Alchian, 1965). This distinction is often made in the property rights literature, where formal property rights are defined as those enforced by the state law, while informal property rights refer to any set of prevailing customs and norms constraining an individual's rights for property. In the literature by de Soto, the word *formal* is essential, as he explains that regardless of the surprisingly large amount of assets owned by the poor¹, the assets cannot be harnessed into capital as the informal property rights systems do not provide sufficient security nor allow the use of the assets as a collateral. Therefore, he calls these assets "dead capital", given that the same assets could be used to generate income in an alternative setting of formal property rights. In essence, de Soto (2000) thus argues that capitalism does not *work* in number of developing countries precisely due to the lack of formal property rights.

Yet, the claims by de Soto have been questioned in the literature. Although the importance of property rights security on economic growth is a rather widely accepted postulation, scholars have contested claims of a direct channel from formal property rights to credit access and further to improvements in the livelihoods of the poor. Besley & Ghatak (2010) for instance argue that specific conditions are required to enable the mechanism of functioning formal property rights, such as competitive capital markets. Furthermore, claims of the direct linkage between formal property rights and prosperity has been criticised by the lack of consideration of the social and historical context, by the assumption of formalisation to security causality and by the mixed empirical evidence of this relationship (Musembi, 2007). For instance, Williamson & Kerekes (2011) show that after including a component for both formal and informal institutions, only the latter remains to have an impact on property rights security. Moreover, the presence of formal *de jure* property rights does not inevitably mean that those are adopted as the standard custom as property rights might continue to be enforced by the *de facto* customs. Alston, Harrid & Mueller (2009) for instance find that despite a supply of *de jure* property rights, *de facto* rights can persist when there is a lack of political will to enforce the formal *de jure* property rights. Overall, it seems that whether the core aim of property rights in terms of development, namely to provide security and allow an efficient use of the assets, is reached, is not a simple sum of whether the organising institution is formal. Because of these controversies, what remains in academia and the field of policy making is a lack of consensus or sometimes even understanding of how property rights institutions should be structured in order to provide sufficient security. This also relates to the wider discussion of institutional

¹ In de Soto (2000), it was estimated that in developing and former communist countries, "85 % of the urban parcels in these nations, and 40-55 % of rural parcels, are held in such a way that they cannot be used to create capital" (p. 34) and that the total amount is at least as large as 9.3 trillion US dollars (p.35).

change and how it can be carried out. In short, although there is a common consensus of the central role that property rights play in economic growth, it is less clear how the property rights theories and empirical findings could be used for current policy implications – also considering the large existing differences in the local institutions over time and space.

2.1.2 Land Reform

Although the ownership of land is only one type of property right, it is an essential one especially when discussing economic growth of the less developed countries (Obeng-Odoom, 2012). For one, land is often the most valuable asset for the people living in rural Africa (Toulmin & Quan, 2000). For those earning their income by agriculture, land is also a central resource of income. The importance is amplified in countries whose GDP is largely dependent on primary production, which often tend to be located at the lower end of the global income distribution (World Bank, 2021a). Historical land ownership systems are often being connected to the development of property rights institutions as a whole: the formal property rights systems in many developed countries are rooted in the historical land ownership institutions (De Soto, 2000). For instance, the common law of real property in England took its first shape in the 12th and 13th century by defining rights to land for tenants and replacing the feudal relationships (Palmer, 1985). In retrospective, these reforms have been argued to having formed the core of the institutional order in England (Palmer, 1985). While in some cases like England, the core of land laws stems from domestic developments, in many countries the first formal land laws were a result of colonialism. Yet, the point here is that historically, land has been the resource for which the demand of property protection by the ordinary people has stemmed from. Although wealth has always existed at the top, it is land as a common resource that has created a demand for a widespread system of ownership protection.

In addition to providing protection of important assets of the most vulnerable, land security is also essential for creating a stable economic environment that enables agricultural improvements (Zarin & Bujang, 1994). Land security can be defined as an unequivocal right to use one's own land without the risk of expropriation, violation or forced eviction (Food and Agricultural Organisation, 2002). It is, however, important to distinguish the right to own and use land from the right to transfer it. Although the former is central for minimising the risks of vulnerable small land holders, with central economic development theories in mind, the latter is crucial because of its impact on functioning land markets and on the ability of an agricultural economy to develop and transform. To illustrate this, it is hard to think that an economy could easily transition from an agricultural economy into one with modern sectors through structural change, if the majority of the land was held by small holders without the right to sell it to larger producers.

Constructing a new or changing the present system of land ownership happens through a land reform, which refers to a set of actions aiming for the redistribution of property rights (Zarin & Bujang, 1994). Historical land reforms have often aimed for a redistribution of property in the light of benefitting specific groups, sometimes the smallholders while other times those in power. This has been no different in Africa, as it is argued that the land laws have, above all, been product of politics rather than strategies towards societal or economic long-run development (McAuslan, 2000). Land reforms have therefore been driven by the interest of

specific groups, although the long-run impacts might have been larger in the society. More recently though, development aspects such as fostering agricultural development and alleviating poverty by improving the security of vulnerable groups have been placed in the core of land reforms (Toulmin, 2008). While the theoretical base of the land tenure-economic growth nexus in many post-independence land reforms in Africa lies in neoclassical economic theories (Zarin & Bujang, 1994), the growing institutional literature of recent decades largely works as the base of the reforms seen today. Consequently, also the complexity of institutions is better acknowledged. Yet, although the question of how to change the existing institutions remains disputable, it is commonly accepted among scholars that a secure land tenure is essential for human development (Kerekes & Williamson, 2010). Accordingly, the core aim of contemporary land reforms is to structure the institution of property rights in a way that the security of land is improved, regardless of the group in hand.

In the discussion of land reform in Africa, it is relevant to question whether there is really a need for one. As explained, from an institutionalist point of view, weak institutions can hinder growth. Therefore, institutional reforms are justified if the present ones fail to fulfil their objectives. What is known of many African countries is that land security remains relatively weak and the battle against poverty, especially in rural areas, continues (Mwabu & Thorbecke, 2004). Moreover, as the land tenure systems in Africa have been in great measure affected by colonial policies, a land reform that addresses any colonially imposed inequalities is inevitably justified and truly needed (Toulmin & Quan, 2000). Important is to remember that the tenderness of land conflicts in Africa is not a result of an isolated evolution of traditional institutions, but rather an outcome of being exposed to multiple customs and enforcements. Based on these aspects and straightforward reasoning, some sort of institutional change in the land ownership system would be required, and a reform is thus justified. Yet, what is really referred to in the academic discussion of land reform is a land title formalisation. This discussion is based upon the observation that institutions that organise land ownership have long existed, but that those systems do not seem to provide enough security or promote economic development. Without doubt, this discussion is also driven by the fact that in countries with strong property rights, the prevailing system is formally enforced by law. At the extreme, the proponents of formalisation speak for replacing the initial institutions with similar to those formal ones that work in developed countries, instead of supporting improvements of the traditional property rights systems in place. Thus, a more relevant question to ask here, is whether Africa needs a land reform that is based on formalising the local tenure systems?

The implemented land reforms across the African continent have largely been attempts to formalise the institutional structures. However, this strategy has been increasingly questioned amongst academia and policy makers. Consequently, researchers have attempted to evaluate the effects of such reforms. A central question has been thereby focussing on the empirical detection of the effects of formalisation on economic development. There is evidence of positive effects on commercial investment (Goldstein et al., 2015; Johnson, McMillan & Woodruff, 2002), productivity and stability of investment (Smith, 2004) as well as on female empowerment (Goldstein et al., 2015). Moreover, Kerekes and Williamson (2008) find supporting evidence for the de Soto hypothesis, as they show that well defined property rights improve capital formation and economic performance. Yet, the evidence remains largely inconclusive, as formalisation does not seem to directly translate into economic growth and the effects are rather complex. Negative aspects have been also found. For instance, Lastarria-

Cornhiel (1997) finds that privatisation can lead to a situation where the rights accrue to those who have the power and resources to claim a formal title, while the more vulnerable might in fact be worse off as they do not have the same opportunities for obtaining a title. It appears that understanding the effects of formalisation on economic development requires closer attention to factors that support or possibly hinder this process.

In response, several scholars have attempted to disentangle the mechanisms of the property right-development nexus as well the question of formalisation by considering the role of local institutions. Incorporating aspects of local institutions in the analysis has been additionally encouraged due to the pressure of increased consideration of long-term evolution of institutions, influenced by the observation that institutions tend to persist through time (Acemoglu, Johnson & Robinson, 2005; La Porta, Lopez-de-Silanes & Shleifer, 2008). The observed path dependency implies that institutional change is time consuming and that the effects of the past institutions can be still identified across a wide range of socio-economic outcomes of today. The view that the customs and characteristics of traditional institutions matter for the strength of current property security have been supported by empirical findings. For instance, by studying the role of *de jure* versus *de facto* property rights in Ghana and Côte d'Ivoire, Bubb (2013) finds that formal rules play a small role in determining land security while *de facto* rules together with overall economic factors are stronger predictors. This indicates that, while traditional institutions can hinder property rights development, in some places they have also succeeded in providing decent security over ownership. Furthermore, Toulmin (2008) argues that the traditional institutions can offer a good foundation for more formal land registration systems, suggesting that the success of land title formalisation can partly be determined by whether or not the traditional institutions are considered along the process. Land reforms can even have negative distributional effects for instance when communal systems are replaced by a system of absolute individual ownership, resulting in losses for the most vulnerable whose rights over land were dependent on those communal arrangements (Musembi, 2007). Furthermore, small land holders can be worse-off if the costs of pursuing a formal title are too high while recognition within the new institutional setting would be required.

Land reforms in countries where land has initially been distributed by the traditional institutions yet later affected by partial formalisation, have generated systems where both types of institutions exist. This has, in some cases, led to legal pluralism, which refers to the co-existence of two systems that are both recognised by the law. This is a common legacy of colonial power across Africa, as the land reforms imposed by Western rulers were often based on the implementation of formal land laws similar to those in the home-countries (Delville, 2000). Thereafter, when other forms of land rights have been legalised, it has created an environment of multiple co-existing land title systems. It is not uncommon in Africa that the traditional land tenure systems have been based on communal ownership, and, as a consequence, the implementation of land reforms based on individual ownership has implied differences in terms of the unit of ownership. Therefore, legal pluralism is not only complex due to differing customs but also in how the ownership is defined. Although the role of traditional institutions is inevitable and must be considered once reforming the institutional system, legal pluralism can also be a source of conflict through increasing the risk of multiple claims over one land. Crook et al. (2007) for instance, find that in Côte d'Ivoire, where there legal pluralism is relatively prevalent, formalisation of property rights has been less effective than in Ghana, where this

formalisation has attempted to legalise traditional systems into state law, aiming for a more unified legal system.

Overall, the evidence on the consequences of land title formalisation in Africa remains mixed. It increasingly appears that land reforms fail to achieve the desired outcome, but what often remains unclear is in which part of the process they fail. Are formal titles still inaccessible to ordinary people? Are there differences between regions, individuals or socio-economic groups concerning access to formal titles? Do the formal institutions collide with informal ones, creating more insecurity? Or is the security over land ownership perhaps not driven by the formality of the institutions, but some other aspects? While researchers have increasingly turned their attention towards local institutions in the search for answers, much remains unanswered.

2.2 Land Rights in Ghana

2.2.1 Property Rights in International Comparison

In an international comparison, the improvement in Ghana's property rights is evident. According to the International Property Right Index (IPRI) (IPRI, 2020b), Ghana ranks 61 out of 129 countries. In comparison to the 30 other African countries for which data is available, Ghana is estimated to have the fifth most secure property rights system. Looking at the IPRI subcomponents separately, the score for property registration is relatively high, indicating good performance and increasing the overall score. The score for property protection is somewhat lower yet around the value of the total score while the score for access to loans is relatively low. Overall, the IPRI estimates suggest that while Ghana succeeds in providing wider access to land titling, inefficiencies exist specially within improving the supporting institutions. Property rights indicators from the Doing Business Database by the World Bank paint a similar cross-country picture: regionally, Ghana is doing relatively well but on a global level, it falls further back on the ranking. A measure of land property rights administration reveals that property rights security and access to land is an aspect where Ghana performs relatively poorly (World Bank, 2021b). Another source that can be used for macro-level comparison in institutional development is the Varieties of Democracy Dataset (V-Dem Dataset) that provides global measures of democracy and political institutions. The specific measure for property rights captures the development of property rights in Ghana over time and shows a clear rising trend since the independence (Coppedge, 2021). However, another remark from this data is that, although the gender gap in property rights has remarkably decreased, it is clearly still present. For instance, the periods in which Ghana experiences drops in overall property security show relatively larger decreases for women than that for men.

It is evident that, overall, Ghana has made progress in strengthening its property and land rights since its independence. In comparison to other countries in Africa, it is doing relatively well. Looking at the global level, however, reveals that there is room for improvement. If Ghana wishes to reach higher sustained levels of economic prosperity, issues in property rights institutions cannot be neglected.

2.2.2 History of Land Reforms in Ghana

As for many countries in SSA, agriculture plays a prominent role in the Ghanaian economy. In the 1960s post-independence Ghana, agriculture accounted for 60 percent of the total employment (Timmer, De Vries & De Vries, 2015). This share sustained over 50 percent all until the 21st century and only in the recent decades has shown a clearer decline. Although the share for value added in GDP is much lower, agriculture has been and continues to be an important provider of income for millions of people (ibid.). Moreover, the majority of people in the rural areas are smallholders and are considered as one of the most vulnerable groups in Ghana (Chamberlin, 2007). Hence, the role of land continues to be central for the Ghanaian development path.

Nowadays, land ownership in Ghana can be classified in a number of ways. While approximately 20 percent of the land is held by the State, the rest is private land owned by individuals, families and communities (Obeng-Odoom, 2012). The ownership of privately held land can further be characterised by a formal state law and different type of traditional institutions, such as communal systems. The way in which land is distributed and the ownership structured originates from colonial policies and from the customs and traditions in place in pre-colonial times. Although the land tenure systems in Ghana have gone through major reforms after the independence, being familiar with the origins of the land systems is essential to understand the consequences of the current reforms. This following section therefore shortly reviews the central land reforms that have shaped the land tenure systems in Ghana.

Pre-Colonial systems

When comparing land ownership systems in Ghana and also more generally in SSA with other parts of the world, it is important to acknowledge the different historical character of land as a resource. Historically, land has been an abundant factor in Africa and hence, the demand for it used to be relatively low. In addition, according to Obeng-Odoom (2016), the reason why land rents were low in Ghana was not solely due to the abundance of land, but also largely because of the prevailing land tenure system. Land was often a joint resource of the village to maintain its own subsistence economy, not a commodity to be exchanged on the markets (Obeng-Odoom, 2016). The purpose of the social institution arranged around land management was to set the rules that determine which land was reserved and for whom. This was done by a set of customary laws. Those laws were, however, not uniform between regions or even necessarily within the communities, as the chiefs sometimes had their own version of the law that did not apply for ordinary people. Central here is that the early institutions for land ownership were formed to define which land belonged to the community and to whom in the village it was assigned to cultivate. As land was abundant, the historical property rights systems were not predominantly formed with selling purposes. Even though scholars have shown that there might have been some exchange of land on the markets, it is argued that this was rarely with profit intentions (Obeng-Odoom, 2016; Kimble 1963: 21-22). The reason of why individual private land ownership systems like in many Western countries did not emerge in Ghana is arguably because there was no similar need to. The tradition of communal land tenure systems originates from maintaining order in a village's subsistence economy, not from transforming land into a tradeable commodity (Obeng-Odoom, 2016).

Colonial systems

The era of colonialization and the imperial rule of Britain came along with attempts to transform land into a commodity that would serve a capitalistic economy. As it mainly was for governing the new colony in general, the system of land rights was also assigned to be managed through chiefs (Ampadu-Ameyaw & Aidoo, 2015). The deed registration in 1883, the Crown Land Ordinance of 1894 and the Lands Bill in 1897 were the first land reforms in Ghana. The fundamental intention behind these reforms was to bring the land, managed by customary practises, under the British control (Ampadu-Ameyaw & Aidoo, 2015). A predominant motive behind the first land reforms was therefore to gain control rather than promote development or improve the livelihoods of the people. By ruling the lands indirectly through the chiefs, and thus also giving the chiefs a local power, the colonial government was to some extent able to cope with the local opposition against the land reforms (Ampadu-Ameyaw & Aidoo, 2015). This did not, however, mean the system of indirect rule functioned without conflict, as some chiefs set up against the colonial rulers too. Moreover, regional differences existed. For instance, in northern Ghana where chieftaincy was not common before colonialism, this governing institution was set up by assigning the position of chief to rich people and people higher up in the hierarchy, making the chieftaincy institution more autocratic and evidently sewing some of the future seeds of conflict (Firmin-Sellers 1996; Amanor 2005, 2010 in Obeng-Odoom, 2016). Despite these shortcomings, the Ordinary Acts implemented by the colonial government lasted all until and to some extent beyond independence (Obeng-Odoom, 2016).

In essence, the colonial rule attempted to formalise and, in a sense, “Westernise”, the land tenure relations (Obeng-Odoom, 2016). What these land reforms and the implementation of indirect rule meant for the traditional system, was that the power of the local village chiefs was reduced as the reforms started to gradually replace the traditional systems with more centralised systems of government (Selase, Jiang & Worlanyo, 2015). One implication of the colonial land reforms was that the access to land for regular people changed and to some extent became more difficult. Oppositely to the custom of traditional institutions, one could not obtain new land by simply clearing it for cultivation. Difficulties also started to arise from the collision of community-based ownership with regards to individual ownership. Nevertheless, as the traditional systems also continued to exist, these reforms started the development of a dualistic legal system, with both customary laws as well as the English law (Selase, Jiang & Worlanyo, 2015). The legacy of this can still be seen today in the legal pluralism on Ghanaian land property rights. Thus, while the communal systems largely stayed in place, the new reforms affected their legitimacy through the creation of an accompanying formal, more capitalistic system.

Land Registry Act (Act 122)

After independence, land reforms in Ghana took another approach, now aiming for regulating the system in a way that the government could withdraw revenues for national and local development (Ampadu-Ameyaw & Aidoo, 2015). The colonial ordinances were repealed and replaced by the new Land Registry Act (Act 122) in 1962 (Obeng-Odoom, 2016). The registration in this system was based on deeds and intended to shift the power over land from chiefs to the State (Ehwi & Asante, 2016; Obeng-Odoom, 2016).

Although the intentions behind these early independence land reforms were perhaps more development-oriented than the colonial ones, it has been argued that the policy designs and implementation were poor and thus, the reforms had little structural effects (Ampadu-Ameyaw & Aidoo, 2015; Obeng-Odoom, 2016). The laws rather enabled the State and the chiefs to continue to expropriate customary lands. To the contrary, laws were implemented in the name of national development while simultaneously eroding poor farmers who could not afford to register their land under the system (Ampadu-Ameyaw & Aidoo, 2015). As the revenues largely continued to accumulate to the chiefs while the State held the ultimate power to manage land, the Act 122 did not significantly change the system from that under the colonial land acts (Obeng-Odoom, 2016). Furthermore, the system has been criticised from its poor design: the descriptions of the lands contained incomplete information and the Act 122 did not provide a systematic examination of the lands to create accurate maps (Ehwi & Asante, 2016). These inefficiencies have contributed to multiple registration of lands and thus to an increased risk of conflicts over land (Ehwi & Asante, 2016). In comparison to a title registration, the deed registration system can therefore have an adverse effect on property security due to the errors stemming from incomplete information in the documents needed (Anyidoho, Clottey & Amanquah, 2008).

Land Title Registration Act (PNDCL 152)

It has been suggested that the land reforms in the 1980s and 1990s under the political power of Jerry Rawlings made the most progress in the land tenure systems by that time (Obeng-Odoom, 2016). These developments were motivated by the increased concerns of the importance of tenure security for poverty reduction and the inability of the past reforms to fulfil this aim. The reforms implemented during the last decades of the 20th century occurred in a period where development reforms in general were based on neoliberal approaches. These decades were characterised by structural adjustment programmes and the views of international organisations of the “needed” neoliberal paths to be taken by the developing countries in order to balance their economies and set them into stable growth paths (Heidhues & Obare, 2011; Ampadu-Ameyaw & Aidoo, 2015).

In 1986, the Land Title Registration Act (PNDCL 152) was passed in Ghana to replace the deed registration system. Although these systems have similarities, the land titling system aimed to address major loopholes in the deed registration (Ehwi & Asante, 2016). In addition to land titles being the final authority ascertaining the validity of land ownership, the system through which a title can be received was constructed in a more detailed manner and included the examination of the land in question and characteristics of the owner before such protection and privilege is awarded (Ehwi & Asante, 2016). The PNDCL 152 has received critique regarding the complexity of the registration process and the inadequate information provided to land holders concerning its stages (Ehwi & Asante, 2016). The improvements in security and ability to adopt merchandise farming can also be undermined by the lack of adequate credit facilities within the region (Ehwi & Asante, 2016). Also, one crucial drawback of the PNDCL 152 in comparison to the deed registration is that it does not have national coverage. Thus, the implementation of the PNDCL 152 implied an existence of dual registration system as the deed system remained in various areas of the country (Ehwi & Asante, 2016).

National Land policy (NLP) and Land Administration Project (LAP)

Due to the complexity of the PNDCL 152 system that assigned the registration management to six different sector agencies, each with different requirements and processes, the number of registrations remained lower than what was aimed for (Ehwi & Asante, 2016). As a consequence, a first National Land Policy (NLP) was passed in 1999, consisting of institutional and legislative arrangements to be implemented in order to improve and speed up the land title registration. This policy was a first step towards a more unified land registration system. Later, the remaining deficiencies of the NLP were further corrected in the Land Administration Project (LAP), which was launched in 2003 (Ampadu-Ameyaw & Aidoo, 2015). These reforms mark important developments in the Ghanaian land reform history, as they aim for more equal access to secure ownership on a national level and for reductions in land tenure related conflicts (Ampadu-Ameyaw & Aidoo, 2015).

The LAP is a large project, with initial timeline of 15 years but was thereafter extended to 25 years. Hence, the project is ongoing as this paper is written. The project is divided into four phases, starting from land sector agency merger with the aim of eliminating previous overlaps and reducing transaction costs from land registration as well as making the process more transparent (Ehwi & Asante, 2016). In the second phase, the focus has been on implementing policies to make land administration more effective and decentralised. The effect of these phases and those to be implemented is to be seen in the upcoming decades.

2.2.3 The Question of Formalisation

Overall, Ghana marks as an example country of where property rights over land have been under major construction by land reforms, while local institutions and customs over land management persist. Like in many countries in SSA, the current land tenure system can be described as a mixed outcome of traditional customs, colonially imposed regulations and modern land reforms. Yet, there are also some specific characteristics of the Ghanaian land right developments that need to be considered. Firstly, colonial land policies in Ghana did not primarily aim at replacing the indigenous customary systems like was the case in a number of other colonies², but rather incorporating State laws into these systems (Bubb, 2013). Secondly, in the post-independence land reforms, the government continued to incorporate customary laws into the State law (Bubb, 2013). It has been argued that these actions have resulted in relatively legalised customary laws in Ghana, leading also to a feedback loop of the spread of more formal customs within the traditional institutions (Crook et al., 2007).

Moreover, there are rather large regional differences, for instance between the northern regions and the rest of the country. Traditional systems over land continue to persist as the dominant systems of land administration in the North (Kasanga, 2001). At the time of colonialism, although the power was officially appointed to the newly introduced chiefs, initial customs remained tightly as the prevailing system of acquiring and holding land. As the power of the State in terms of land management has not been able to reach and reform the customs in the

² It has been stated that in especially in the French colonies, the reforms rather attempted to replace the traditional property rights systems than try to incorporate them under the state laws (Bubb, 2013).

northern areas, traditional customs have been able to persist relatively long (Yaro, 2010). Thus, it is relevant to study the possible regional differences there are in terms of land title formality and the provided rights over land.

After going through a packed history of land reforms, a question arises: where does Ghana actually stand nowadays? Have the attempts to incorporate traditional institutions into the formal state law improved the security of small land holders? The theory suggests that formality would increase land security. One can ask whether those possessing a formal title therefore have superior rights to use their land? Moreover, are there other factors that have affected the security of land other than the type of institution that manages it? Considering institutional and historical differences between Ghanaian regions, it could also be expected that land security and the formality-security linkage depends on the region. These are central questions for the specific case of Ghana, yet also tightly connected to the theory of property rights. And as the relationship between theoretical predictions and reality is not straightforward, the case of Ghana is used in the following sections to provide empirical evidence for these urgent questions of formality.

3 Data and Methodology

3.1 Data

3.1.1 Source

Empirical analysis is carried by using data from the Ghana Living Standards Survey Round Five Plus (GLSS5+) (ISSER, 2009). The survey was carried out in 2008 by the Institute of Statistical, Social and Economic Research (ISSER) of the University of Ghana together with the Ghana Statistical Service (GSS). The purpose of the survey was to provide baseline data for the evaluation of the Millennium Development Authority (MiDA) programme. The households included are located in the chosen MiDA programme Intervention Zones: Northern Agricultural Zone, Afram Basin Intervention Zone and Southern Horticultural Zone (consisting jointly of the South-West and South-East Horticultural Zones). A map of these intervention zones and the districts they included can be found in Appendix A. Although the objective of the MiDA programme was to promote development, the areas included are diverse and were not selected based on certain income level. Therefore, the GLSS5+ dataset should not be biased towards representing relatively poor households or any other particular socio-economic group. Naturally, it is inevitable that any results retrieved from the data cannot be directly interpreted to hold for whole Ghana, as the survey does not cover the entire population.

The sample design of the survey was based on two stage sampling, with both systematic and random sampling stages involved (ISSER, 2009). A total of 15 households per cluster were interviewed, implying disproportionately larger samples from lesser populated districts. The sample was therefore not self-weighting, and additional household weights were computed and included in the dataset. Yet as the objective in using this dataset is not to provide precise estimates for the total population in the given areas, but rather to detect individual differences in the form of regression analysis, I opt for the unweighted data. Hence, each individual is treated with same weight (=1), regardless of the population of the cluster.

Using the data from GLSS5+ offers seminal advantages for the purpose of this study in comparison to the standard GLSS rounds. Firstly, and most importantly, it includes more extensive information on land characteristics such as the forms of ownerships and on the rights to use the land, particularly important for this paper. Secondly, the separate community module includes information on institutions and political organisations. Hence, the survey data offers a possibility to study linkages between land title formality and land security, with respect to location and individual characteristics as well as to local institutions.

3.1.2 Sample

The total survey sample consists of 9310 households in 23 districts, located in six regions in Ghana: Northern, Ashanti, Eastern, Central, Volta and the Greater Accra region. Figure A1 in the Appendix shows how the districts within these regions were divided into the three intervention zones. The districts in the Northern region form the whole Northern Agricultural Zone, while the Afram Basin Zone consists of districts located in the Ashanti region and additional three districts located the Eastern region. The other three districts located in the Eastern regions belong to the Southern Horticultural Zone, so do all the districts in the Volta, Central and the Greater Accra region. Table A1 in the Appendix contains a list of the districts and to which region and intervention zone they belong to.

The GLSS5+ contains information for 38 481 individuals in total. Out of these individuals, only those who reported to own a land plot are included in the sample of this analysis, which sums up to 3 699 individuals. As the interest lies on the rights over land in particular, the level of identification is a land plot instead of an individual. This is also conventional as the particular land regarded survey responses were denoted by a land plot. A total of 9 201 observations for owned land are identified, which forms the final size of the sample, at its maximum. This number of observations is larger than the number of individuals as some own more than one land plot. To control for the possible bias caused by multiple observations for some individuals, sampling based on individual level is additionally conducted as a robustness check and the results discussed in sections 4.3 and 4.4.

The community module contains data for a total of 5 131 communities within the given districts. The sample is restricted to those who filled the survey section on land titling and the respective institutional characteristics. Thus, the number of communities included in the analysis ranges between 46 to 183 communities.

The survey sections for households and communities are separate and therefore the communities of each household (and hence, individual) cannot be traced. Thus, the analysis based on household and community samples will be done separately. The household sample is used to study the relationship between land title formality and land security as well as the drivers of formality. The community sample is thereafter used to deepen the understanding of the drivers of formality by utilising other institutional aspects.

3.1.3 Variables

Household analysis

To measure land security, the right to sell land or to use it as a collateral is used. This serves as the dependent variable of the main analysis. *LandSecurity* is a binary variable, taking the value 1 if the owner of the respective land responded positively to either having the right to sell this land, to use it as collateral for security purposes or both. Oppositely, the variable takes the value of 0 if the owner responded not to have either of these rights. To measure formality of land ownership, two variables will be used. *ContractFormality* is a measure of how the ownership was arranged in the first place. It is also a binary variable, taking the value of 1 if the contract

was a formal written one and the value of 0 if it was an oral contract. The other variable employed is *Title*, which measures the current registration status of the respective land plot. It takes the value 1 if the land was reported to be registered with a deed and the value of 0 if it was owned without a deed.

Other variables used are regional dummies, MiDa Zone dummies, gender of the landowner, whether the land is located in urban or rural areas and whether the person from whom the land was obtained occupies a traditional or political position. The MiDa Zones are not initially reported in the dataset, but they can be traced based on information from Baah-Kumi & Lee (2016) who report which district belongs to which zone. Furthermore, religion and ethnicity dummies are used as controls.

Community analysis

On the community level, the formality of property rights is measured by a variable *Papertitle*, which indicates whether land buyers in the community receive a paper title for the land purchase. To measure institutional aspects, variables based on two survey questions will be used. Firstly, the binary variables *InstState*, *InstTraditional* and *InstBoth* indicate whether state, traditional or both institutions were involved in solving a land related conflict in a community. Secondly, the binary variables *AbilityState* and *AbilityTraditional* measure whether the community perceives that the respective institution has been able to solve the conflict. Additionally, to measure the custom through which land is most often obtained in the community, binary variables *Family* and *Chieftancy* are included, both taking the value of 1 if the respective way was reported as the predominant modus of obtaining an owned land in the community. The MiDa Zones and whether the community is located in a rural or urban environment are used as control variables. This information is not directly available for the community sample, but by identifying the cluster of the community, such data can be obtained from the household sample.

A more extensive list of the variables used and how they were constructed based on the survey data can be found in table A2 in the Appendix.

3.2 Empirical Method

Qualitative dependent variable models are often appropriate choices for microeconomic analysis where the attempt is to detect factors affecting individual choices, which are constrained by a fixed set of options. Given that the dependent variable of interest here, the security of land ownership, is of dichotomous nature, a binary choice variable model will be utilised.

The main dependent variable is *LandSecurity*, representing the right to sell one's land or to use it as a collateral as opposed to situation where such right does not hold, as expressed in the previous section. This same choice can be alternatively expressed by an indicator variable y :

$$y = \begin{cases} 1 & \text{individual has the right to sell the respective land, use it as collateral or both} \\ 0 & \text{individual does not have the right to sell or use the respective land as collateral} \end{cases}$$

I therefore define here that $y = \text{LandSecurity}$. Since the interest here is in the choice of one option over the alternative, the choice can be measured in terms of a probability. If the probability that y equals 1 is p , then

$$P[y = 1] = p$$

$$P[y = 0] = 1 - p$$

The probability function can therefore be expressed as:

$$f(y) = p^y(1 - p)^{1-y}, y = 0, 1$$

Theoretically, this choice can be modelled with using both, linear and non-linear probability models. However, using a linear probability model such as the Ordinary Least Squares (OLS) causes two possible problems. Firstly, homoskedasticity might be violated and secondly the range of predicted values, which are now probabilities, is not restricted between 0 and 1 and thus the range is implausible. Estimating *LandSecurity* in relation to the respective dependent variables with a linear OLS and running the Breusch-Pagan test of heteroskedasticity indeed reveals that the linear probability model error term in this case is heteroskedastic. A common solution for proceeding is to discard the assumption of linear relationship and to use a non-linear probability model instead. The probability p is now kept within the interval $[0, 1]$ by using a nonlinear S-shaped relationship between the explanatory variable x and the probability p (Hill, Griffiths & Lim, 2012). When the slope of this curve follows a standard normal cumulative distribution function, the functional relationship between x and the probability p is estimated by a probit function. The use of a probit model is common and widely supported in empirical analyses of microeconomic choices and likewise is chosen in this analysis.

Based on a probit function $\phi(z)$, the probability p that the variable y takes the value of 1 can now be expressed by a statistical model:

$$p = P[Z \leq \beta_1 + \beta_2 x] = \phi(\beta_1 + \beta_2 x)$$

This probability model can be used to estimate the probability p :

$$\hat{p} = \phi(\tilde{\beta}_1 + \tilde{\beta}_2 x)$$

where $\tilde{\beta}_1$ and $\tilde{\beta}_2$ are the unknown parameters. When y is *LandSecurity*, we can estimate the probability that it takes the value 1 with respect to a set of dependent variables. This estimation method will also be used for the other dependent variables by replacing y in the probability model with *ContractFormality*, *Title* and *Papertitle*, respectively. Since the coefficients' values represent their impact on the probability through a probit function, they cannot be directly interpreted from the estimation results. Therefore, marginal effects will be analysed to quantify their impact on the probability. More specifically, average adjusted predictions (AAP) and average marginal effects (AME) are used, since the independent variables are categorical and therefore the intuition behind using marginal effects at means (MEM) is weaker due to difficulties in terms of interpretation (Williams, 2012).

4 Empirical analysis

4.1 Descriptive statistics

The panels A, B and C in Table 1 show the responses to the survey questions on land security, initial contract formality and current title. The main variables *LandSecurity*, *ContractFormality* and *Title* are based on these responses. The unit of observation is a land plot, and therefore only those individuals who reported to be owners of a land plot are included. The responses in Table 1 are disaggregated first by regions and thereafter by rural and urban location.

Panel A shows that for most land plots, the owners have the right to sell their land or use it as collateral for security, from which the majority reported to possess both of these rights. Oppositely, for 36.6 percent of the lands, the owner does not have neither of these rights. In the Northern region, land security appears to be most widespread, while in Central and Greater Accra the majority of the landowners do not have security over their land. But considering that the number of observations is much lower in the latter regions, this remark might be biased by a small sample size. The last two columns show that ownership of land located in urban locations is characterised with slightly more secure property rights than in rural areas. This could be driven for instance by lower level of development in rural areas or by holding more tightly to traditional customs. Nevertheless, this also implies that those for whom land is especially vital, tend to have inferior rights to use it.

Panel B shows that for over 96 percent of the lands, the initial ownership has been arranged by an oral contract. This holds relatively equally regardless of the region or whether the land is located in urban or rural areas. Panel C shows that the majority of the land is owned without a registered title. A wider variation is revealed than for contract formality, as in the Northern region only about 2 percent of the land is registered with deed while in Ashanti and Greater Accra the respective share is around a third. Interestingly, the regional differences in land security do not seem to positively correlate with the differences in land formality, as in the Northern region security is relatively high while formality is low. If there is some relationship on cross-regional comparison, it seems rather leaned towards a negative one. Table 2 confirms this observation, by showing that the cross-regional correlation between the share of lands with secure ownership and the share of lands with formal initial contract and title is negative.

To further explore the relationship between land security and land ownership formality, the left side of the Figure 1 shows the number of land plots that have the right to sell their land and/or use it as collateral, disaggregated by contract formality. Regardless of the formality, the majority of land held by the households can be sold or used as collateral. The right side of the figure shows the respective shares of ownership security given the ownership formality and discloses that with a formal contract, the probability of having a secure property rights over land is higher than with informal arrangements.

Table 1. Statistics of survey responses to land security, initial contract formality and ownership title.

(A) Have right to sell farmland	Full Sample	Northern	Eastern	Volta	Ashanti	Central	Greater Accra	Urban	Rural
No right	36.74 %	30.17 %	44.5 %	38.99 %	39.98 %	80.73 %	79.61 %	29.61 %	37.93 %
Security for collateral	13.04 %	13.21 %	15.19 %	15.96 %	4.99 %	3.67 %	2.91 %	12.87 %	13.07 %
Sell	9.59 %	7.69 %	7.49 %	12.57 %	17.85 %	8.26 %	14.56 %	10.78 %	9.4 %
Both	40.63 %	48.76 %	32.79 %	32.48 %	38.19 %	7.34 %	2.91 %	46.74 %	39.61 %
Observations	9,005	4,715	1,409	1,789	762	218	103	1,290	7,715

(B) Initial formality of the contract	Full Sample	Northern	Eastern	Volta	Ashanti	Central	Greater Accra	Urban	Rural
Oral contract	96.4 %	99.8 %	86.81 %	96.67 %	94.52 %	95.83 %	97.14 %	93.18 %	96.94 %
Formal written contract	3.6 %	0.2 %	13.19 %	3.33 %	5.48 %	4.17 %	2.86 %	6.82 %	3.06 %
Observations	8,250	4,080	1,342	1,740	767	216	105	1,187	7,063

(C) Ownership of land:	Full sample	Northern	Eastern	Volta	Ashanti	Central	Greater Accra	Urban	Rural
Without deed	86.84 %	97.72 %	75.41 %	78.38 %	66.29 %	83.48 %	62.96 %	85.44 %	87.07 %
With deed	13.16 %	2.28 %	24.59 %	21.62 %	33.71 %	16.52 %	37.04 %	14.56 %	12.93 %
Observations	9,201	4,778	1,448	1,836	807	224	108	1,319	7,882

Table 2. Share of land plots with security, formal initial contract and registered title.

Region	LandSecurity=1	ContractFormality=1	Title=1
Northern	69.78 %	0.20 %	2.28 %
Eastern	61.01 %	3.33 %	21.62 %
Volta	55.50 %	13.19 %	24.59 %
Ashanti	61.02 %	5.48 %	33.71 %
Central	19.27 %	4.17 %	16.52 %
Greater Accra	20.39 %	2.86 %	37.04 %

Notes: Table shows the share of land plots with secure ownership (LandSecurity=1), formal initial contract (ContractFormality=1) and formal title (Title=1).

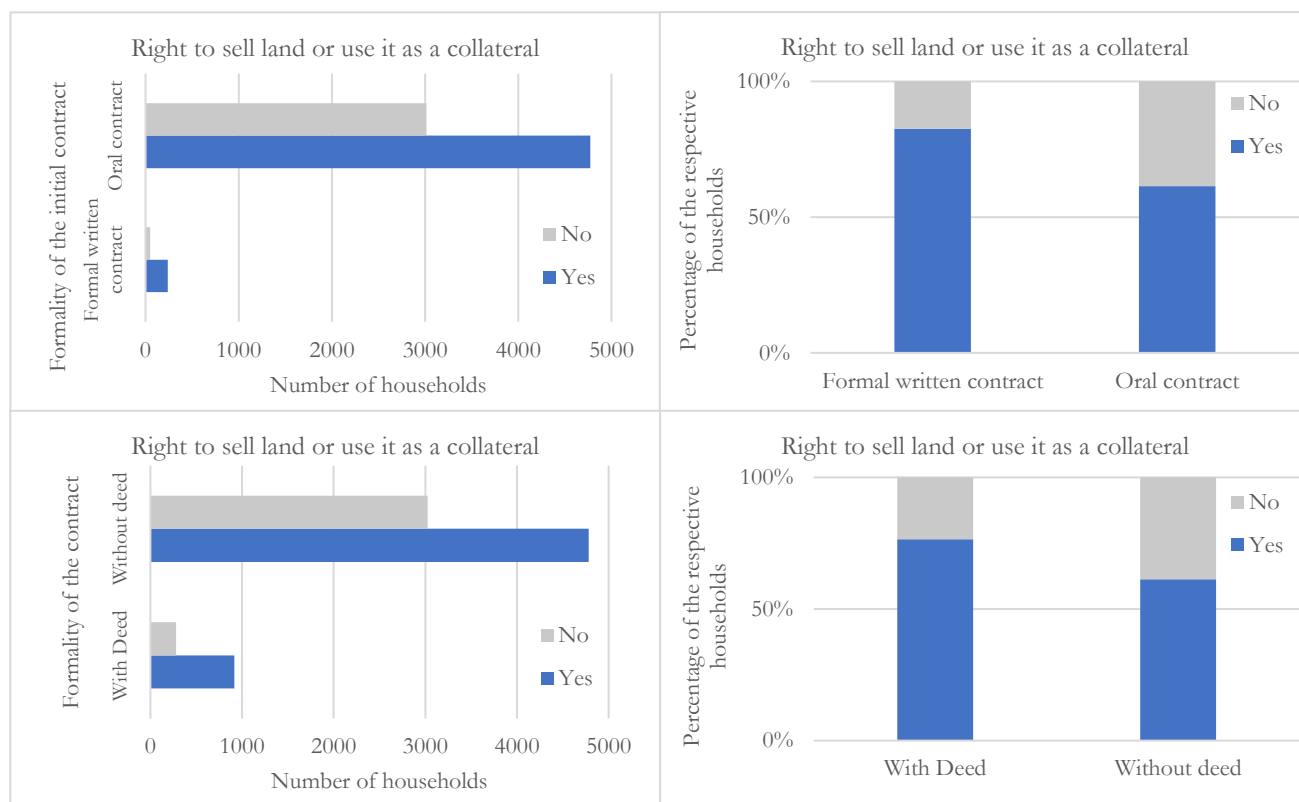


Figure 1. Land security with respect to initial contract formality (upper panels) and land title (lower panels).

Table 3. Pairwise correlation of Land Security with Contract Formality and Land Title.

Pairwise correlation with LandSecurity

	Total	Northern	Eastern	Volta	Ashanti	Central	Greater Accra	Urban	Rural	Male	Female
ContractFormality	0.081* (8127)	-0.022 (4030)	0.268* (1319)	-0.027 (1721)	0.172* (731)	0.297* (214)	0.119 (100)	0.071 (1160)	0.080* (6955)	0.080* (6468)	0.090* (1647)
Title	0.107* (9017)	0.031 (4715)	0.235* (1409)	0.116* (1798)	0.506* (762)	0.347* (218)	0.141 (103)	0.094* (1290)	0.109* (7715)	0.085* (7286)	0.226* (1719)

* shows significance at the .01 level. Number of observations in parentheses.

The pairwise correlations of the variables *LandSecurity* with *ContractFormality* and *Title* in Table 3, however, reveal that for the whole sample, the relationship between land security and formality is positive. Dividing the total sample into regional groups indicates regional differences in the relationship. The second row shows that land security is positively correlated with land title possession, and the regional samples indicate differences only in the magnitude and statistical significance. For the contract formality in the first row, the variation is larger. In the Northern and Volta regions, the relationship is negative, yet small. Gender differences can also be observed from the pairwise correlations. For females, the correlation of land title and contract formality with land security appears stronger than for males. Although remaining silent of the direction of the causality, this suggests that having a formal title increases the probability of having a secure land ownership relatively more for females than for males.

4.2 Results

4.2.1 Drivers of Land Security

Table 4 shows the probit estimation results for land security. In column (1), only formality variables are used to explain the probability of land security without any controls. Columns (2) to (4) show the results after controlling first for regions, then for gender, urban/rural living area and the position from whom the land was obtained, and finally also for religion and ethnic group of the land owner. Columns (5) and (6) are similar to (3) and (4), with the difference of using the MiDA Intervention Zones as regional controls instead of the six official regions.

The results show that both, initial contract formality and current title affect positively on the probability to have a secure land ownership. These coefficients remain statistically significant and in general become larger in magnitude after adding control variables. Number of other observations can be retrieved from the table. Being located in the Northern region increases the probability of land security. Moreover, if the owner of the respective land is male, this increases land security as well. This result is in line with literature showing the inferior position of women in Sub-Saharan Africa in terms of land ownership (Joireman, 2008). Urban location also increases the likelihood of having a secure ownership. Interestingly, the negative coefficient for *Position* suggests that a land obtained from a person holding a political or traditional position reduces land security.

Table 4. Probit Estimates for Land Security.

Explanatory variables	Dependent variable: <i>LandSecurity</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
ContractFormality	0.400*** (0.0924)	0.500*** (0.0984)	0.521*** (0.104)	0.501*** (0.106)	0.532*** (0.100)	0.513*** (0.104)
Title	0.411*** (0.0463)	0.649*** (0.0506)	0.663*** (0.0521)	0.712*** (0.0545)	0.624*** (0.0502)	0.681*** (0.0526)
Northern		0.304*** (0.0384)	0.337*** (0.0433)	0.975*** (0.147)		
Eastern		-0.183*** (0.0488)	-0.220*** (0.0498)	-0.614*** (0.0837)		
Ashanti		-0.0887 (0.0564)	-0.166*** (0.0587)	-0.590*** (0.108)		
Central		-1.195*** (0.105)	-1.098*** (0.105)	-1.573*** (0.144)		
Accra		-1.376*** (0.156)	-1.403*** (0.156)	-1.317*** (0.181)		
Urban			0.148*** (0.0446)	0.197*** (0.0458)	0.158*** (0.0438)	0.230*** (0.0452)
Male			0.186*** (0.0398)	0.185*** (0.0404)	0.196*** (0.0389)	0.181*** (0.0397)
Position			-0.266*** (0.0334)	-0.230*** (0.0342)	-0.306*** (0.0330)	-0.278*** (0.0338)
MiDA: Northern					0.488*** (0.0388)	1.602*** (0.127)
MiDA: Afram					-0.102** (0.0428)	0.0295 (0.0563)
Constant	0.242*** (0.0152)	0.142*** (0.0325)	0.0850** (0.0414)	0.0381 (0.128)	-0.0497 (0.0376)	-0.733*** (0.103)
Religion	No	No	No	Yes	No	Yes
Ethnicity	No	No	No	Yes	No	Yes
Omitted region	Volta	Volta	Volta	Volta	-	-
Omitted zone	-	-	-	-	Southern	Southern
Observations	8,077	8,077	7,992	7,992	7,992	7,992

Robust standard errors in parentheses. Significance level indicated by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The descriptive statistics suggested regional differences in the formality-security relationship between the regions. To test this empirically with the probit model, the sample is divided by regions. As the number of observations varies largely between the six official regions, MiDA Zones are used for more equal sample sizes. As a reminder, these results should be interpreted as factors that affect land security *between* the individuals *within* the respective zones, thus excluding the effect of observation differences between the zones. Estimation results are reported in Table 5, both without and with religion and ethnicity controls.

The differences are evident, especially for the initial contract formality measure. In the Afram Basin, the positive effect of initial contract formality on land security is evident while in the Southern Zone the coefficient shows some statistical significance only after including all the controls. In the Northern Zone, however, the coefficient is negative, but not statistically significant, implying that initial contract formality does not have a statistically significant effect on the probability of current land security. Current title shows a positive effect land security in all three samples, yet in the Northern Zone the statistical significance fades once including all the controls. Again, the effect appears strongest in the Afram Basin sample.

Table 5. Probit Estimates for Land Security with sample restriction to MiDA Zones.

Explanatory variables	Dependent variable: <i>LandSecurity</i>					
	Northern (1)	Northern (2)	Afram Basin (3)	Afram Basin (4)	Southern (5)	Southern (6)
ContractFormality	-0.674 (0.453)	-0.607 (0.533)	1.084*** (0.181)	0.889*** (0.199)	0.109 (0.140)	0.322** (0.142)
Title	0.295* (0.151)	0.201 (0.152)	1.136*** (0.0871)	1.267*** (0.0950)	0.380*** (0.0656)	0.458*** (0.0684)
Urban	0.199*** (0.0628)	0.339*** (0.0632)	0.149* (0.0844)	-0.00414 (0.0893)	0.0698 (0.0983)	0.0437 (0.100)
Male	0.360*** (0.0920)	0.287*** (0.0947)	-0.0672 (0.0728)	-0.0123 (0.0773)	0.272*** (0.0542)	0.271*** (0.0574)
Position	-0.380*** (0.0447)	-0.372*** (0.0476)	-0.305*** (0.0926)	-0.0817 (0.103)	-0.221*** (0.0603)	-0.0339 (0.0653)
Constant	0.336*** (0.0931)	0.755** (0.301)	-0.131** (0.0639)	-0.640*** (0.207)	-0.0487 (0.0466)	-0.681*** (0.134)
Religion controls	No	Yes	No	Yes	No	Yes
Ethnicity controls	No	Yes	No	Yes	No	Yes
Omitted ethnic group	-	Ewe, Krobo,	-	Dagomba	-	Hausa, Dagomba
Observations	3,982	3,979	1,558	1,550	2,452	2,451

Robust standard errors in parentheses. Significance level indicated by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Notes: Probit estimates with sample restriction to MiDA Zones separately: Northern, Afram Basin and Southern.

Moreover, regional differences can be identified in the effect of other individual specific factors on land security. Only within the Northern zone, urban area location increases the probability of security, while having obtained the land from a politically involved person reduces it. Gender explains land probability in the Northern and Southern Zones, but not within the Afram Basin Zone. In the Afram Basin Zone instead, where the contract and title formality appeared as the strongest predictors of land security, other factors have no effect after including all controls. Overall, these results indicate that the effect of formality on land security differs among the different regions in Ghana. The fact that the share of land with security was highest in the Northern region (which itself forms the whole Northern MiDA Zone) suggests that traditional institutions and arrangements have been rather successful for providing security over land there.

To further investigate the gender differences in the formality-security relationship, the sample is divided by gender, similar to the previous division by zones. The results show that, while the first measure of formality, initial formal contract formality, does not have an effect on land security for females, the positive effect of current formal title is larger by its magnitude than in the male sample, suggesting relatively larger positive effects of formalisation for females than for males. These results can be found in the Table B2 in the Appendix B.

As the magnitude of the factors affecting the probability of secure land cannot be directly interpreted from the probit estimates in Tables 4 and 5, marginal effects are computed. The respective average adjusted predictions (AAP) and average marginal effects (AME) of the probit estimates are calculated and presented in Table 6. The value of AAP indicates the predicted probability of the dependent variable, in this case *LandSecurity*, conditional on the value of the explanatory variable. That is, how likely it is to have a secure land when there is a formal title over land in comparison to informal title, for instance. AME is the difference

Table 6. Marginal Effects based on Probit Estimates in Table 4 and 5.

	Dependent variable: <i>LandSecurity</i>				Dependent variable: <i>LandSecurity</i>		
	AAP		AME		AAP		AME
	(1)	(2)	(3)		(1)	(2)	(3)
	Explanatory variable at 0	Explanatory variable at 1		Explanatory variable at 0	Explanatory variable at 1		
ContractFormality	0.616	0.778	0.162***	<i>Northern Agriculture Zone</i>			
Title	0.590	0.804	0.214***	ContractFormality	0.677	0.463	-0.214
MiDA: Northern	0.363	0.814	0.451***	LandTitle	0.675	0.739	0.064
MiDA: Afram	0.619	0.629	0.0102	Observations	3,979		
Urban	0.610	0.688	0.078***	<i>Afram Basin Zone</i>			
Male	0.571	0.634	0.064***	ContractFormality	0.553	0.800	0.247***
Position	0.662	0.565	-0.096***	LandTitle	0.464	0.840	0.376***
				Observations	1,550		
Religion	Yes	Yes		<i>Southern Horticultural Zone</i>			
Ethnicity	Yes	Yes		ContractFormality	0.559	0.670	0.110**
				LandTitle	0.529	0.688	0.159***
Observations	7,992			Observations	2,451		

Significance level indicated by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Notes: Average Adjusted Predictions and Average Marginal Effects are based on the probit estimates in Table 4.

Significance level indicated by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Notes: Average Adjusted Predictions and Average Marginal Effects are based on the probit estimates in Table 5 with both ethnicity and religion controls included.

between these AAPs, thus the marginal effect of the respective variable on land security. Results in the left panel of the Table 6 are based on the full sample results with all control variables included and MiDA zones used for regional controls (column (6) of Table 4). The values in the first columns represent the predicted probability of *LandSecurity* when the respective explanatory variable takes the value of 0 (i.e. does not hold) while the second column shows the same predicted probability when the variable takes the value 1. These predicted probabilities of each row hold with the condition that the value of the other explanatory variables remains the same. The intuition behind the interpretation is as follows. For a person with an initial informal contract (*ContractFormality* = 0), the probability of secure land ownership is 0.616. Now if the same person had instead a formal initial contract, the probability of secure land would be 0.778. The AME of *ContractFormality* is thus 0.162. The same predicted probabilities are illustrated in Figure B1, which repeats the information of Table 6 in a graphic matter and shows the marginal effect of each variable on the probability of land security.

Focusing on the main explanatory variables, for the full sample, it is evident that both, contract formality and land title are strong predictors of land security. Additionally, the magnitude of the regional effect is remarkable, as being located in the Northern zone increases the probability of secure land from 0.363 to 0.814. In this context, it is important to mention that the Southern Horticultural Zone is omitted in the estimates and thus serves as the base group for the zone dummies. The marginal effects for the regional samples confirm the differences that the coefficients suggested. Formality has the largest predictive power on land security in the Afram Basin Zone, with largest contrast to the Northern Zone, where no effect is found. Overall, the results support the theoretical foundation by confirming that formality positively affects land security, but also reveal wide regional variation in this relationship.

4.2.2 Drivers of Formality

In this section, the analysis turns into detecting possible factors that aside from affecting land security, might as well drive formality. It could, for instance, be that gender, while affecting security directly, could also issue an indirect effect through formality. Also, it is possible that the access to formal land titling differs between regions as well as between urban and rural areas. Therefore, location might also affect security through unequal access to formal institutions. It might as well be informative to measure how initial contract formality affects current land title formality. This would allow to detect possible persistence in formality. The intertwined relationship between title formality and land security could also cause a problem of endogeneity. This is acknowledged and further discussed in the section 4.3.

To predict drivers of formality, Table 7 shows probit estimates when using *ContractFormality* and *Title* as dependent variables. Columns (1) and (2) show that urban location, gender, political position of whom the land was obtained, as well as region have an impact on the probability of initial contract formality. Yet, as the Table B3 of the respective marginal effects shows, the effects of these variables on the predicted probabilities of an initial formal contract are very small. This is perhaps of no surprise given that the measure of initial contract formality is retrieved from the past.

The focus is therefore on columns (3) to (5), where the dependent variable is current title formality. It appears that secure land increases the probability of having a registered land title.

Table 7. Probit Estimates for Contract Formality and Land Title.

Explanatory variables	Dependent variable:				
	<i>Contract Formality</i>	<i>Contract Formality</i>	<i>Title</i>	<i>Title</i>	<i>Title</i>
	(1)	(2)	(3)	(4)	(5)
LandSecurity			0.543*** (0.0460)		
ContractFormality			1.382*** (0.0890)	1.471*** (0.0864)	1.511*** (0.0887)
Urban	0.409*** (0.0775)	0.462*** (0.0814)	-0.0477 (0.0588)	-0.0364 (0.0569)	-0.00224 (0.0601)
Male	0.334*** (0.0714)	0.299*** (0.0745)	0.115** (0.0463)	0.125*** (0.0452)	0.0995** (0.0461)
Position	0.0356 (0.0716)	0.0635 (0.0740)	-0.0858* (0.0475)	-0.117** (0.0460)	-0.0853* (0.0468)
MiDA: Northern	-1.336*** (0.126)	-1.219*** (0.432)	-1.225*** (0.0581)	-1.114*** (0.0551)	-1.344*** (0.139)
MiDA: Afram	0.445*** (0.0647)	0.334*** (0.0890)	0.171*** (0.0467)	0.152*** (0.0455)	0.233*** (0.0582)
Constant	-2.034*** (0.0753)	-2.313*** (0.192)	-1.230*** (0.0529)	-0.910*** (0.0435)	-0.341*** (0.105)
Religion controls	No	Yes	No	No	Yes
Ethnicity controls	No	Yes	No	No	Yes
Omitted MiDA Zone	Southern	Southern	Southern	Southern	Southern
Observations	8,157	8,157	7,992	8,157	8,157

Robust standard errors in parentheses. Significance level indicated by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Yet, calculating the marginal effects shows that the magnitude of this is rather low. The effect of security on formality is further discussed in the robustness section. Hereon, the focus is on the effect of other explanatory variables on title formality, for which results are shown in columns (4) and (5). Being a male owner increases the probability of having a land title while a political position of whom the land was obtained reduces this probability. These variables appear to impact similarly on title formality as they do on land security. However, the marginal effects of these variables on the formality variable, shown in Table B3, are lower. What can also be seen is that initial contract formality exercises a positive effect on current land title possession, suggesting a persistence in individuals' conducts regarding land ownership institutions and possibly a persistence in the access to a certain type of institutions. Naturally though, the positive relationship is expected given that, to some extent, these variables measure the same thing: having an initial written formal contract most probably means that the individual holds a formal title over the land. Figure B2 of the marginal effects displayed in the Appendix B shows that, out of these variables, the initial contract formality has the relatively largest power in predicting the probability of the current land title. Overall, the effect of these individual specific factors is of the same direction for land title formality than they were for land security, yet notably smaller in magnitude.

The community data is utilised to detect further predictors of formality. As explained in the data section 3.1.3., the variable used to measure formality here is a binary variable indicating whether land buyers in the community receive a paper title of their purchase. Table 8 shows the probit estimation results. Results in columns (1) and (2) suggest opposite effects of the perception of state institutions on the land title formality in comparison to the perception of traditional institutions. In communities where state institutions are perceived as able to solve a land-related conflict, the probability to have a formal land title system is higher. The opposite effect holds for traditional institutions, as in communities where traditional institutions are being perceived as effective in solving a conflict, the probability of land title formality is lower. The base value of these binary variables is always the situation where the respective institution is not perceived as able to solve a conflict. However, as the number of observations is small and the value of the coefficients perhaps unreasonably high, these results should be interpreted with caution and considered as preliminary evidence for further research.

Due to the limitation of low number of observations, the effects of alternative institutional determinants are estimated in columns (3) and (4). Without adding other institutional variables, column (3) shows that neither the involvement of traditional nor state institutions in solving a conflict has an effect on the probability of formal land title. However, in column (4), after controlling for the system through which land is most commonly acquired in the community, these institutional variables turn significant. On the contrary, however, the effect of any institution involved in a solving a conflict on land title formality appears as negative. The reliability of these results might be reduced by the low number of communities that reported that neither institutions are involved in solving the dispute, given that they serve as a base group for the three dummy variables. Therefore, it is recommended to look at the differences between the coefficients instead of their magnitude or absolute sign. On this note, having both state and traditional institutions involved in solving a land conflict predicts higher probability of formal land title than the presence of one type of institution itself. However, there is also a possible problem of simultaneity as, when land title is formal, the disputes can also be expected to be solved by State institutions.

Table 8. Probit Estimates for Formal Land Title in Communities.

Dependent variable: <i>Papertitle</i>				
Explanatory variables	(1)	(2)	(3)	(4)
<i>Institutions involved into solving a land dispute</i>				
InstState			-0.746 (0.505)	-4.404*** (0.265)
InstTraditional			-0.326 (0.535)	-4.225*** (0.301)
InstBoth			0.633 (0.597)	-3.381*** (0.368)
<i>Perception of the respective institution to solve a conflict</i>				
AbilityState	4.063*** (0.320)	3.685*** (0.340)		
AbilityTraditional	-5.228*** (0.662)	-4.628*** (1.023)		
<i>1st system of obtaining a land to own</i>				
Family				1.206 (0.857)
Chieftaincy				0.693 (0.855)
Urban	Omitted	Omitted	1.954*** (0.374)	1.816*** (0.310)
MiDA: Northern		-0.175 (1.027)	-1.556*** (0.375)	-1.472*** (0.375)
MiDA: Afram		-1.056 (0.785)	-0.947** (0.395)	-0.251 (0.630)
Constant	1.165*** (0.255)	1.308*** (0.273)	1.015** (0.509)	3.752*** (0.883)
Omitted MiDA zone	Southern	Southern	Southern	Southern
Observations	46	46	183	177

Robust standard errors in parentheses. Significance level indicated by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Finally, the last column indicates that whether land is most often acquired through family or chieftaincy does not affect the probability of the presence of a formal land title system in the community. Marginal effects of the column (4) are found in Table B4 and further illustrated in Figure B3 in the Appendix B, showing the magnitude of these findings. The upper part indicates that the negative effect of institutions involved is largest for the traditional institutions, and smallest for State institutions. Thus, the marginal effects reveal that it is not the involvement of both institutions, but of State institutions only that has the smallest negative effect on land formality. Overall, the community analysis suggests that perceptions of institutions within a community can predict to some extent whether the community has a formal land title system in place. While these findings require further analysis, they provide suggestive evidence of location-specific institutions and customs affecting land title formality.

4.3 Robustness

A common alternative to the probit model for estimating the probability of a binary response is to use a logistic (logit) model. It differs from the probit model by the cumulative distribution function, which is based on a closed form $[0, 1]$ of possible values instead of following a normal distribution (Hill, Griffiths & Lim, 2012). The models should, however, provide rather similar results, often only differing in terms of magnitude of the coefficients. As a robustness check, the estimates of Table 4 are repeated by using a logit model. The results can be found in the Appendix Table B5 and the respective marginal effects in Table B6. These results appear very similar to those based on the probit probability function, thus confirming the main results and the positive impact of formality on land security, as well as the presence of rather large regional differences.

As the unit of observation in the main analysis is a land plot, the results could be biased due to larger weight put on those individuals who have multiple land plots. This would also be problematic if the variables of interest are correlated with the number of land plots held by the individual. To control for this, the averages for *ContractFormality* and *Title* per individual are calculated and the sample is restricted by using an individual as the unit of observation. The dependent variable is still *LandSecurity*, but only the first reported land plots of each individual are included. All controls are added, and the alternative regional controls (official regions and MiDA zones) tested separately. Table B7 in the Appendix shows the results, which appear in line with those in Table 4, again confirming the main findings.

One possible problem with the formality-security analysis is endogeneity. We cannot exclude the possibility that places with more secure property rights are more likely to adopt formal customs of land ownership. This is not so much of a problem with the variable *ContractFormality* as it measures the initial contract formality, but it could be the case for the variable *Title*. Yet, although it is completely plausible that there is some level of reverse causality, the intuition that the relationship between formality and security shown so far in the results would only be driven by security to formality causality is rather weak. For instance, post-independence land reforms themselves have been implemented in order to tackle the problem of insecure ownership. At an individual level, in turn, a person who has acquired strong security over land in the traditional system can be expected to be less inclined towards changing to a formal title than a person whose possibilities for land rights are weaker under the informal customs. Thus, a more plausible source of endogeneity lies in the possible occurrence of a simultaneity bias, in which both, formality and land security affect each other simultaneously. However, as was mentioned in the result section 4.2.2., the marginal effect of land security on current formality is lower than other way round, suggesting that the findings are not, at least by large extent, driven by reverse causality.

4.4 Discussion

The results from the main analysis are in line with the predictions of institutional economics theory. Both suggest that formal property right institutions provide stronger security over land than informal ones. In Ghana, having a formal title over the land owned increases the probability of being able to sell the land or use it as collateral for security. However, the predicted probabilities derived from the marginal effects reveal that, even when there is no formal title over land, the probability of having security over the ownership of land is above 0.5. This can be interpreted as an evidence for traditional institutions being able to provide decent security over land as relatively large amount of the lands owned through informal ownership arrangements can be sold or used as a collateral. Nevertheless, the positive impact of formality is evident: in the analysis, it results with the largest predictive power over the probability of secure land ownership. However, the statistics on the survey data the analysis is based upon also revealed that over 85 percent of the land plots are not registered with an official title. It therefore seems that there is a substantial potential for improving the land security through providing access to formal titles.

What do these key findings imply? At first hand, contradictory implications could be drawn. Why formalise land titles if security is often already provided by informal institutions? On the other hand, it could also be argued that if formalisation does have a positive impact, as the estimates showed, it should be pursued. A tempting answer would be that as Ghana continues to carry out the large land reform of LAP, the focus should be on providing wider access to formal titles, yet not with the expense of those traditional institutions that have actually managed to build up a functioning land ownership system. This obviously instantly raises another, more difficult question, on how to do this? I would argue the first claim is not that simple either and there are aspects that need consideration before concluding that one system is superior over another in a specific location. Moreover, the additional findings from this paper provide insights that help to unpuzzle the complexity of the formalisation question.

Regional aspects are central for Ghana. The empirical results imply that out of the six regions included in the analysis, in the land rights in the Northern region are stronger whereas the formality of land titles is less common than in the other regions. An important note here is that there were no findings of a negative effect of formality on security in the Northern region, but rather that formality does not predict security there and land rights are instead driven by other local and individual specific aspects. The results also show that the probability of formality is lesser in the Northern region, which can be expected given the persistence of traditional land administration systems in the Northern area. The remoteness of small land holders and the lower access to markets within these regions can also partly explain the low number of officially registered titles (Chamberlin, 2007). Although the land systems in the northern part of Ghana have started to undergo more rapid transformation in the recent decades (Yaro, 2010), the relatively long persistence of traditional institutions alone could explain the relatively strong security they have provided, as alternative systems have been relatively absent and thus have the additional disputes which plural systems could create. The regional differences between property right security have been established in the earlier literature too. Bubb (2013) argues that such regional differences within Ghana are driven mainly by economic factors, such as the

cultivation of cash crops. Regardless of whether it is because of different economic paths or because of differences in the traditional institutions and how they were affected by colonial reforms, the results of this paper imply that the informal institutions in the Northern region have succeeded in providing a system of relatively secure land rights.

Hence, this finding would also suggest that the reforms should not only consider traditional institutions per se, but the regional differences in such institutions. In places where the informal property right customs on land are poor or where they are restricted to specific groups, formalisation based on replacing these customs might be more justified than in regions where traditional institutions have been successful in proving land security. In those areas, formalisation should be first and foremost based on building upon the existing system. Similar implication has been made from a recent qualitative study by Edwin, Glover and Glover (2020) on Northern Ghana. They argue that formalisation in areas with relatively strong customary property rights only work at best when legal recognition is provided based on the prevailing traditional political system. It is also important to remember here that different areas in Ghana have also been differently affected by the past land reforms, and we cannot disentangle such effects from the effect of the indigenous institutions. Moreover, property right institutions do not function in an isolation from other institutions and customs. The ability to sell land or use it as a collateral depends on whether, for instance, the financial institutions recognise one's holding. Based on the regional estimation results, it is valid to assume that in the northern areas, other institutions support the prevailing customs of land ownership. Lastly, in the Northern region, the owner of a land is more often male than any of the other regions, raising a question of whom the traditional institutions provide security for. This points out that the expected effects of formalisation have to be evaluated from multiple perspectives in order to result in an outcome of which the overall benefits are largest.

The findings of gender affecting on land security relate to the wider discussion of gender differences in land rights. Based on the results, the gender gap in land property rights in Ghana is still evident because the probability of being able to sell or use land as collateral is higher for male owners than for females. Formal titles, however, increase the security of land relatively more for females than for males. Interestingly though, the results do not show less access to formal titles for females, as the probability of title formality tends to be relatively equal between the genders. A simple correlation would have shown that formal title is positively correlated with a female landowner. Yet, the model estimations revealed that, after controlling for other aspects, the probability is not any higher for females. Therefore, although the access to formal titles seems quite equal, the results provide preliminary evidence that the positive effects of formalisation are relatively larger for females. These aspects encourage further research on the mechanisms of the property right gender gap. Nevertheless, in order to fulfil the development objectives of land reforms in Ghana, the current inferior position of females in terms of land security ought to be considered. A key takeaway from these gender differences to the formalisation question is that, even if traditional institutions in Ghana provide decent security, this is not necessarily equal between genders. Despite the differences between the prevailing informal customs, formalisation might be a way to ensure more equal opportunities in terms of land usage.

Having obtained the land from a person occupying a traditional or political position has a negative effect on the probability of land security. A further look into the data shows that among

those with secure land ownership, around 40 percent have obtained the land from a person occupying a special position while the respective share for those without a security is around 45 percent. The effect of the past owner's position on contract formality, however, is not large. This suggests that the negative effect on security cannot account for decreased access to formal titles. A possible explanation is that the person whom the land was obtained from, still holds the respective rights or in some way constraints the rights of the owner to sell the land or use it as collateral. Again, this implies that there are customs that affect land security outside the formality of a land title. Finally, the community analysis provides suggestive evidence that the perceptions of traditional and state institutions as well as customs through which the land is acquired, have an impact on the probability of land title formality.

I may now return to the question of formalisation. Firstly, these additional aspects disclosed by the analysis imply that formalisation is not itself sufficient for providing wider access to secure land rights. As traditional institutions have been more successful in providing security in some areas than in others, it is likely that the accompanying customs and institutions within these locations support those informally arranged land rights. In places where solid land property rights have been built by traditional customs, these reforms should not conflict with the traditional institutions, and the reforms should aim for more comprehensive merger of local institutions rather than a replacement of initial systems. However, as the aim of the ongoing LAP land reform in Ghana is to create a more unified system of formal titles, it is important that the mergers aim at an overall compatible outcome. It is beneficial in the long run to create a nation-wide system that would enable equal access to credit and opportunities of agricultural development regardless of the location. Secondly, there are aspects other than formality that have an impact on land security. Examples are gender, urban or rural location, region and even religion and ethnicity. Although these represent non-institutional aspects, it does not imply that these effects could not be affected by institutional reform. Institutional change should rather tackle any discriminative aspects of current land right systems in order to enable equal access to a secure title over land, where the individual could build his or her income upon. Institutions, at best, can work as a mechanism to equalise opportunities over socio-economic groups.

Lastly, the limitations of this analysis should be established. As discussed in the empirical results, the analysis does not provide a full confirmation of causality due to limitations with the data used. An inclusion of time-series would allow to improve the analysis in terms of detecting changes in formality and security over time. Let this analysis work as a preliminary evidence and as an encouragement for more extensive utilisation of micro-level data that is increasingly made available for research purposes. The second limitation is related to external validity. Naturally, any general conclusions of property right formalisation in Sub-Saharan Africa cannot be drawn solely from the results of this paper. Yet, generalisation should not be the target of micro-level studies on institutions, acknowledging the mosaic of cultures and customs that the continent of Africa is. The vast number of cross-country studies on institutions and development over the recent decades has shown that institutions matter, but for custom-made and detailed policy implications, case studies are needed to understand the context and the local mechanisms. As these micro-level studies allow to disentangle more detailed mechanisms of how institutions work in a particular environment, the results of particular factors can however potentially be used to improve understanding of other countries too.

5 Conclusion

This paper provides empirical evidence to answer the question whether formal institutions improve land security. By utilising survey-based micro data, I show that formal land titles predict increased probability of land security in comparison to informal institutions in Ghana. These results are in line with institutional theories and imply that the formalisation-focused land reforms of post-independent Ghana have been, to some extent, successful in strengthening rights to use land for sale and collateral. An important aspect this analysis however identified is the predominant regional differences. Whether formality has a statistically significant impact on land security depends largely on the region, as in the Northern region formality is less common but security relatively widespread. This gives support for the branch of literature which states that, aside from informal institutions, local and economic determinants also play a central role in land security while the effect of prevailing formality of property rights can be minor. Lastly, the analysis provides suggestive evidence of the effect of how different types of institutions are perceived on land title formality. There is a positive correlation between perceiving State institutions as able to solve land disputes and the prevalence of a formal title system. Yet, further research is required to identify a causal link between these aspects.

Overall, this paper contributes to the property right literature by providing micro-level insights of the mechanisms of land security. Although macro-level studies in the field have received increased attention by contributing to the discussion on the role of institutions on development, these types of micro-level studies are necessary for policy implications. The design of policies aiming for institutional change should be finely customised based on local aspects. As the recent land reforms in Ghana focused on legalising traditional systems, the results of this paper can work as a benchmark for future land reform policies by indicating that such reformations have generated formal titles that positively effect on security. Yet, another key message to be taken from this analysis is that the efficiency of the informal customs for providing sufficient land security should be thoroughly measured before deciding on formalisation. Given that in some areas, an environment that supports the use of land for sale and collateral purposes has been created without formal titles, formalisation reforms must consider the consequences also in terms of the supporting institutions. Reconstructing local institutional structures just for the sake of increasing the reach of State law might be harmful if it endangers the establishment and the created interlinkages of local institutions. Lastly, development aspects should be the front-line objectives of the reforms and therefore, it is necessary to look at whom the benefits of formalisation accrue to.

References

- Acemoglu, D., Johnson, S., & Robinson, J. A. (2005). Institutions as a Fundamental Cause of Long-run Growth, in P. Aghion & S. N. Durlauf (eds.) *Handbook of economic growth*, vol. 1, Ch. 6, pp. 385-472
- Acemoglu, D., S. Johnson and J. A. Robinson (2001). The Colonial Origins of Comparative Development: An Empirical Investigation, *American Economic Review*, vol. 91, no. 5, pp. 1369-1401
- Alchian, A. A. (1965). Some Economics of Property Rights. *Il politico*, vol. 30, no. 4, pp. 816-829
- Alston, L. J., Harris, E., & Mueller, B. (2009). De Facto and De Jure Property Rights: Land Settlement and Land Conflict on the Australian, Brazilian and US Frontiers, *NBER Working Paper*, no. w15264, National Bureau of Economic Research
- Amanor, K. (2005). Night Harvesters, Forest Hoods and Saboteurs: Struggles over Land Expropriation in Ghana, in S. Moyo & P. Yeros (eds.), *Reclaiming the Land: The Resurgence Of Rural Movements in Africa, Asia and Latin America*, pp. 102-117. London and New York: Zed Books
- Ampadu-Ameyaw, R., & Aidoo, R. (2015). Formalizing Informality for Increased Security: Customary Land Tenure Formalization in Ghana. *Asian Journal of Agricultural Extension, Economics & Sociology*, vol. 6, no. 2, pp. 76-87
- Anyidoho, N. A., Amanquah, S. T., & Clottey, E. A. (2008). Chieftaincy Institutions and Land Tenure Security: Challenges, Responses, and the Potential for Reform. *Technical Report. Institute of Statistical, Social & Economic Research (ISSER)*, University of Ghana
- Baah-Kumi, B., & Lee, Y. F. W. (2016). Rural Poverty Reduction in Ghana: Evidence from MiDA Intervention Zones. *Journal of Economics*, vol. 4, no. 4, pp. 1-11
- Besley, T. (1995). Property Rights and Investment Incentives: Theory and Evidence from Ghana. *Journal of political Economy*, vol. 103, no. 5, pp. 903-937
- Besley, T., & Ghatak, M. (2010). Property Rights and Economic Development, in *Handbook of development economics*, vol. 5, pp. 4525-4595. Elsevier
- Bubb, R. (2013). The Evolution of Property Rights: State Law or Informal Norms?. *The Journal of Law and Economics*, vol. 56, no. 3, pp. 555-594
- Chamberlin, J. (2007). Defining Smallholders Agriculture in Ghana: Who are Smallholders, What Do They Do and How Are They Linked with Markets? *GSSP Background Paper*, no. GSSP 0006

- Coppedge, M., Gerring, J., Knutsen, C. H., Lindberg, S. I., Teorell, J., Alizada, N., Altman, D., Bernhard, M., Cornell, A., Fish, M. S., Gastaldi, L., Gjerløw, H., Glynn, A., Hicken, A., Hindle, G., Ilchenko, N., Krusell, J., Luhrmann, A., Maerz, S. F., Marquardt, K. L., McMann, K., Mechkova, V., Medzihorsky, J., Paxton, P., Pemstein, D., Pernes, J., von Römer, J., Seim, B., Sigman, R., Skaaning, S-E., Staton, J., Sundström, A., Tzelgov, E., Wang, Y., Wig, T., Wilson, S. & Ziblatt, D. (2021). V-Dem [Country–Year/Country–Date] Dataset v11.1, *Varieties of Democracy Project*. Accessed 15.4.2021.
- Crook, R., Affou, S., Hammond, D., Vanga, A. F., & Yeboah, M. O. (2007). The Law, Legal Institutions and The Protection of Land Rights in Ghana and Côte d'Ivoire: Developing a More Effective and Equitable System. *Institute of Development Studies Research Report*, no. 58
- De Soto, H. (2000). *The mystery of capital: Why capitalism triumphs in the West and fails everywhere else*, New York: Basic Books
- Delville, P. L. (2000). Harmonising Formal Law and Customary Land Rights in French-speaking West Africa, in Toulmin C. & Quan J.F. (eds) *Evolving land rights, policy and tenure in Africa*. London: DFID/IIED/NRI, Ch. 5, pp. 97–122
- Edwin, D. A., Glover, E. K., & Glover, E. K. (2020). When Tradition Meets Modernity in Land Registration: Evidence from Dagbon, Ghana. *Land*, vol. 9, no. 11: 416
- Ehwi, R. J., & Asante, L. A. (2016). Ex-post Analysis of Land Title Registration in Ghana Since 2008 Merger: Accra Lands Commission in Perspective, *Sage Open*, vol. 6, no. 2
- Firmin-Sellers, K. (1996). *The transformation of property rights in the Gold Coast*. New York: Cambridge University Press
- Food and Agricultural Organisation (FAO). (2002). Land tenure and rural development. *FAO Land Tenure Studies*, Rome
- Goldstein, M., Hounbedji, K., Kondylis, F., O'Sullivan, M., & Selod, H. (2015). Formalizing Rural Land Rights in West Africa: Early Evidence from a Randomized Impact Evaluation in Benin. *World Bank Policy Research Working Paper*, no. 7435
- Hall, R. E., & Jones, C. I. (1999). Why Do Some Countries Produce so Much More Output per Worker than Others?. *The quarterly journal of economics*, vol. 114, no. 1, pp. 83-116
- Heidhues, F., & Obare, G. A. (2011). Lessons from Structural Adjustment Programmes and Their Effects in Africa, *Quarterly Journal of International Agriculture*, vol. 50, no. 1, pp. 55-64
- Hill, R. C., Griffiths, W. E., & Lim, G. C. (2012). *Principles of Econometrics*. 4th ed. International Student Version. John Wiley & Sons
- IPRI, (2020a), International Property Rights Index 2020 Full report. (Levy-Carciente S., & Montanari, L.)

- IPRI, (2020b), International Property Right Index / Ghana, Accessed 15.4.2021: [https://www.internationalpropertyrightsindex.org/country/ghana]
- ISSER (Institute of Statistical, Social and Economic Research) (2009). Report of the Baseline Survey (GLSS 5+). Accessed 30.3.2021, Dataset available: https://microdata.worldbank.org/index.php/catalog/2281
- Johnson, S., McMillan, J., & Woodruff, C. (2002). Property Rights and Finance. *American Economic Review*, vol. 92, no. 5, pp. 1335-1356
- Joireman, S. F. (2008). The Mystery of Capital Formation in Sub-Saharan Africa: Women, Property Rights and Customary Law. *World Development*, vol. 36, no. 7, pp. 1233–1246
- Kasanga, R. K., & Kotey, N. A. (2001). Land Management in Ghana: Building on Tradition and Modernity. International Institute for Environment and Development, London.
- Kerekes, C. B., & Williamson, C. R. (2008). Unveiling de Soto's mystery: property rights, capital formation, and development. *Journal of Institutional Economics*, vol. 4, no. 3, pp. 299
- Kerekes, C., & Williamson, C. (2010). Propertyless in Peru, Even with a Government Land Title. *American Journal of Economics and Sociology*, vol. 69, no. 3, pp. 1011-1033
- Kimble, D. 1963. A Political History of Ghana: The Rise of Gold Coast Nationalism 1850–1928. Oxford: Clarendon Press
- Knack, S., & Keefer, P. (1995). Institutions and Economic Performance: Cross-country Tests Using Alternative Institutional Measures. *Economics & Politics*, vol. 7, no. 3, pp. 207-227
- La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2008). The Economic Consequences of Legal Origins. *Journal of Economic Literature*, vol. 46, pp. 285–332
- Lastarria-Cornhiel, S. (1997). Impact of Privatization on Gender and Property Rights in Africa. *World development*, vol. 25, no. 8, pp. 1317–1333
- Leblang, D. A. (1996). Property rights, Democracy and Economic Growth. *Political Research Quarterly*, vol. 49, no. 1, pp. 5–26
- McAuslan, P. (2000). Only the name of the country changes: the diaspora of "European" land law in Commonwealth Africa, in Toulmin C. & Quan J.F. (eds) *Evolving land rights, policy and tenure in Africa*. London: DFID/IIED/NRI, Ch. 4, pp. 75–96
- Musembi, C. N. (2007). De Soto and Land Relations in Rural Africa: Breathing Life into Dead Theories About Property Rights. *Third World Quarterly*, vol. 28, no. 8, pp. 1457-1478
- Mwabu, G., & Thorbecke, E. (2004). Rural Development, Growth and Poverty in Africa. *Journal of African economies*, vol. 13, no. 1, pp. 16–65

- North, D. C. (1990). *Institutions, Institutional Change and Economic Performance*. Cambridge university press
- North, D. C. (1991). Institutions, *Journal of Economic Perspectives*, Vol. 5, No. 2, pp. 97-112
- Obeng-Odoom, F. (2012). Land Reforms in Africa: Theory, Practice, and Outcome. *Habitat International*, vol. 36, no. 1, pp. 161-170
- Obeng-Odoom, F. (2016). Understanding Land Reform in Ghana: A Critical Postcolonial Institutional Approach. *Review of Radical Political Economics*, vol. 48, no. 4, pp. 661-680
- Palmer, R. C. (1985). The Origins of Property in England. *Law & History Review*, vol. 3, no. 1
- Scully, G. W. (1988). The Institutional Framework and Economic Development. *Journal of Political Economy*, vol. 96, no. 3, pp. 652–662
- Selase, A. E., Jiang, L. F., & Worlanyo, A. S. (2015). Land Tenure System in The Pre-colonial Era: Ghana as The Insight. *International Journal of African and Asian Studies*, vol. 14, pp. 89-95
- Smith, R. E. (2004). Land Tenure, Fixed Investment, and Farm Productivity: Evidence from Zambia's Southern Province. *World Development*, vol. 32, no. 10, pp. 1641-1661
- Timmer, M. P., de Vries, G. J., & de Vries, K. (2015). Patterns of Structural Change in Developing Countries. In J. Weiss, & M. Tribe (Eds.), *Routledge Handbook of Industry and Development*, pp. 65-83. Routledge. The dataset accessed 14.5.2021. Available at: [<https://www.rug.nl/ggdc/structuralchange/previous-sector-database/10-sector-2014>]
- Toulmin, C. (2008). Securing Land and Property Rights in Sub-Saharan Africa: The Role of Local Institutions. *Land use policy*, vol. 26, no. 1, pp. 10-19
- Toulmin, C., & Quan, J. (2000). *Evolving Land Rights, Policy and Tenure in Africa*, DFID/IIED/NRI, London
- Williams, R. (2012). Using the Margins Command to Estimate and Interpret Adjusted Predictions and Marginal Effects. *The Stata Journal*, vol. 12, no. 2, pp. 308-331
- Williamson, C. R., & Kerekes, C. B. (2011). Securing Private Property: Formal Versus Informal Institutions. *The Journal of Law and Economics*, vol. 54, no. 3, pp. 537-572
- Williamson, O. E. (1975). *Markets and Hierarchies: Analysis and Antitrust Implications: A Study in the Economics of Internal Organization*. New York: Free Press
- Williamson, O. E. (1981). The Economics of Organization: The Transaction Cost Approach, *American Journal of Sociology*, vol. 87, no. 3, pp. 548-577

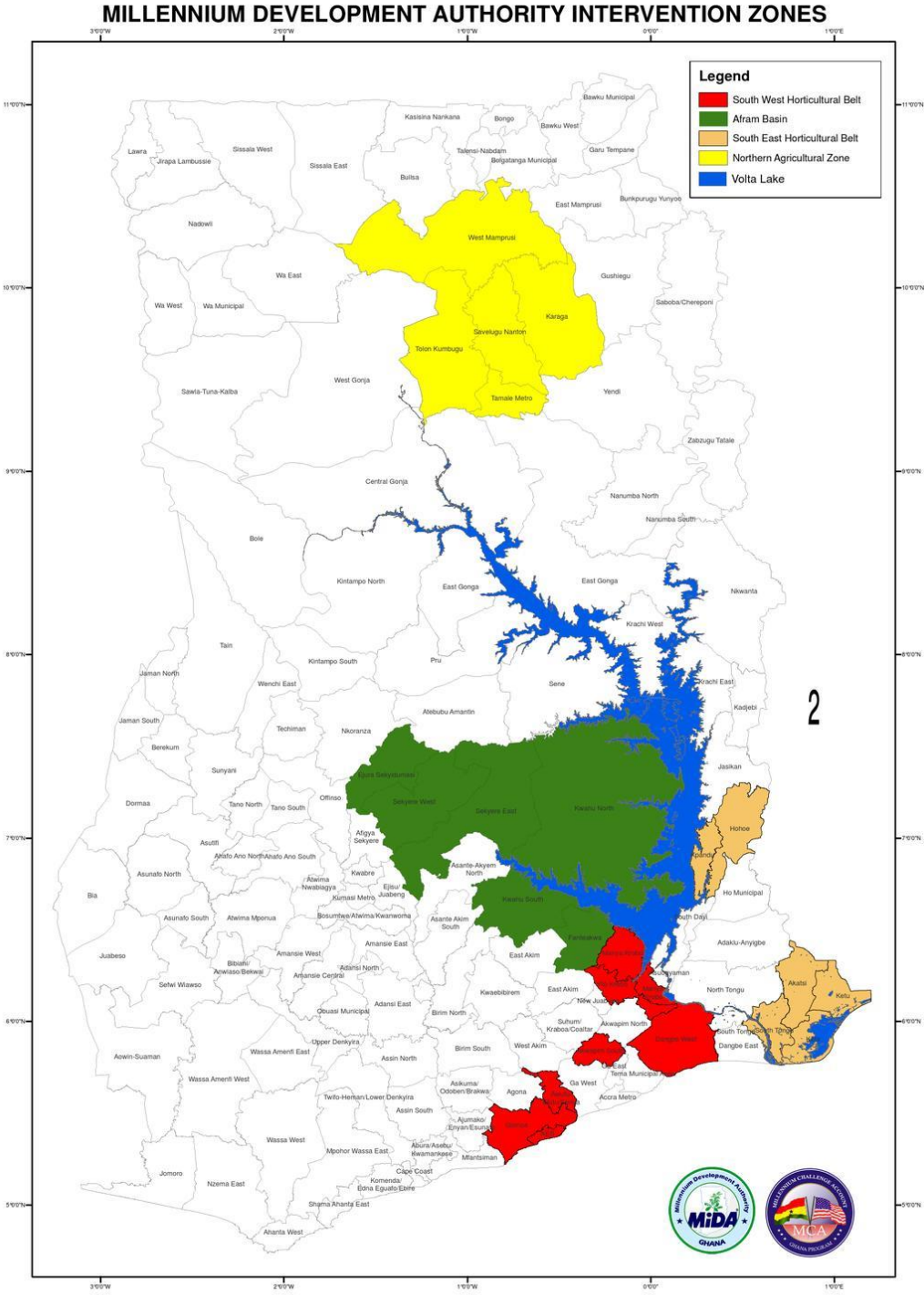
- Williamson, O. E. (1990). A Comparison of Alternative Approaches to Economic Organization. *Journal of Institutional and Theoretical Economics (JITE)/Zeitschrift für die gesamte Staatswissenschaft*, pp. 61-71
- World Bank (2021a), World Development Indicators database. Accessed April-May 2021: <http://data.worldbank.org/data-catalog/world-development-indicators>
- World Bank (2021b), Doing Business project (<http://www.doingbusiness.org/>). Accessed 14.5.2021.
- Yaro, J. A. (2010). Customary Tenure Systems Under Siege: Contemporary Access to Land in Northern Ghana. *GeoJournal*, vol. 75, no. 2, pp. 199-214.
- Zarin, H. A., & Bujang, A. A. (1994). Theory on Land Reform: An Overview. *Bulletin Ukur*, vol. 5, no. 1, pp. 9-14

Appendix A

Table A1. List of Districts by Region and MiDA Zone.

MiDA Intervention Zone	Region	District
Northern Agricultural Zone	Northern	West Mamprusi
		Tolon Kumpungu
		Savelugu-Nanton
		Tamale
		Karaga
Afram Basin Intervention Zone	Ashanti	Sekyere West
		Sekyere East
		Ejura- Sekyeredumasi
	Eastern	Kwahu South
		Fanteakwa
		Afram Plains
Southern Horticultural Zone	Eastern	Akuapim South
		Manya Krobo
		Yilo Krobo
	Central	Awatu Efutu Senya
		Gomoa
	Volta	Akatsi
		Hohoe
		Keta
		Ketu
		North Dayi
	Greater Accra	South Tongu
Dangme West		

Figure A1. Map of districts included in the GLSS5+ dataset located in the Intervention Zones.



Source: Baah- Kumi & Lee (2016).

Table A2. List of variables.

Variable name	Unit of identification	Survey question	Variable construction based on the response categories	Additional information
<i>LandSecurity</i>	land & individual	Does the household have the right to sell this farmland or use it as collateral for security?	1= Sell 1= Security 1= Both 0= No right	
<i>ContractFormality</i>	land & individual	What was the formality of the contract at that time?	1=Formal written contract 0=Oral contract	If response was “Other” or “Registered tenant”, then the respective land is excluded from the sample
<i>MeanContractFormality</i>	individual		Mean value of <i>ContractFormality</i> for all the owned land plots per individual.	
<i>Title</i>	land & individual	Is this farmland owned by the household?	1= Yes with deed 0= Yes without deed	If response to this question was “no”, then the respective land is excluded from the sample
<i>MeanTitle</i>	individual		Mean value of <i>Title</i> for all the owned land plots per individual.	
<i>Northern</i>	individual	Region	1= Northern 0= Other	
<i>Eastern</i>	individual	Region	1=Eastern 0= Other	
<i>Volta</i>	individual	Region	1=Volta 0= Other	
<i>Ashanti</i>	individual	Region	1=Ashanti 0= Other	
<i>Central</i>	individual	Region	1=Central 0= Other	
<i>Accra</i>	individual	Region	1=Accra 0= Other	
<i>Urban</i>	individual	Location: Urba/Rural	1=Urban 0=Rural	
<i>Male</i>	individual	Sex	1= Male 0= Female	
<i>Position</i>	individual	(From whom did you obtain the land when you began to own or use it? >>>) Did this person occupy a special political or traditional position?	1= Yes 0= No	
<i>MiDA: Northern</i>	individual	Region	1=Northern (Region) 0= Other	Information of clusters/region included in the MiDA Zone based on Baah-Kumi & Lee (2016).

<i>MiDA: Afram</i>	individual	Region & Cluster	1= Ashanti (region) & 1 = Kwahu South, Ejura Sekyere, Afram Plains (clusters in Eastern region) 0= Other	Information of clusters/region included in the MiDA Zone based on Baah-Kumi & Lee (2016).
<i>MiDA: Sourthern</i>	individual	Region & Cluster	1=Volta (region) 1= Central (region) 1= Greater Accra (region) & 1 = Akuapem South, Manya Krobo, Yilo Krobo (clusters in Eastern region) 0= Other cluster	Information of clusters/region included in the MiDA Zone based on Baah-Kumi & Lee (2016).
<i>Papertitle</i>	community	Do some buyers receive paper title for land in this community?	1= Yes 0= No	
<i>InstState</i>	community	Were state institutions or traditional methods used to try to solve the conflict?	1= State 0= Traditional 0= Traditional & State 0= Neither	
<i>InstTraditional</i>	community	Were state institutions or traditional methods used to try to solve the conflict?	0= State 1= Traditional 0= Traditional & State 0= Neither	
<i>InstBoth</i>	community	Were state institutions or traditional methods used to try to solve the conflict?	0= State 0= Traditional 1= Traditional & State 0= Neither	
<i>AbilityState</i>	community	Have the state institutions been able to resolve the conflict?	1= Yes 0= No	
<i>AbilityTraditional</i>	community	Have the traditional institutions been able to resolve the conflict?	1= Yes 0= No	
<i>Family</i>	community	What are the main system(s) of obtaining land to own in this community?	1=Family owned patrilineal/matrilinear 0= any other category	
<i>Chieftaincy</i>	community	What are the main system(s) of obtaining land to own in this community?	1= Chieftaincy owned (or administered) patrilineal/matrilinear 0= any other category	

Appendix B

Table B1. Pairwise correlations of the household dataset variables.

Pairwise correlations												
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) LandSecurity	1.000											
(2) ContractFormality	0.081*	1.000										
(3) Title	0.107*	0.340*	1.000									
(4) Northern	0.142*	-0.181*	-0.334*	1.000								
(5) Eastern	-0.069*	0.227*	0.146*	-0.449*	1.000							
(6) Volta	-0.023	-0.007	0.125*	-0.519*	-0.216*	1.000						
(7) Ashanti	-0.014	0.032*	0.188*	-0.322*	-0.134*	-0.155*	1.000					
(8) Central	-0.144*	0.005	0.016	-0.164*	-0.068*	-0.079*	-0.049*	1.000				
(9) Accra	-0.096*	-0.005	0.077*	-0.113*	-0.047*	-0.054*	-0.034*	-0.017	1.000			
(10) Male	0.106*	-0.013	-0.089*	0.383*	-0.085*	-0.225*	-0.166*	-0.122*	-0.044*	1.000		
(11) Urban	0.060*	0.071*	0.017	0.009	-0.032*	-0.076*	0.157*	-0.032*	-0.016	-0.011	1.000	
(12) Position	-0.043*	-0.079*	-0.158*	0.413*	-0.194*	-0.215*	-0.181*	0.063*	-0.044*	0.217*	-0.116*	1.000

* shows significance at the .01 level

Figure B1. Marginal effects based on Probit Estimates in Table 6.

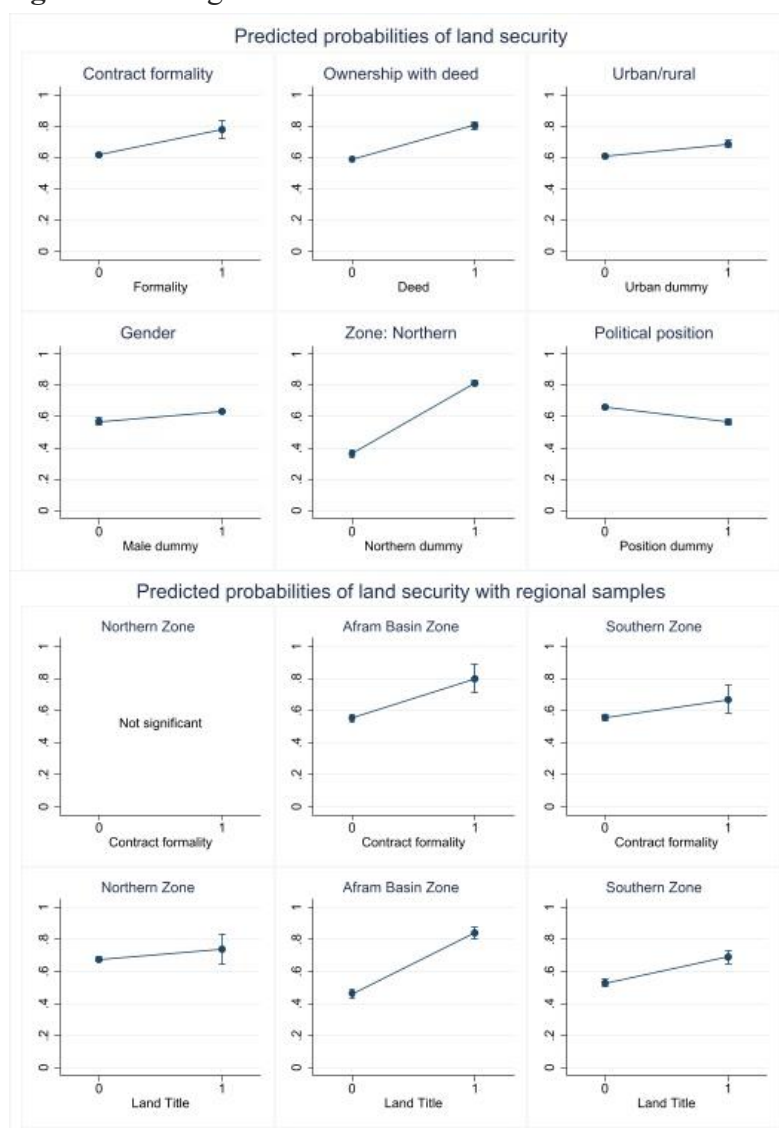


Table B2. Marginal effects based on Probit Estimates on gender restricted samples.

	Dependent variable: <i>LandSecurity</i> .					
	Male sample			Female sample		
	(1)	(2)	(3)	(4)	(5)	(6)
	AAP:		AME	AAP:		AME
Explanatory variable at 0	Explanatory variable at 1		Explanatory variable at 0	Explanatory variable at 1		
Formality	0.639	0.830	0.191***	0.526	0.562	0.0360
Title	0.620	0.812	0.192***	0.469	0.76	0.300***
MiDA: Northern	0.352	0.790	0.438***	0.467	0.901	0.434***
Mida: Afram	0.652	0.611	-0.0403*	0.477	0.617	0.140***
Urban	0.634	0.715	0.0814***	0.521	0.558	0.0371
Position	0.689	0.598	-0.0910***	0.552	0.431	-0.121***
Observations	6,368			1,624		

Significance level indicated by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Notes: Notes: Average Adjusted Predictions and Average Marginal Effects are based on probit estimates on gender restricted samples. Controls for religion and ethnic group are included.

Table B3. Marginal effects based on Probit Estimates in Table 7.

Dependent variable:	<i>ContractFormality</i>			<i>Title</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
	AAP:		AME	AAP:		AME
	Explanatory variable at 0	Explanatory variable at 1		Explanatory variable at 0	Explanatory variable at 1	
Formality	-	-	-	0.119	0.528	0.408***
Urban	0.0290	0.0651	0.0361***	0.138	0.137	-0.0004
Male	0.0231	0.0404	0.0173***	0.126	0.143	0.0166***
Position	0.0336	0.0377	0.00408	0.142	0.127	-0.0144*
MiDA: Northern	0.0538	0.00302	-0.0508***	0.247	0.0295	-0.218***
Mida: Afram	0.0252	0.0472	0.0220***	0.125	0.167	0.042***
Observations	8,157			8,157		

Significance level indicated by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Notes: Average Adjusted Predictions and Average Marginal Effects are based on probit estimates in Table 7. Controls for religion and ethnic group are included.

Figure B2. Predicted probabilities of land title based on Probit Estimates in Table 7.

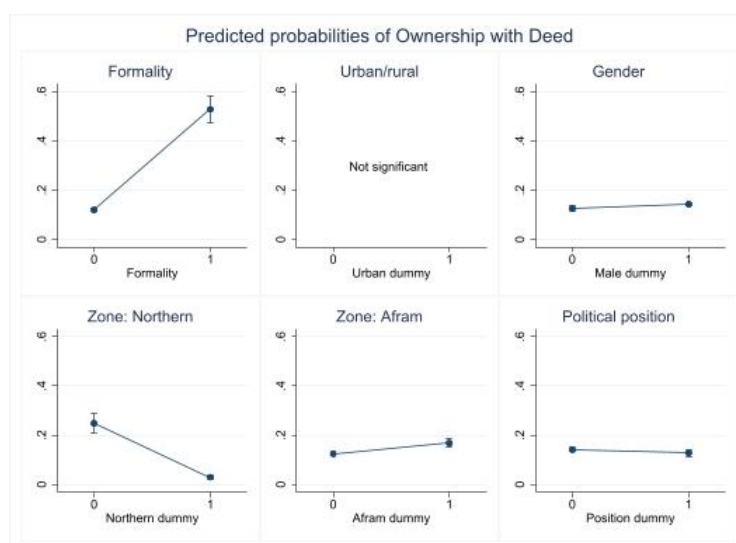


Table B4. Marginal effects based on Probit Estimates in Table 8.

Dependent variable: *Papertitle*

	(1)	(2)	(3)
	AAP:		AME
	Explanatory variable at 0	Explanatory variable at 1	
<i>Institutions involved into solving a land dispute</i>			
InstState	0.920	0.429	-0.491***
InstTraditional	0.910	0.294	-0.617***
InstBoth	0.865	0.337	-0.528***
<i>1st system of obtaining a land to own</i>			
Family	0.645	0.877	0.232
Chieftaincy	0.831	0.913	0.0824
Urban dummy	0.688	0.968	0.280***
Mida: Northern	0.886	0.586	-0.301***
Mida: Afram	0.851	0.812	-0.0395
Observations	177		

Significance level indicated by *** p<0.01, ** p<0.05, * p<0.1.

Notes: Average Adjusted Predictions and Average Marginal Effects are based on probit estimates in Table 8. Controls for religion and ethnic group are included.

Figure B3. Predicted probabilities of land title based on Probit Estimates in Table 8.

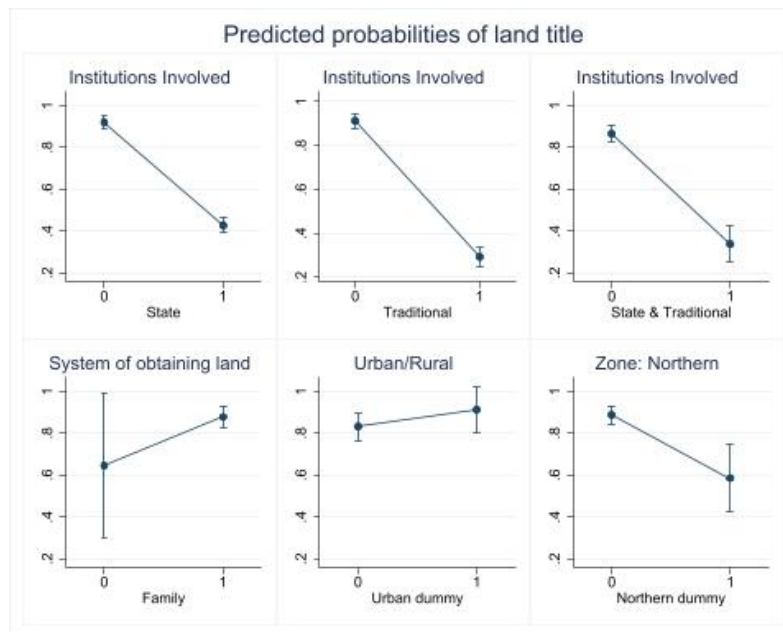


Table B5. Logit Estimates of land security.

Explanatory variable	Dependent variable: <i>LandSecurity</i>			
	(1)	(3)	(2)	(4)
ContractFormality	0.899*** (0.189)	0.849*** (0.195)	0.909*** (0.181)	0.875*** (0.190)
Title	1.115*** (0.0911)	1.211*** (0.0966)	1.036*** (0.0857)	1.140*** (0.0910)
Northern	0.536*** (0.0710)	1.691*** (0.263)		
Eastern	-0.375*** (0.0822)	-1.038*** (0.138)		
Ashanti	-0.307*** (0.0962)	-1.032*** (0.179)		
Central	-1.805*** (0.182)	-2.633*** (0.247)		
Accra	-2.356*** (0.276)	-2.226*** (0.317)		
Urban	0.256*** (0.0744)	0.341*** (0.0766)	0.269*** (0.0728)	0.391*** (0.0751)
Male	0.301*** (0.0651)	0.308*** (0.0665)	0.317*** (0.0632)	0.297*** (0.0649)
Position	-0.433*** (0.0550)	-0.371*** (0.0560)	-0.501*** (0.0542)	-0.455*** (0.0554)
MiDA: Northern			0.787*** (0.0634)	2.721*** (0.228)
MiDA: Afram			-0.189*** (0.0701)	0.0278 (0.0926)
Constant	0.146** (0.0676)	0.0321 (0.212)	-0.0750 (0.0609)	-1.212*** (0.171)
Religion controls	No	Yes	No	Yes
Ethnicity controls	No	Yes	No	Yes
Omitted region	Volta	Volta	-	-
Omitted Mida Zone	-	-	Southern	Southern
Observations	7,992	7,992	7,992	7,992

Robust standard errors in parentheses. Significance level indicated by *** p<0.01, ** p<0.05, * p<0.1.

Table B6. Marginal Effects based on Logit Estimates in Table B5.

	Dependent variable: <i>LandSecurity</i>		
	(1)	(2)	(3)
	AAP Explanatory variable at 0	AAP Explanatory variable at 1	AME
Formality	0.616	0.782	0.165***
Deed	0.590	0.804	0.214***
Mida Northern	0.362	0.810	0.448***
Mida Afram	0.620	0.626	0.0059
Urban dummy	0.610	0.690	0.0803***
Male dummy	0.571	0.635	0.064***
Position dummy	0.662	0.565	-0.096***
Observations	7,992		

Significance level indicated by *** p<0.01, ** p<0.05, * p<0.1.

Notes: Average Adjusted Predictions and Average Marginal Effects are based on the probit estimates in Table B5.

Table B7. Robustness: Probit Estimates with individual as a unit of observation.

Dependent variable: <i>LandSecurity</i>		
Explanatory variables	(1)	(2)
Mean ContractFormality	0.639*** (0.156)	0.576*** (0.153)
Mean Title	0.669*** (0.0691)	0.651*** (0.0673)
Northern	0.611*** (0.203)	
Eastern	-0.584*** (0.109)	
Ashanti	-0.382*** (0.144)	
Central	-1.343*** (0.192)	
Accra	-1.040*** (0.229)	
Urban	0.157** (0.0673)	0.208*** (0.0662)
Male	0.148** (0.0597)	0.154*** (0.0586)
Position	-0.134** (0.0550)	-0.193*** (0.0542)
MiDA: Northern		1.094*** (0.180)
MiDA: Afram		-0.0169 (0.0778)
Constant	0.0694 (0.168)	-0.582*** (0.131)
Religion controls	Yes	Yes
Ethnicity Controls	Yes	Yes
Omitted region	Volta	-
Omitted MiDA Zone	-	Southern
Observations	3,272	3,272

Robust standard errors in parentheses. Significance level indicated by *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Notes: Only the first reported land plots per individual are included, therefore each individual appears in the sample only one time.