IFPRI Discussion Paper 01545

July 2016

Perceived Land Tenure Security and Rural Transformation

Empirical Evidence from Ghana

Hosaena Ghebru

Huma Khan

Isabel Lambrecht

Development Strategy and Governance Division

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

The International Food Policy Research Institute (IFPRI), established in 1975, provides evidence-based policy solutions to sustainably end hunger and malnutrition and reduce poverty. The Institute conducts research, communicates results, optimizes partnerships, and builds capacity to ensure sustainable food production, promote healthy food systems, improve markets and trade, transform agriculture, build resilience, and strengthen institutions and governance. Gender is considered in all of the Institute's work. IFPRI collaborates with partners around the world, including development implementers, public institutions, the private sector, and farmers' organizations, to ensure that local, national, regional, and global food policies are based on evidence. IFPRI is a member of the CGIAR Consortium.

AUTHORS

Hosaena Ghebru is a research fellow in the Development Strategy and Governance Division, International Food Policy Research Institute (IFPRI), Addis Ababa.

Huma Khan is a senior research assistant in the Development Strategy and Governance Division of IFPRI, Washington, DC.

Isabel Lambrecht is an associate research fellow in the Development Strategy and Governance Division of IFPRI, Accra.

Contents

Tables

Figures

ABSTRACT

Tenure security is believed to be critical in spurring agricultural investment and productivity. Yet what improves or impedes tenure security is still poorly understood. Using household- and plot-level data from Ghana, this study analyzes the main factors associated with farmers' perceived tenure security. Individually, farmers perceive greater tenure security on plots acquired via inheritance than on land allocated by traditional authorities. Collectively, however, perceived tenure security lessens in communities with more active land markets and economic vibrancy. Migrant households and women in polygamous households feel less secure about their tenure, while farmers with political connections are more confident about their tenure security.

Keywords: tenure security, customary tenure system, social and economic transformation, gender, Ghana

ACKNOWLEDGMENTS

This work was undertaken as part of the CGIAR Research Program on Policies, Institutions, and Markets (PIM), which is led by IFPRI and funded by the CGIAR Fund Donors. We thank the United States Agency for International Development (USAID) for their support for this study under the Ghana Strategic Support Program. The authors recognize Shashidhara Kolavalli, Ruth Meinzen-Dick, and an anonymous reviewer for their feedback. This paper has not gone through IFPRI's standard peer-review procedure. The opinions expressed here belong to the authors, and do not necessarily reflect those of PIM, IFPRI, CGIAR, or USAID.

1. INTRODUCTION

For more than 50 years, land tenure reforms have moved up and down the priority lists of African governments and donors (Peters 2009). Today they continue to be considered and reconsidered as a major strategy to increase agricultural productivity and promote agricultural investment. At the heart of this debate is the concept of *tenure security*.

Tenure security has attracted considerable attention because, conceptually, improving it paves the way for more agricultural investment and therefore greater agricultural production (Besley 1995). What drives tenure security, however, is not clear. Few studies have looked at the question (an exception is Linkow [2016]). Hence, debates on the need for and the design of land policy reforms rest on assumptions of what can drive tenure security rather than on empirical evidence. Many land policies promoted from the late 1960s until the early 1980s were based on the premise that customary systems did not provide adequate tenure security. Formalization of tenure through land titling or registration was seen as an effective way to ensure tenure security (Atwood 1990; Peters 2009). Others, however, have argued that due to the prevalence of high transaction costs and market imperfections, customary land rights systems may provide better or equal tenure security compared with statutory systems (Atwood 1990; Brasselle, Gaspart, and Platteau 2002; Bromley 2008; Ghebru 2012; Bruce and Migot-Adholla 1994). Yet processes of rural transformation, such as the development of active land markets, population increase, migration, and urbanization, can erode the social cohesion that is the main legitimacy of customary tenure systems (Augustinus and Deininger 2005; Lastarria-Cornhiel 1997).

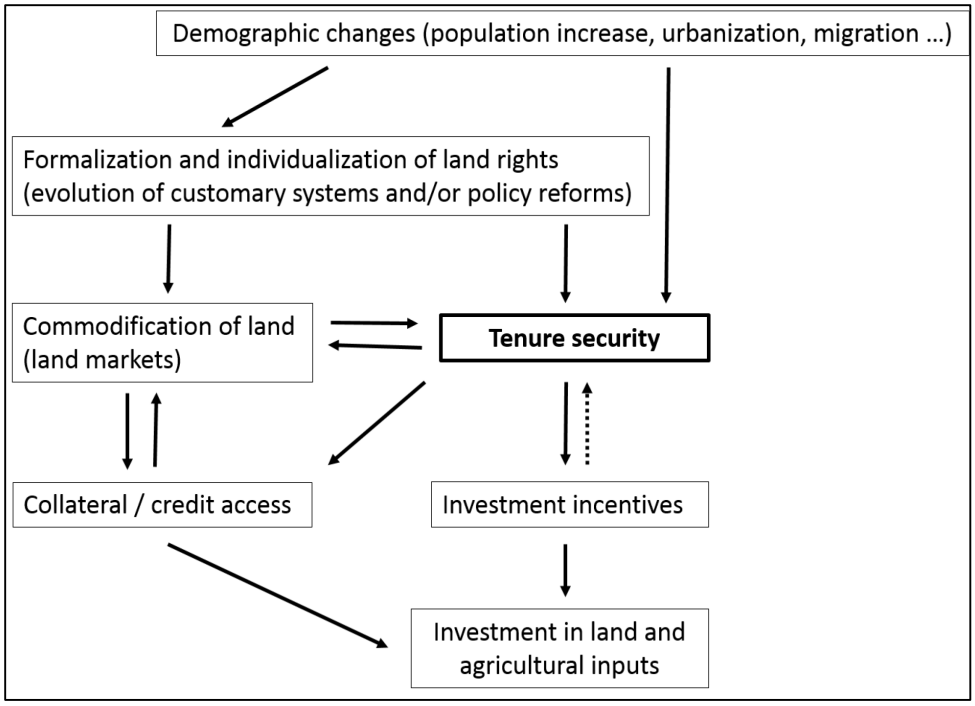
In this study, we shed light on three elements at the forefront of the debate on land reforms and drivers of tenure security: (1) individualization and formalization of land rights; (2) commodification of land; and (3) the changing demography of rural areas. We use nationally representative data from Ghana to understand factors related to perceived tenure security for smallholder farmers. Ghana provides a relevant case study context due to the existence of both customary and statutory land governance systems, the ethnic and agroecological diversity, and the existence of clear patterns of rural transformation in several regions of the country. Moreover, there is a strong policy interest in land tenure reforms in Ghana. During the past decades land reforms have continuously been on the agenda of the government as well as the donor community in Ghana and throughout Africa south of the Sahara.

Our main outcome variable is a measure of perceived tenure insecurity that indicates whether a farmer can leave his or her land empty without the risk of losing the land. As fallowing is the most common method of soil fertility improvement in Ghana, the indicator is practical, pertinent, and relevant as a key aspect of farmers' perceived tenure security. Our results show that farmers' perception of tenure security is lower in communities with more active processes of rural transformation, that is, in more urbanized areas with more active land markets and with a higher share of migrants in the population. At the same time, farmers are more secure over land obtained through market-based and individual transactions compared with land obtained through customary non-market-based transactions. Migrant farmers and female farmers in female-headed households and polygamous households are most vulnerable to tenure insecurity.

2. CONCEPTUAL FRAMEWORK: RURAL TRANSFORMATION AND TENURE SECURITY

Theoretically, three main pathways relate a higher degree of tenure security to increased land investments and subsequently higher agricultural productivity (Figure 2.1). First, farmers that are more tenure secure have greater incentives to invest in their land. Second, they can use their land as collateral, which facilitates access to resources to invest. Third, more secure tenure facilitates land market transactions, and that indirectly leads to higher overall investments in the land (Besley 1995; Ghebru and Holden 2015a; Holden, Deininger, and Ghebru 2011; Place 2009). Conceptually these three tenure security–investment pathways make sense. Empirical results are less conclusive (Deininger and Jin 2006; Place 2009). Some studies conclude that improved tenure security increases investment and productivity (Abdulai, Owusu, and Goetz 2011; Ali, Dercon, and Gautam 2011; Goldstein and Udry 2008; Ghebru and Holden 2015b; Holden, Deininger, and Ghebru 2009), whereas others find insignificant or mixed results (Besley 1995; Brasselle, Gaspart, and Platteau 2002; Fenske 2011; Linkow 2016).

Figure 2.1 Conceptual model linking rural transformation, tenure security and agricultural investment



Source: Authors creation based on Place (2009).

The differing conclusions arise in large part from the variation in how tenure security is defined and measured, whether tenure security is considered at the individual or collective level, and the context of the case studies (Arnot, Luckert, and Boxall 2011; Lambrecht and Asare 2015). Despite its key position in the debate on land reforms, the use of the term tenure security is generally problematic (Arnot, Luckert, and Boxall 2011; Place 2009). Researchers agree on no uniform definition of the term, and therefore use a range of different indicators to represent the concept (Arnot, Luckert, and Boxall 2011; Place 2009). Most studies rely on de jure indicators of land tenure as indirect proxy measures for tenure insecurity, such as number or nature of land rights, land titles or land registration, mode of acquisition, and existence of clear parcel boundaries (for example, Abdulai, Owusu, and Goetz 2011; Besley 1995; Brasselle, Gaspart, and Platteau 2002; Fenske 2011). The choice of such de jure indicators rests on strong

assumptions of what drives tenure security, which are not always substantiated with evidence. Only a small minority of studies effectively use farmers' perceived risk of losing their land as a measure of perceived tenure security for the analysis of its impact on agricultural investment and productivity (for example, Ali, Deininger, and Goldstein 2014; Hagos and Holden 2006; Holden and Yohannes 2002; Linkow 2016; Mekonnen 2009).

The key interest of this paper is to better understand which factors influence perceived tenure security. Three main elements dominate the debate on land reforms because they are believed to affect tenure security: (1) formalization and individualization of land rights; (2) commodification of land; and (3) the changing demography of rural areas (Figure 2.1). Exclusive, well-defined, or documented land rights, or some combination thereof, potentially reduce land disputes, ensure more objective dispute resolution, and thereby increase tenure security. Moreover, several studies argue that formalization and individualization of land rights can facilitate land market transactions (Besley 1995). Yet others argue that land titling and land registration are not necessarily conducive for tenure security, and that the number, or nature, of land rights is not automatically linked to farmers' perceptions of tenure security (Arnot, Luckert, and Boxall 2011; Atwood 1990; Bromley 2008; Jacoby and Minten 2007; Place and Migot-Adholla 1998). Without institutions to enforce property rights effectively, land registration systems are not effective in enhancing tenure security (Bromley 2008; Deininger and Feder 2009). Land titling and registration may allow more powerful and well-connected people to appropriate a disproportionately large share of land at the expense of others (Atwood 1990; Deininger and Feder 2009; Lastarria-Cornhiel 1997). Also, formal attempts to clarify parcel boundaries and identify the owner of the land might spark latent conflicts (Gignoux, Macours, and Wren-Lewis 2013).

During the past decades, land market transactions have become more common in many areas of Africa (Lastarria-Cornhiel 1997). The commodification of land and the development of land markets has been met with enthusiasm by some and caution by others. Advocates of the development of land markets suggest that easier transferability of land results in more efficient use of land (Besley 1995; Deininger et al. 2014). Others expect a reduction in tenure security due to an upsurge of land conflicts triggered by monetary incentives (Chimhowu and Woodhouse 2006).

Several processes of demographic change, such as migration, population increase, and urbanization, directly and indirectly affect tenure security. Growth of the rural population subsequently reduces per capita landholdings and therefore increases the scope for land conflicts and tenure insecurity (Deininger and Feder 2009). Migration has played a critical role in the individualization and commoditization of land in Africa (Chimhowu and Woodhouse 2006). Migration, especially rural-to-rural migration, changes the population density and ethnic composition of communities and necessitates changes in local land governance. Urbanization typically comes with a higher density of households, but also more off-farm income opportunities.

Farmers' status in the household and community affects their claims to land. In many African settings, migrants, female farmers, and nonindigenes have limited tenure security (Colin and Ayouz 2006; Goldstein and Udry 2008; Gray and Kevane 2001). Connectedness through political or traditional offices, or both, can increase tenure security (Goldstein and Udry 2008; Gray and Kevane 2001). Rather than unambiguously affecting tenure security, many processes of rural transformation will differently affect different community members, especially women and other vulnerable groups (Ali et al. 2014; Gray and Kevane 2001). Farmers' investments on their land can also affect tenure security. Long-term land investments, such as tree planting or terracing, have been shown to reinforce farmers' claims to the land, providing a classical example of reverse causality in the tenure security–investment link (Besley 1995; Brasselle, Gaspart, and Platteau 2002; Sjaastad and Bromley 1997). In a study on the land distribution policy in Southern Ethiopia, Holden and Yohannes (2002) find that drivers of tenure security are largely site-specific, and that local historical, cultural, and demographic differences shape the distribution of tenure security.

3. LAND TENURE AND TENURE SECURITY IN GHANA

Ghana's land tenure systems are characterized by diversity (Lambrecht and Asare 2015). Ghana covers three main agroecological zones and hosts roughly 100 ethnic groups (Ghana Statistical Service 2012). Population densities are as high as 224 persons per square mile in the Central Region, and as low as 35 persons per square mile in the Northern Region (Ghana Statistical Service 2012). Only a minority of the land in Ghana is owned privately or by the government. The majority of the land (about 80 percent) is under customary tenure (Pande and Udry 2005).

Land governance in Ghana is characterized by a legal duality between statutory laws and customary laws. Both types are recognized by the state, yet several laws overlap or contradict, or both (Quan, Ubink, and Antwi 2008). For decades, land reforms, aiming at improving tenure security and hence increasing agricultural production, have been on the policy agenda of the government of Ghana and the donor community. In 1986, the Land Title Registration Law was enacted, which indicated land titling as the official system for property registration. However, the law was scarcely applied (Jones-Casey and Knox 2011). In 1999, Ghana approved its first comprehensive land policy, the National Land Policy (Ghana, Ministry of Lands and Forestry 1999). In 2003, the World Bank and other partners started the Land Administration Reform Program in Ghana. That project seeks to enhance land tenure security and strengthen both government land administration services through decentralization as well as customary authorities by initiating pilots of customary land secretariats1 (IEG 2013; Quan, Ubink, and Antwi 2008).

Individualization and Formalization of Land Tenure

Throughout Ghana, land is considered a spiritual entity that belongs to past, current, and future generations (Bakang and Garforth 1998; Lambrecht and Asare 2015). Customary land is owned by communities under control of the chief or land priest (skin or stool land) or owned by families, lineages, or clans under control of the respective family, lineage, or clan head (family land). Membership of a family or clan is established through female bloodlines in matrilineal, and through male bloodlines in patrilineal, ethnic groups (La Ferrara 2007). Generally, customary land is cultivated under the form of communal tenure, where individual members select or are allocated a specific parcel for which they have temporary or permanent use or transfer rights (Takane 2002; Lambrecht and Asare 2015). The duration of an individual's use rights and the degree to which individuals can temporarily or permanently transfer customary land to others depend strongly on the community and the specific situation (Lambrecht and Asare 2015).

As in many other African countries, several community and family members have overlapping rights to agricultural land (Fenske 2011). According to customary law, individual ownership is recognized for standing crops but not for the land itself. A farmer is reasonably sure to retain access to his or her land under cash tree crops, such as cocoa, rubber, or oil palm, but not so much to land cultivated with annual crops (Goldstein and Udry 2008; Lambrecht and Asare 2015; Pande and Udry 2005). Tenure security is most precarious for land that is left fallow. Yet fallowing is the primary mechanism by which farmers restore and maintain soil fertility in Ghana (Goldstein and Udry 2008). In a study of Akwapim South District in the Eastern Region of Ghana, Goldstein and Udry (2008) showed that the risk of losing land significantly reduces fallowing periods, hence impeding full restoration of soil fertility and resulting in a significant loss of productivity.

[1] The customary land secretariat (CLS) is an intervention (program) first launched in 2004 under the World Bank–funded Land Administration Project to strengthen the institutional capacity and accountability of customary land administration systems in the country. Ten pilots were set up, one in each region beginning in 2004. Today, there are 37 customary land secretariats throughout the whole country (Bugri 2011).

Yet customary land tenure institutions are evolving toward more individualized rights to land (Fred-Mensah 1999; Quisumbing et al. 2001). Farmers increasingly have permanent use rights to the land they cultivate, and they have greater control over the possibility of alienating and bequeathing land (Ferrara and Milazzo 2014). At the same time, control over the land by traditional authorities such as chiefs, land priests, and clan or lineage heads is reduced (Quisumbing et al. 2001).

Despite major efforts toward formalization of landownership in Ghana, the Lands Commission2 can provide land titles only for properties within the Greater Accra Region. In the other nine regions of Ghana landholders cannot obtain an actual land title, but land transactions (leases, assignments, mortgages, and so on) can be documented through the Lands Commission in the form of deed registration. Registration of farmland is mostly done by large-scale investors and is less common among smallholder farmers who mostly resort to informal written documents for permanent transactions. Despite their aim to improve tenure security, formal systems of land registration do not effectively protect buyers from multiple registrations of the same plot of land (Boni 2008; Lambrecht and Asare 2015).

Commodification of Land

In more remote and sparsely populated communities, land markets (that is, renting, sharecropping, selling, and long-term lease of land) are virtually nonexistent. According to custom, farmland in such communities should not be sold or rented out. Land acquisition mainly occurs through nonmarket transactions such as borrowing, allocation of customary land, gifts, or inheritance of land (Bakang and Garforth 1998; Lambrecht and Asare 2015). However, in many areas an increasing number of land transactions take place in which agricultural land can temporarily or permanently be held by an individual in return for monetary or in-kind payments, especially in the south of Ghana, where competition over land is stiff (Quisumbing et al. 2001). These are typically communities that are more easily accessible and where farmland is scarcer. Market land transactions take place through the renting, sharecropping, and even purchasing of land (Lambrecht and Asare 2015; Takane 2002; Tsikata and Yaro 2013).

A recurring issue on customary land is the concurrent claims of multiple parties to the same land. For customary land, ideally, each ethnic group is confined with a clearly demarcated territory that is under custody of the paramount chief, the head of the group. That territory is then subdivided among different clans, families, and in some cases households. In reality, boundaries are not clearly demarcated and frequent disputes occur over transfer and use rights to land across and within each level of the existing hierarchies (Pul 2003; Boni 2008). Land acquired through purchase is considered private land,3 so the owner is less likely to face expropriation due to competing claims from family or community members. However, tenure security can still be under threat due to multiple sales of land, renegotiation of the agreement, boundary disputes, and illegal encroaching of land (Boni 2008; Lambrecht and Asare 2015). It is not uncommon for a family member to renege on an agreement that was made for the sale of family land by his or her siblings, and multiple sales occur willfully or unknowingly (Lambrecht and Asare 2015).

Demographic Changes

Land tenure systems in Ghana are dynamic and change in response to rapid rural transformation (Quisumbing et al. 2001; Lambrecht and Asare 2015). Rural-to-rural migration in search for farmland and other agricultural livelihood opportunities has been documented throughout Ghana's history and continues to shape land tenure (Berry 2009; Wouterse 2010). In addition, people started migrating from rural to urban areas in search of other income opportunities, and many rural households have diversified

[2] In Ghana, the Lands Commission is responsible for the management of all public lands and lands vested in the president. In addition, the Lands Commission plays a supervisory role in the registration of transactions of customary land. Registration of customary land with the Lands Commission is voluntary, not mandatory (Lambrecht and Asare 2015).

[3] Officially, the sale of customary land is not allowed, and any such long-term transfer must occur under the form of a lease. In practice, customary land is being sold in some areas, and after the purchase the land is considered private land.

into nonfarm income-generating activities (Nin-Pratt and McBride 2014). Farmers increasingly use fertilizers and other modern inputs (Houssou et al. 2013). Contrary to the common view of decreasing per capita land sizes, the average land–labor ratio has increased during the past decades in Ghana. From 1990 to 2010, the land area cultivated increased by 3.9 percent annually, whereas the rural population grew on average only 1.1 percent (Houssou et al. 2013). However, much of this comes at the cost of increased land scarcity and a reduction in fallow land (Goldstein and Udry 2008; Ragasa et al. 2013).

Customarily, the allocation of land and the resolution of land disputes primarily occur with the help of neighbors, the family head and family elders, the village head, or the land priest, or some combination thereof (Boni 2008). The risk of losing land under fallow is therefore highly dependent on the individual's position in social and political hierarchies (Goldstein and Udry 2008). Migrants often face greater tenure insecurity than indigenous community members. As land becomes scarcer, contracts and the nature of those contracts between customary authorities and migrants are often renegotiated or reinterpreted in order to reallocate more land to indigenous community members (Berry 2009; Goldstein and Udry 2008; Quan, Ubink, and Antwi 2008). Men's access to land is generally prioritized over women's access to land, and decisions over land are considered "men's business," which leads to lower tenure security for female farmers (Brydon 1996; Clark 1994, 100–101; Goldstein and Udry 2008; Lambrecht 2016). Finally, those who have better connections with traditional political offices are better able to secure their access to land (Goldstein and Udry 2008).

4. DATA AND METHODS

Data

We use data from the first round of the EGC-ISSER Ghana Socioeconomic Panel Survey (EGC-ISSER 2009 Ghana socioeconomic Survey), which was a collaboration between the Economic Growth Center (EGC) at Yale and the Institute of Statistical, Social, and Economic Research (ISSER) at the University of Ghana, Legon. The survey was conducted in 2009 and 2010 and is nationally representative. Our main outcome variable is a binary variable answering the question: "Could you leave the land empty for a period of several months without being worried about losing it?" This measure of tenure security closely follows the conventional view of tenure security as "risk of losing the land" (Sjaastad and Bromley 2000), and is different from other commonly used indicators that focus on the de jure aspects of land tenure, such as mode of acquisition or land rights. It is very relevant in the tenure security–investment narrative, since agricultural investment decisions are essentially made based on expectations of whether the plot holder can reap the benefits of his or her investments. The three key components of tenure security—duration, breadth, and assurance (Place, Roth, and Hazell 1994)—are all reflected in our measure of perceived tenure security.

Using a measure of perceived tenure security is very relevant in the context of the tenure security-investment narrative and provides an improvement over other de jure measures of tenure security, such as land rights or mode of acquisition. The perceived tenure security measure is, however, subjective. It is therefore still imperfect to represent vulnerability to de facto loss of land. All else equal, some farmers may worry more easily about losing their land than others. Moreover, farmers may not be sufficiently well informed to anticipate large exogenous shocks such as large-scale land acquisitions. In interpreting the results, it is therefore important to remember that we talk about perceived, rather than de facto, tenure insecurity.

To ensure that our analyses and interpretations are meaningful, the sample for our main descriptive and regression analyses is limited to a subset of households and agricultural plots. There are three main reasons for reducing the sample. First, the study includes only households that practice farming on at least one of their landholdings. Households that have no landholdings or that do not practice farming on any of their landholdings are therefore excluded. Second, plots with 100 percent perennial crops are excluded. Our outcome variable for perceived tenure security is limited to the concept of "leaving the land empty," which is unlikely to occur on plots with perennials. Third, we do not include plots acquired through renting or sharecropping in our main regressions. User rights on such plots are inherently of limited duration, and it is unlikely for a tenant to leave rented or sharecropped land empty during growing seasons. Hence, the main analyses in this study are based on data from 3,982 plots operated by 2,238 households.

Hypotheses

This study tests the following hypotheses:

H1: The position of a farmer within the community and household determines his or her tenure security:

> **H1a:** Perceived tenure security is lower among female-headed households than it is among their male counterparts, and it is lower among female plot holders compared with male plot holders.
>
> **H1b:** Tenure security is particularly low among female plot holders who belong to polygamous households compared with other female plot holders.
>
> **H1c:** Perceived tenure security is greater among households with more social and political connectedness.

H2: Economic and social transformations affect the protection that a traditional or customary tenure system provides to smallholder farmers in Africa (Ghebru 2012):

H2a: Perceived tenure security is weaker among nonindigene (migrant) landholders compared with those who are indigene.

H2b: Tenure security is lower among households that reside in communities with a large proportion of nonindigenous (migrant) households.

H3: Individualization and commodification of land are not necessarily detrimental to tenure security at the individual level (internal effect), although it may erode a collective sense of tenure security (external effect):

H3a: Individual tenure security is higher on plots acquired via purchase or inheritance than it is on plots acquired via allocation by traditional authorities.

H3b: Collectively, tenure security is less strong among farmers who reside in communities with relatively active land markets and more economic vibrancy, as such factors lead to an increase in land values.

Empirical Method

Given the binary nature of our dependent variable, the study uses a simple probit model. The regression analysis is based on the following equation:

$$TS_p = \beta_0 + \beta_1 G_p + \beta_2 FH_h + \beta_3 PH_h + \beta_{13} G_p{*}PH_h + \beta_4 M_p + \beta_5 LM_c + \beta_6 HT_c + \beta_7 EV_c + \beta_8 T_p + \beta_9 A_h + \beta_{10} SC_h + \beta_{11} PL_p + \beta_{12} IL_p + \beta_{13} PP_p + \beta_{14} HH_h + \beta_{15} CC_c + \epsilon_h + \epsilon_p + \epsilon_c \quad (1)$$

The key variables used in our analysis are the following (the signs of each variable shown in parentheses indicate the expected relationship with the dependent variable):

- TS_p – a binary dependent variable answering "Could you leave the land empty for a period of several months without being worried about losing it?"
- G_p – indicator variable for a female plot holder (-/+)
- FH_h – indicator variable for a female-headed household (-)
- PH_h – indicator variable for a polygamous household (+)
- $G_p{*}PH_h$ – interaction term of gender of plot holder with polygamous household (-)
- M_p – indicator variable for migrant (nonindigene) plot holder (-)
- LM_c – proportion of households in a community that participate in land market activity (that is, households that purchase, rent, or sharecrop at least one plot) (-)
- HT_c – proportion of migrant/nonindigene households in a community (-)
- EV_c – proxy variable for economic vibrancy = proportion of households in the community with modern roofing material (corrugated iron, tile, concrete, and so on) (-)
- T_p – number of years since acquisition (first cultivation) of a plot (+)
- A_h – total farm size of the household (-/+)
- SC_p – proxy variable for social connectedness = a dummy variable equal to one if the plot holder ever held a position in traditional political office (+)
- PL_p – dummy for a plot acquired via purchase (reference group is free allocation by traditional authorities) (+)
- IL_p – dummy for a plot acquired via inheritance (reference group is free allocation by traditional authorities) (+)
- PP_p – other plot-level variables (+/-)
- HH_h – other household-level variables (+/-)
- CC_c – other community-/village-/cluster-level variables (+/-)
- $\epsilon_p, \epsilon_h, \epsilon_c$ – error terms at plot, household, and community level

Robustness/Sensitivity Analysis

To account for potential attrition and test the robustness of our findings to the reduction in sample sizes with unique features (plots with perennial crops and plots acquired via rent/sharecropping), we conducted a sensitivity analysis by running eight distinct regression models with and without the subset of datasets described above as well as relaxing the definition of family size considering "with" and "without" direct descendants of the head or spouse, or both, who no longer reside in the household[4] (Table 4.1).

Table 4.1 Model specification used for sensitivity analysis

	Sample		Family size variable includes nonresident direct descendants	Number of observations
Models	**Includes rented/ sharecropped in plots**	**Includes plots with only permanent crops**		
Model 1	Yes	Yes	Yes	4,466
Model 2+	**No**	**No**	**Yes**	**3,290**
Model 3++	**Yes**	**No**	**Yes**	**3,982**
Model 4	No	Yes	Yes	3,645
Model 5	Yes	Yes	No	4,466
Model 6	No	No	No	3,276
Model 7	Yes	No	No	3,966
Model 8	No	Yes	No	3,645

Source: Authors' compilation using data from the EGC-ISSER 2009 Ghana socioeconomic Survey
Notes: + Same model specification reported as the main findings under Table 6.1, Model C. ++ Same model specification reported as the main findings under Table 6.1, Model D.

[4] We include this in the sensitivity analysis since direct descendants of the head or spouse, or both, who no longer reside in the household are often considered when it comes to intrahousehold resource land distribution.

5. DESCRIPTIVE ANALYSIS

About two-thirds of households (61.3 percent) have no fear of losing any of their plots in case they are left empty (Table 5.1). The remaining group (38.7 percent) fears losing land for at least one of the plots held. More than a quarter of all households (27.7 percent) are female headed. The average age of the household head is 50 years. Around 10 percent of the households are migrant households where both the husband and wife are nonindigene to the community in which they live. On average, nucleus family size (only considering resident family members) is about four, whereas extended family size (considering also nonresident descendants of the head and/or spouse) is 17 per household. Overall, households own two plots with an average per capita[5] landholding of almost 1 hectare (Table 5.1).

Table 5.1 Mean household characteristics and comparisons by tenure security status

	All households		Household is tenure secure+				
			Yes		No		
Variable	Mean	Standard error	Mean	Standard error	Mean	Standard error	a
Household is tenure secure+	0.613	(0.012)					
Head of household is female	0.272	(0.012)	0.259	(0.015)	0.293	(0.020)	*
Age of household head	50.219	(0.394)	50.614	(0.510)	49.594	(0.619)	
Migrant—head and spouse nonindigene	0.105	(0.007)	0.079	(0.008)	0.147	(0.014)	****
Household size (resident only)	4.217	(0.062)	4.171	(0.079)	4.291	(0.102)	
Family size: including nonresident	17.240	(0.136)	17.076	(0.168)	17.499	(0.231)	*
Total number of plots cultivated	2.02	(0.028)	1.99	(0.034)	2.07	(0.047)	
Total farm size (hectares)	2.731	(0.089)	2.583	(0.097)	2.967	(0.171)	**
Farm size per capita[b] (hectares)	0.948	(0.054)	0.935	(0.062)	0.970	(0.099)	
Number of observations	2,238		1,289		771		

Source: Authors' computation using data from the EGC-ISSER 2009 Ghana socioeconomic Survey.

Notes: + Household is tenure secure if response for all plots is yes to "Could you leave the land empty for a period of several months without worrying that you will lose it?" [a] Pairwise comparisons of tenure-secure and tenure-insecure households significantly different at **** $p < 0.001$; *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$. [b] Farm size does not include landholdings that are rented in or sharecropped.

The proportion of female-headed households in the tenure-secure group is significantly lower (25.9 percent) compared with the proportion among tenure-insecure households (29.3 percent). The proportion of migrant households among those who fear losing their land (tenure insecure) is significantly higher (14.7 percent) compared with the proportion of migrants in the group who reported having no fear of losing their land (7.9 percent). Moreover, results also show that tenure security is negatively associated with farm size. Households with weaker tenure security have significantly more land (2.97 hectares) compared with those who do not fear losing their land (2.58 hectares) (Table 5.1).

At the plot level, more than two-thirds of the plot holders (that is, 67.4 percent) report no fear of losing their land in case of fallow (Table 5.2). More than a quarter of the plots are held by migrant farmers (26 percent) and female farmers (27.4 percent). Nonmarket means of land acquisition are the dominant means of land transactions. We find that 39.9 percent and 37.4 percent of the plots are acquired via inheritance and free land allocation by traditional authorities, respectively. Only 2.8 percent of the plots were acquired via purchase. Nearly three-quarters of plot holders (74.2 percent) believe the boundary markings of their plot are clear.

A significantly higher proportion of tenure-insecure plot holders are migrant or female compared with tenure-secure plot holders. On average, plot holders who feel secure in their ownership have held the plot for 1.32 years longer than plot holders who fear losing land (that is, 11.76 and 10.44 number of years since land acquisition for those who feel secure and insecure about their land possession, respectively).

[5] Per capita holding is computed considering only resident members of the household and is calculated in adult equivalent (consumer unit).

There is no statistically significant difference in proportion of land acquired through purchase among perceived tenure-secure and tenure-insecure plots. Among the plots on which the holders felt tenure secure, 53.4 percent were acquired via family inheritance and only about 43.4 percent had been acquired via allocation by traditional authorities. The reverse holds for plots where holders felt tenure insecure, showing 43.8 percent and 53.7 percent for land acquired via inheritance and free allocation, respectively.

Table 5.2 Plot characteristics and group mean comparisons of by tenure security status

Variable	All plots		Plot holder is tenure secure[+]				[a]
			Yes		No		
	Mean	Standard error	Mean	Standard error	Mean	Standard error	
Plot holder is tenure secure (no fear of land loss)	0.674	(0.013)					
Plot holder is migrant	0.260	(0.012)	0.217	(0.014)	0.348	(0.022)	****
Plot holder is female	0.274	(0.012)	0.257	(0.015)	0.308	(0.021)	*
Number of years since land acquisition	11.326	(0.323)	11.758	(0.392)	10.435	(0.566)	*
Plot is acquired via purchase	0.028	(0.004)	0.028	(0.005)	0.029	(0.008)	
Plot is acquired from inheritance	0.502	(0.014)	0.534	(0.017)	0.434	(0.024)	****
Plot is acquired from free allocation	0.470	(0.014)	0.438	(0.017)	0.537	(0.024)	****
Plot size (hectares)	1.319	(0.045)	1.246	(0.042)	1.470	(0.107)	**
Distance to plot (in minutes)	49.57	(0.995)	48.158	(1.516)	51.989	(2.097)	*
Plot has a permanent/tree-type crop	0.120	(0.008)	0.126	(0.010)	0.109	(0.012)	
Plot fallowed in the last 2 years	0.105	(0.008)	0.117	(0.010)	0.080	(0.011)	**
Plot is currently fallowed	0.043	(0.005)	0.052	(0.007)	0.024	(0.007)	****
Plot has clear boundary markings	0.742	(0.012)	0.739	(0.016)	0.748	(0.019)	
Total number of observations	3,442		2,348		1,094		

Source: Authors' computation using data from the EGC-ISSER 2009 Ghana socioeconomic Survey.

Notes: [+]Plot holder tenure secure if the response is yes for the question "Could you leave the land empty for a period of several months without worrying that you will lose it?". [a] Statistical significance of pairwise comparisons of tenure-secure and tenure-insecure households. All figures are weighted averages adjusted using sampling weights. **** $p < 0.001$; *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

Moreover, tenure-secure plots are also found to be closer to the residential homes of the plot holder. Average plot size is smaller for plots where farmers feel secure. Among tenure-secure and tenure-insecure plots there is no significantly different proportion of plots that have some permanent crops, but there is a significantly higher proportion of recent fallowing on plots with perceived tenure security.

6. ECONOMETRIC RESULTS

This section presents the regression results of factors associated with perceived tenure security (Table 6.1) and the sensitivity analysis (Table 6.2). Model C in Table 6.1 is the main regression model, using the sample as described in Section 4. Models A and B in Table 6.1 are the reduced forms of the main regression model (Model C). Model D includes plots held under renting and sharecropping arrangements.

Perceived tenure security is strongly associated with the gender, migrant status, and political connectedness (proxied by an indicator variable if the plot holder has ever held traditional office) of individuals and households. Perceived tenure security is lower among female-headed households as compared to male-headed households (Table 6.1). Lower tenure security among female-headed households can be explained by their weaker social and economic position in the community. In contrast with these findings, the positive coefficient of the interaction of "female head of household" and "household per capita landholding" shows that perceived tenure insecurity is lower for such groups when land is relative abundant.

Surprisingly, female plot holders have better perceived tenure security than male plot holders. This may be explained by social gender norms in which men are perceived to be the main people responsible for providing the main household necessities as well as providing women with access to land (Lambrecht 2016). Men in male-headed households may therefore worry more about losing their land than women in male-headed households. However, it is worth noting that plots held by women in monogamous male-headed households are rare (3.3 percent of the main sample).

Men in polygamous households are more tenure secure than other men, yet female plot holders in polygamous households are less tenure secure compared with other female plot holders. Men in polygamous marriages often have a high social or economic status, with more secure access to land in the community. Yet the presence of multiple wives reduces the level of support that women in polygamous marriages can expect from their male spouse for access to land and provision of basic household necessities (Lambrecht 2016). These empirical findings are in line with the growing consensus that the customary tenure system could be well suited to protect women's land rights in some, but not all, cases.

As hypothesized in hypothesis H1c, and in line with Goldstein and Udry (2008), we find that tenure security is significantly greater for farmers who have ever held traditional political office. Traditional authorities continue to play a major role in Ghana, especially in matters related to land tenure. Customary tenure rules are often prone to substantial interpretation and modification, enabling those that hold positions in the traditional chieftaincy and lineage structures to influence land allocation and settling of land disputes (Goldstein and Udry 2008; Lambrecht and Asare 2015).

The negative and statistically significant coefficient of the variable "landholder is a migrant" supports our second hypothesis (H2a) that perceived tenure security is weaker among nonindigene (migrant) landholders. The customary tenure systems in Ghana, which still predominate over statutory tenure, normally favor land interests of indigene members of the community. Moreover, the length of time since the farmer acquired a plot is positively associated with tenure security. These farmers are more likely to feel more secure with respect to their land tenure than are new landholders (recent settlers), who could be disfavored by the customary tenure system.

Table 6.1 Factors associated with perceived tenure security: Plot level (marginal effects)

Variable*	Model A ME/(se)	Model B ME/(se)	Model C ME/(se)	Model D ME/(se)
Head of household is female	-0.145***	-0.141***	-0.227****	-0.237****
	(0.05)	(0.05)	(0.05)	(0.05)
Household is polygamous	0.054**	0.013	0.05	0.056**
	(0.02)	(0.02)	(0.03)	(0.03)
[Female head]*[per capita farm size]	0.024*	0.032**	0.045**	0.050**
	(0.01)	(0.02)	(0.02)	(0.02)
Plot holder is female	0.087**	0.084**	0.140***	0.143****
	(0.04)	(0.04)	(0.05)	(0.04)
[Female plot holder]*[Family is polygamous]	-0.177**	-0.142*	-0.149*	-0.156*
	(0.08)	(0.08)	(0.09)	(0.08)
Plot holder is migrant	-0.127****	-0.078****	-0.078****	-0.052***
	(0.02)	(0.02)	(0.02)	(0.02)
Plot holder has ever held traditional office	0.021	0.036	0.104****	0.105****
	(0.03)	(0.03)	(0.03)	(0.03)
Community proportion with at least one plot acquired via purchase, rent/sharecrop in (land market vibrancy)		-0.212****	-0.156***	-0.04
		(0.05)	(0.05)	(0.05)
Community proportion of households where the head and spouse are migrants (nonindigene)		-0.293****	-0.239****	-0.237****
		(0.07)	(0.07)	(0.07)
Community proportion of households with modern roofing material		-0.191****	-0.236****	-0.280****
		(0.03)	(0.04)	(0.03)
Community proportion of households who acquired their first plot within the last 5 years		0.150****	0.090**	-0.06
		(0.04)	(0.04)	(0.04)
Location is rural		0.073***	0.060**	0.061**
		(0.02)	(0.03)	(0.02)
Plot is acquired via purchase			0.04	0.05
			(0.06)	(0.06)
Plot is acquired through inheritance			0.065***	0.087****
			(0.02)	(0.02)
Plot is acquired through renting or sharecropping				-0.141****
				(0.03)
Log (number of years since plot acquisition)			0.030***	0.022**
			(0.01)	(0.01)
Total farm size (in hectares)			-0.013*	-0.015**
			(0.01)	(0.01)
Plot has permanent crop cultivated			0.085***	0.071***
			(0.03)	(0.03)
Family size (including nonresident direct descendants of the head or spouse)			-0.007****	-0.007****
			(0.01)	(0.01)

Table 6.1 Continued

Variable[+]	Model A ME/(se)	Model B ME/(se)	Model C ME/(se)	Model D ME/(se)
Joint F-test for other household-level variables[i]			2.60	2.34
Joint F-test for plot/soil-quality variables[ii]			2.33	2.53
Joint F-test for cultivated crop-type variables[iii]			42.82***	34.97****
Joint F-test for ethnicity/religion-related variables[iv]			120.20****	139.12****
Joint F-test for other community-level variables[v]			12.76***	16.27*
Number of observations	4,012	3,907	3,300	3,995
Probability > chi^2	0.0000	0.0000	0.0000	0.0000
Pseudo R^2	0.0179	0.0447	0.1342	0.1635

Source: Authors' computation using data from the EGC-ISSER 2009 Ghana socioeconomic Survey.

Notes: [+] Regression results with detailed coefficients/signs of all variables included are presented in the appendix. [i] Household-level variables include age and education of the household head and total farm size. [ii] Plot-quality variables include soil-type categories, soil-depth categories, and plot distance from residence. [iii] Crop dummy variables include permanent crop, vegetables, nuts and oil seeds, and other crops grown. [iv] Ethnicity/religion-related variables include dummy variables for major ethnic groups and religions. [iv] Other community/cluster-level variables include dummy variables for presence of large-scale farms in the community, prevalence of land disputes, experience of natural disasters (shocks), and so on. In each alternative model specification, the dependent variable is indicator variable equals 1 if "the household is confident leaving the plot uncultivated for several months without fear of losing it," and 0 otherwise. **** significant at 0.1%; *** significant at 1%; ** significant at 5%; * significant at 10%.

At the plot level, individual landholders have greater perceived tenure security on plots acquired via inheritance versus land allocated by traditional authorities (Table 6.1). At the community level, the land market vibrancy indicator shows that a higher prevalence of market-based land transactions is associated with lower perceived tenure security of farmers living in the community (H3b). We also find that economic vibrancy—proxied by proportion of households owning at least a house with modern roof materials within a given community—is negatively correlated with perceived tenure security. This is consistent with our assertion that the probability of perceived tenure security is lower when the economic value of the plot is higher. Reinforcing these findings, we find that tenure security is greater in rural compared with urban areas. These findings add an important nuance to the debate on the impact of commodification of land. Whereas it may provide more protection of land rights at the individual level, an increase in land market transactions and land values increases competition for land and therefore has a negative impact on the perceived tenure security of all members in the community.

A larger proportion of migrant (nonindigene) households in a community is negatively associated with household perceived tenure security. This finding is in line with our social transformation hypothesis (H2b). Results also suggest that a higher level of recent land acquisitions (proxied by proportion of households acquiring their first plots within the last five years) is positively correlated with tenure security (Model C), except when we include sharecropped and rented plots (Model D). This may be indicative that farmers are less worried about losing their land in communities where plots have a high turnover of plot holders, most likely in areas where shifting cultivation is more commonly practiced. Yet when a high turnover is rather due to a high demand for land through rental or sharecropping arrangements, it may have a negative impact on tenure security, especially among those seeking to rent or sharecrop land.

Perceived tenure security is greater on plots that contain some perennial crops. This could be interpreted in several ways. First, it is well known that land rights in customary systems can improve when a farmer invests in the land—such as by growing trees (for example, Otsuka et al. 2003). Second, the variable can be taken as a proxy for wealth status of the household by which the perceived tenure security is greater for better-off families. Third, tree crops provide clear boundary demarcations and hence reduce future disputes over the land. Fourth, households may invest in cultivating perennial crops only on a plot on which they feel more tenure secure.

Finally, plot-specific risk of tenure insecurity is also shown to be positively associated with farm size. This also could be potentially related to households' inability to protect their interest in land where the total farm size is larger—perhaps due to encroachment or due to higher land values potentially inflated due to the size of a given plot.

We scrutinize the robustness of the drivers of perceived tenure insecurity with a series of parametric regressions with alternative specifications. Table 6.2 summarizes the results of the key variables of interest: (1) for models with alternative household size specifications (that is, with and without nonresident direct descendants); (2) for models with and without plots with only perennial crops cultivated; and (3) for models with and without plots that are acquired via rent/sharecropping. As can be seen from the table, all of the six key variables of interest remain statistically significant and with their respective expected signs in all eight of the alternative model specifications. While controlling for the potential sensitivity of our key empirical findings to a potential attrition bias, the results of the robustness check maintain the comparability of our findings with other studies that use the various model specifications presented in Table 6.2.

Table 6.2 Sensitivity analysis for factors explaining drivers of household perceived tenure insecurity: Plot-level analysis

Sample			Family size variable includes nonresident direct descendants	Marginal effects of key variables of interest[¥]						
MODEL	Includes rented/ sharecropped in plots	Includes plots with only permanent crops		Head of household is female	Non-indigene household[i]	Social/ political connectedness[ii]	Vibrant land market[iii]	Vibrant economy[iv]	Communities with high proportion of nonindigene[v]	Number of observations
1	Yes	Yes	Yes	-0.237****	-0.052***	0.102****	-0.124***	-0.270****	-0.225****	4466
2	**No[+]**	**No**	**Yes**	**-0.227******	**-0.078******	**0.104******	**-0.156*****	**-0.236******	**-0.239******	**3300**
3	**Yes[++]**	**No**	**Yes**	**-0.237******	**-0.052*****	**0.105******	**-0.039**	**-0.280******	**-0.237******	**3995**
4	No	Yes	Yes	-0.237****	-0.074****	0.102****	-0.118**	-0.229****	-0.251****	3645
5	Yes	Yes	No	-0.219****	-0.054***	0.101****	-0.017	-0.266****	-0.232****	4466
6	No	No	No	-0.208****	-0.082****	0.105****	-0.159***	-0.232****	-0.250****	3276
7	Yes	No	No	-0.216****	-0.055***	0.106****	-0.155****	-0.277****	-0.246****	3966
8	No	Yes	No	-0.219****	-0.078****	0.102****	-0.118**	-0.224****	-0.263****	3645

Source: Authors' computation using data from the EGC-ISSER 2009 Ghana socioeconomic Survey.

Notes: [¥] In each alternative model specification, the dependent variable is indicator variable "the household is confident leaving the plot empty for several months without fear of losing it." [+] Same model specification reported as the main findings under Table 6.1, Model C. [++] Same model specification reported as the main findings under Table 6.1, Model D. [i] Indicator variable equals 1 if the head of household wasn't born in the community, and 0 otherwise. [ii] Indicator variable equals 1 if the head of household has ever held any position in traditional institutions, and 0 otherwise. [iii] Proportion of households in a community (%) with at least one plot acquired via purchase, rent, or sharecrop. [iv] Proportion of households in a community (%) with modern roofing (such as roofing made of iron sheet, concrete, slate, or tile). [v] Proportion of households with head or spouse or both not born in the same village or community. **** significant at 0.1%; *** significant at 1%; ** significant at 5%; * significant at 10%.

7. CONCLUSION

Increasing agricultural investment and productivity through improved tenure security is a key motivation for land tenure reforms. A large body of research analyzes the impact of tenure security on farmers' investment and farm productivity, but remarkably few studies provide direct evidence of which factors drive or impede farmers' perceived tenure security. In this study, we aim to improve the understanding of the association between several plot-, household-, and community-level factors with perceived tenure security. We use a measure of perceived tenure security—whether a farmer can leave his or her land fallow without worrying about losing it—to look at drivers of tenure security in Ghana.

Whether formalization, individualization, and commodification of land tenure can improve tenure security hinges on the question of whether customary systems are adequate in governing access to land. Neither the current customary land rights system nor the statutory land rights system seems sufficiently able to provide tenure security for farmers. On the one hand, we find that individuals have more perceived tenure security on plots acquired via inheritance than they do on land allocated by traditional authorities. We also find that the position of the farmer in society has a strong influence on his or her perceived tenure security. Those with connections to a traditional political office are more confident they will not lose their land, but other vulnerable groups, such as female-headed and migrant households, have a lower perceived tenure security. These results lead us to conclude that customary tenure systems cannot always provide tenure security to all smallholder farmers, and the most vulnerable farmers in the communities have the lowest perceived tenure security. This calls for a continuation of efforts that aim at better inclusion and representation of all smallholder farmers in land decisions in traditional tenure systems in the form of the ongoing effort in Ghana in operationalizing village land management units (such as the customary land secretariats in Ghana). Moreover, these findings are important in light of past, current, and future large-scale land acquisitions in Ghana, as well as in many other countries on the continent, which often take place in areas where customary allocation of land is the predominant mode of access to land.

On the other hand, the prevalence of land market transactions in a given community seem to erode perceived tenure security. Results indicate the negative impact plot shadow value plays in dictating the farmers' sense of tenure security. Perceived tenure security is worse when the economic value of the plot is higher—that is, when the plot is located in an urban area, in an area with a vibrant economy, and in a community with an active land market. It is in such areas that land rights are rapidly becoming more individualized and commoditized. Hence, targeting land policy reform actions and interventions that aim to enhance tenure security in areas with high economic potential and vibrant land markets can enhance program uptake (Atilola 2010; Ghebru et al. 2014; Javelle 2013) and therefore maximize the potential positive outcomes of such programs. More specifically, targeting land rights protection programs to areas where land markets are vibrant may serve a dual purpose—enhancing the positive individual (internal) effects while mitigating the potential negative collective (external) effects of market-based land access.

APPENDIX: SUPPLEMENTARY TABLE

Table A.1 Factors associated with perceived tenure security: Plot level (marginal effects)

Variable	Model A ME/se	Model B ME/se	Model C ME/se	Model D ME/se
Head of household is female	-0.145***	-0.141***	-0.227****	-0.237****
	(0.05)	(0.05)	(0.05)	(0.05)
Family is polygamous	0.054**	0.013	0.05	0.056**
	(0.02)	(0.02)	(0.03)	(0.03)
[Female head]*[per capita farm size]	0.024*	0.032**	0.045**	0.050**
	(0.01)	(0.02)	(0.02)	(0.02)
Plot holder is female	0.087**	0.084**	0.140***	0.143****
	(0.04)	(0.04)	(0.05)	(0.04)
[Female plot holder]*[Family is polygamous]	-0.177**	-0.142*	-0.149*	-0.156*
	(0.08)	(0.08)	(0.09)	(0.08)
Plot holder is migrant	-0.127****	-0.078****	-0.078****	-0.052***
	(0.02)	(0.02)	(0.02)	(0.02)
Plot holder has ever held traditional office	0.021	0.036	0.104****	0.105****
	(0.03)	(0.03)	(0.03)	(0.03)
Community proportion with least one plot via purchase, rent/sharecrop in the last 5 years (land market vibrancy)		-0.212****	-0.156***	-0.04
		(0.05)	(0.05)	(0.05)
Community proportion of households where the head and spouse are migrants (nonindigene)		-0.293****	-0.239****	-0.237****
		(0.07)	(0.07)	(0.07)
Community proportion of households with modern roofing material		-0.191****	-0.236****	-0.280****
		(0.03)	(0.04)	(0.03)
Community proportion of households who acquired their first plot within the last 5 years		0.150****	0.090**	-0.06
		(0.04)	(0.04)	(0.04)
Location is rural		0.073***	0.060**	0.061**
		(0.02)	(0.03)	(0.02)
Plot is acquired via purchase			0.04	0.05
			(0.06)	(0.06)
Plot is acquired through inheritance			0.065***	0.087****
			(0.02)	(0.02)
Plot is acquired through renting or sharecropping				-0.141****
				(0.03)
Log (number of years since plot acquisition)			0.030***	0.022**
			(0.01)	(0.01)
Total farm size (in hectares)			-0.013*	-0.015**
			(0.01)	(0.01)
Plot has permanent crop cultivated			0.085***	0.071***
			(0.03)	(0.03)
Family size (incl. nonresident direct descendants of the head or spouse)			-0.007****	-0.007****
			0.00	0.00
Coast region			0.04	0.02
			(0.04)	(0.03)
Forest region			-0.01	-0.04
			(0.03)	(0.03)
Age of head of household			0.00	0.00
			0.00	0.00
Total farm size of the household			0.00	0.00
			0.00	0.00
Crop cultivated—vegetable			0.01	0.00
			(0.02)	(0.02)
Crop cultivated—nuts			-0.04	-0.04
			(0.03)	(0.03)
Crop cultivated—other crops			0.05	-0.06
			(0.11)	(0.09)

Table A.1 Continued

Variable	Model A ME/se	Model B ME/se	Model C ME/se	Model D ME/se
dm_ethnicity2			-0.178****	-0.101***
			(0.04)	(0.04)
dm_ethnicity3			0.02	-0.03
			(0.03)	(0.03)
dm_ethnicity4			0.241****	0.265****
			(0.05)	(0.05)
dm_ethnicity5			-0.01	-0.090***
			(0.04)	(0.03)
dm_ethnicity6			0.077**	0.03
			(0.04)	(0.03)
dm_ethnicity7			-0.400****	-0.420****
			(0.07)	(0.06)
dm_ethnicity8			0.310***	0.07
			(0.11)	(0.09)
dm_ethnicity9			0.092*	0.06
			(0.05)	(0.04)
Religion—Muslim			0.01	0.01
			(0.03)	(0.03)
Religion—traditional			-0.02	-0.03
			(0.03)	(0.02)
Soil depth—deep			0.00	-0.03
			(0.03)	(0.03)
Soil depth—medium			-0.061**	-0.077***
			(0.03)	(0.03)
dm_soiltype1			0.095**	0.116***
			(0.05)	(0.04)
dm_soiltype2			0.03	0.05
			(0.04)	(0.04)
dm_soiltype3			0.05	0.07
			(0.05)	(0.04)
dm_soiltype5			0.170***	0.154***
			(0.06)	(0.05)
dm_soiltype6			0.111**	0.114***
			(0.04)	(0.04)
Village had experience of shock or land dispute			0.01	0.02
			(0.02)	(0.02)
Dummy variable indicating 1 if a large-scale land acquisition took place in the community, 0 if not			-0.02	-0.01
			(0.03)	(0.02)
Number of observations	4,012	3,907	3,300	3,995
Probability > chi^2	0.0000	0.0000	0.0000	0.0000
Pseudo R^2	0.0179	0.0447	0.1342	0.1635

Source: Authors' computation using data from the EGC-ISSER Ghana socioeconomic Survey 2009.
Notes: **** significant at 0.1%; *** significant at 1%; ** significant at 5%; * significant at 10%.

REFERENCES

Abdulai, A., V. Owusu, and R. Goetz. 2011. "Land Tenure Differences and Investment in Land Improvement Measures: Theoretical and Empirical Analyses." *Journal of Development Economics* 96: 66–78.

Ali, D. A., M. Collin, K. Deininger, S. Dercon, J. Sandefur, and A. Zeitlin. 2014. *The Price of Empowerment: Experimental Evidence on Land Titling in Tanzania*. CSAE Working Paper WP/2014-23. Oxford, UK: Centre for the Study of African Economies.

Ali, D. A., K. Deininger, and M. Goldstein. 2014. "Environmental and Gender Impacts of Land Tenure Regularization in Africa: Pilot Evidence from Rwanda." *Journal of Development Economics* 110: 262–275.

Ali, D. A., S. Dercon, and M. Gautam. 2011. "Property Rights in a Very Poor Country: Tenure Insecurity and Investment in Ethiopia." *Agricultural Economics* 42: 75–86.

Arnot, C. D., M. K. Luckert, and P. C. Boxall. 2011. "What Is Tenure Security? Conceptual Implications for Empirical Analysis." *Land Economics* 87 (2): 297–311.

Atilola, O. 2010. *Land Administration Reform in Nigeria: Issues and Prospects.* Paper presented at the FIG Congress 2010, "Facing the Challenges—Building the Capacity," Sydney, April 11–16.

Atwood, D. 1990. "Land Registration in Africa: The Impact on Agricultural Production." *World Development* 18 (5): 659–671.

Augustinus, C., and K. Deininger. 2005. "Innovations in land tenure, reform and administration in Africa." *Land Rights for African Development* 14.

Bakang, J. A., and C. J. Garforth. 1998. "Property Rights and Renewable Natural Resources Degradation in North-Western Ghana." *Journal of International Development* 10: 501–514.

———. 2009. "Property, Authority, and Citizenship: Land Claims, Politics, and the Dynamics of Social Division in West Africa." *Development and Change* 40 (1): 23–45.

Besley, T. 1995. "Property Rights and Investment Incentives: Theory and Evidence from Ghana." *Journal of Political Economy* 103 (5): 903–937.

Boni, S. 2008. "Traditional Ambiguities and Authoritarian Interpretations in Sefwi Land Disputes." In *Contesting Land and Custom in Ghana: State, Chief, and the Citizen,* edited by J. M. Ubink and K. S. Amanor, 81–112. Leiden, Netherlands: Leiden University Press.

Brasselle, A.-S., F. Gaspart, and J.-P. Platteau. 2002. "Land Tenure Security and Investment Incentives: Puzzling Evidence from Burkina Faso." *Journal of Development Economics* 76: 373–418.

Bromley, D. W. 2008. "Formalising Property Relations in the Developing World: The Wrong Prescription for the Wrong Malady." *Land Use Policy* 26: 20–27.

Bruce, J., and S. Migot-Adholla. 1994. *Searching for Land Tenure Security in Africa: Review.* Dubuque, IA, US: Kendall-Hunt.

Brydon, L. 1996. "Women Chiefs and Power in the Volta Region of Ghana." *Journal of Legal Pluralism* 37–38: 227–247.

Bugri, J. T. 2008. "The Dynamics of Tenure Security, Agricultural Production, and Environmental Degradation in Africa: Evidence from Stakeholders in North-East Ghana." *Land Use Policy* 25: 271–285.

———. 2011. "Sustaining Customary Land Secretariats for Improved Interactive Land Governance in Ghana." Paper presented at the 2011 World Bank Conference on Land and Poverty, Washington, DC, April 23–26. www.landandpoverty.com/agenda/pdfs/paper/bugri_full_paper.pdf.

Chimhowu, A., and P. Woodhouse. 2006. "Customary vs Private Property Rights? Dynamics and Trajectories of Vernacular Land Markets in Sub-Saharan Africa." *Journal of Agrarian Change* 6 (3): 346–371.

Clark, G. 1994. *Onions Are My Husband: Survival and Accumulation by West African Market Women.* Chicago: University of Chicago Press.

Colin, J.-P., and M. Ayouz. 2006. "The Development of a Land Market? Insights from Cote d'Ivoire." *Land Economics* 82 (3): 404–423.

Deininger, K., and G. Feder. 2009. "Land Registration, Governance, and Development: Evidence and Implications for Policy." *World Bank Research Observer* 42 (2): 233–266.

Deininger, K., and S. Jin. 2006. "Tenure Security and Land-Related Investment: Evidence from Ethiopia." *European Economic Review* 50: 1245–1277.

Deininger, K., T. Hilhorst, and V. Songwe. 2014. "Identifying and Addressing Land Governance Constraints to Support Intensification and Land Market Operation: Evidence from 10 African Countries." *Food Policy* 48: 76–87.

Fenske, J. 2011. "Land Tenure and Investment Incentives: Evidence from West Africa." *Journal of Development Economics* 95: 137–156.

Fred-Mensah, B. K. 1999. "Capturing Ambiguities: Communal Conflict Management Alternative in Ghana." *World Development* 27 (6): 951–965.

Ghana, Ministry of Lands and Forestry. 1999. *National Land Policy.* Accra.

Ghana Statistical Service. 2012. *2010 Population and Housing Census. Summary Report of Final Results.* Accra: Sakoa Press.

Ghebru, H. 2012. *Land Policy and Governance Reform and Agricultural Transformation*. Discussion Note 013. Ghana Strategy Support Program. Washington, DC: International Food Policy Research Institute,

Ghebru, H., H. Edeh, D. Ali, K. Deininger, and S. Woldeyohannes. 2014. *Tenure Security and Demand for Land Tenure Regularization in Nigeria: Empirical Evidence from Ondo and Kano States.* IFPRI-NSSP Working Paper 25. Abuja, Nigeria: International Food Policy Research Institute.

Ghebru, H., and S. Holden. 2015a. "Reverse-Share-Tenancy and Agricultural Efficiency: Farm-Level Evidence from Ethiopia." *Journal of African Economies* 24 (1): 148–171.

———. 2015b. "Technical Efficiency and Productivity Differential Effects of Land Right Certification: Quasi-Experimental Evidence." *Quarterly Journal of International Agriculture* 54 (1): 1–31.

Gignoux, J., K. Macours, and L. Wren-Lewis. 2013. *Evaluating the Impact of Land Administration Programs on Agricultural Productivity and Rural Development*. Technical Note IDB-TN-506. New York: Inter-American Development Bank.

Goldstein, M., and C. Udry. 2008. "The Profits of Power: Land Rights and Agricultural Investment in Ghana." *Journal of Political Economy* 116 (6): 981–1022.

Gray, L. C., and M. Kevane. 2001. "Evolving Tenure Rights and Agricultural Intensification in Southwestern Burkina Faso." *World Development* 29 (4): 573–587.

Hagos, F., and S. Holden. 2006. "Tenure Security, Resource Poverty, Public Programs, and Household Plot-Level Conservation Investments in the Highlands of Northern Ethiopia." *Agricultural Economics* 34: 183–196.

Holden, S., K. Deininger, and H. Ghebru. 2009. "Impacts of Low-Cost Land Certification on Investment and Productivity." *American Journal of Agricultural Economics* (91) 2: 359–373.

———. 2011. "Tenure Insecurity, Gender, Low-Cost Land Certification, and Land Rental Market Participation." *Journal of Development Studies* 47 (1): 31–47.

Holden, S., and H. Yohannes. 2002. "Land Redistribution, Tenure Insecurity, and Intensity of Production: A Study of Farm Households in Southern Ethiopia." *Land Economics* 78 (4): 573–590.

Houssou, M., X. Diao, F. Cossar, S. Kolavalli, K. Jimah, and P. O. Aboagye. 2013. "Agricultural Mechanization in Ghana: Is Specialized Agricultural Mechanization Service Provision a Viable Business Model?" *American Journal of Agricultural Economics* 95 (5): 1237–1244.

IEG (Independent Evaluation Group). 2013. *Project Performance Assessment Report: Ghana Land Administration Project*. IEG Public Sector Evaluation 75084. Washington, DC: World Bank.

Jacoby, H. G., and B. Minten. 2007. “Is Land Titling in Sub-Saharan Africa Cost-Effective? Evidence from Madagascar.” *World Bank Economic Review* 21 (3): 461–485.

Javelle, A. 2013. *Land Registration in Cameroon.* Focus on Land in Africa Brief. Washington, DC: World Resources Institute and Landesa.

Jones-Casey, K., and A. Knox. 2011. *Ghana: Ghana’s Land Administration at a Crossroads.* Focus on Land in Africa Brief. Washington, DC: World Resources Institute and Landesa.

La Ferrara, E. 2007. “Descent Rules and Strategic Transfers. Evidence from Matrilineal Groups in Ghana.” *Journal of Development Economics* 83: 280–301.

La Ferrara, E., and A. Milazzo. 2012. “Customary Norms, Inheritance, and Human Capital: Evidence from a Reform of the Matrilineal System in Ghana.” Unpublished, Bocconi University, Milan.

La Ferrara, E., and A. Milazzo. 2014. Customary norms, Inheritance, and Human Capital: Evidence from a Reform of the Matrilineal System in Ghana.Upublished, Bocconi University, Milan.

Lambrecht, I. 2016. *“As a Husband I Will Love, Lead, and Provide”: Gendered Access to Land in Ghana.* IFPRI Discussion Paper 01514. Washington, DC: International Food Policy Research Institute.

Lambrecht, I., and S. Asare. 2015. *Smallholders and Land Tenure in Ghana: Aligning Context, Empirics, and Policy.* IFPRI Discussion Paper 01492. Washington, DC: International Food Policy Research Institute.

Lastarria-Cornhiel, S. 1997. “Impact of Privatization on Gender and Property Rights in Africa.” *World Development* 25 (8): 1317–1333.

Linkow, B. 2016. “Causes and Consequences of Perceived Land Tenure Insecurity: Survey Evidence from Burkina Faso.” *Land Economics* 92 (2): 308–327.

Mekonnen, A. 2009. “Tenure Security, Resource Endowments, and Tree Growing: Evidence from the Amhara Region of Ethiopia.” *Land Economic*s 85 (2): 292–307.

Nin-Pratt, A., and L. McBride. 2014. “Agricultural Intensification in Ghana: Evaluating the Optimist’s Case for a Green Revolution.” *Food Policy* 48: 153–167.

Otsuka, K., A. R. Quisumbing, E. Payongayong, and J. B. Aidoo. 2003. “Land Tenure and the Management of Land and Trees: The Case of Customary Land Tenure Areas of Ghana.” *Environment and Development Economics* 8 (1): 77–104.

Pande, R., and C. Udry. 2005. *Institutions and Development: A View from Below.* Discussion Paper 928. New Haven, CT, US: Economic Growth Center.

Peters, P. E. 2009. “Challenges in Land Tenure and Land Reform in Africa: Anthropological Contributions.” *World Development* 37 (8): 1317–1325.

Place, F. 2009. “Land Tenure and Agricultural Productivity in Africa: A Comparative Analysis of the Economics Literature and Recent Policy Strategies and Reforms.” *World Development* 37 (8): 1326–1336.

Place, F., and S. E. Migot-Adholla. 1998. “The Economic Effects of Land Registration on Smallholder Farms in Kenya: Evidence from Nyeri and Kakamega Districts.” *Land Economics* 74 (3): 360–373.

Place, F., M. Roth, and P. Hazell. 1994. “Land Tenure Security and Agricultural Performance in Africa: Overview of Research Methodology.” In *Searching for Land Tenure Security in Africa,* edited by J. W. Bruce and S. Migot-Adholla, 15–27. Dubuque, IA, US: Kendall-Hunt.

Pul, H. A. S. 2003. “Exclusion, Association, and Violence: Trends and Triggers in Northern Ghana’s Konkomba-Dagomba Wars.” *African Anthropologies* 10 (1): 39–82.

Quan, J., J. Ubink, and A. Antwi. 2008. “Risks and Opportunities of State Interventions in Customary Land Management: Emergent Findings from the Land Administration Project Ghana.” In *Contesting Land and Custom in Ghana: State, Chief, and the Citizen,* edited by J. M. Ubink and K. S. Amanor, 183–222. Leiden, Netherlands: Leiden University Press.

Quisumbing, A. R., E. Payongayong, J. B. Aidoo, and K. Otsuka. 2001. "Women's Land Rights in the Transition to Individualized Ownership: Implications for Tree-Resource Management in Western Ghana." *Economic Development and Cultural Change* 50 (1): 157–182.

Ragasa, C., A. Dankyi, P. Acheampong, A. N. Wiredu, A. Chapoto, M. Asamoah, and R. Tripp. 2013. *Patterns of Adoption of Improved Maize Technologies in Ghana.* GSSP Working Paper 36. Accra: Ghana Strategy Support Program, International Food Policy Research Institute.

Sjaastad, E., and D. W. Bromley. 1997. "Indigenous Land Rights in Sub-Saharan Africa: Appropriation, Security, and Investment Demand." *World Development* 4: 549–562.

Sjaastad, E., and D.W. Bromley. 2000. "The Prejudices of Property Rights: On Individualism, Specificity, and Security in Property Regimes." Development Policy Review 18: 365–389.

Takane, T. 2002. "The Cocoa Farmers of Southern Ghana: Incentives, Institutions, and Change in Rural West Africa." Chiba, Japan: Institute of Developing Economies.

Tsikata, D., and J. A. Yaro. 2013. "When a Good Business Model Is Not Enough: Land Transactions and Gendered Livelihood Prospects in Rural Ghana." *Feminist Economics* 20 (1): 202–226.

Wouterse, F. 2010. *Internal Migration and Rural Service Provision in Northern Ghana.* IFPRI Discussion Paper 00952. Washington, DC: International Food Policy Research Institute.

RECENT IFPRI DISCUSSION PAPERS

For earlier discussion papers, please go to www.ifpri.org/pubs/pubs.htm#dp.
All discussion papers can be downloaded free of charge.

1544. *Global and regional pulse economies: Current trends and outlook.* P. K. Joshi and P. Parthasarathy Rao, 2016.

1543. *United States agricultural policy: Its evolution and impact.* Joseph W. Glauber and Anne Effland, 2016.

1542. *Roads to innovation: firm-level evidence from China.* Xu Wang, Xiaobo Zhang, Zhuan Xie, and Yiping Huang, 2016.

1541. *A systematic review of cross-country data initiatives on agricultural public expenditures in developing countries.* Richard Anson and Tewodaj Mogues, 2016.

1540. *Does female labor scarcity encourage innovation?: Evidence from China's gender imbalance.* Zhibo Tan and Xiaobo Zhang, 2016.

1539. *Linking smallholder farmers to commercial markets: Evidence from nongovernmental organization training in Nicaragua*. Ayako Ebata and Manuel A. Hernandez, 2016.

1538. *Can labor market imperfections explain changes in the inverse farm size–productivity relationship?: Longitudinal evidence from rural India.* Klaus Deininger, Songqing Jin, Yanyan Liu, and Sudhir K. Singh, 2016.

1537. *Labor adaptation to climate variability in eastern Africa.* Xiaoya Dou, Clark Gray, Valerie Mueller, and Glenn Sheriff, 2016.

1536. *A dynamic spatial model of agricultural price transmission: Evidence from the Niger millet market.* Anatole Goundan and Mahamadou Roufahi Tankari, 2016.

1535. *Qualitative methods for gender research in agricultural development*. Deborah Rubin, 2016.

1534. *Anchoring bias in recall data: Evidence from Central America*. Susan Godlonton, Manuel A. Hernandez, and Mike Murphy, 2016.

1533. *Contracting by small farmers in commodities with export potential: Assessing farm profits of lentil growers in Nepal.* Anjani Kumar, Devesh Roy, Gaurav Tripathi, P. K. Joshi, and Rajendra P. Adhikari, 2016.

1532. *Rent dispersion in the US agricultural insurance industry.* Vincent Smith, Joseph Glauber, and Robert Dismukes, 2016.

1531. *Long-term drivers of food and nutrition security.* David Laborde, Fahd Majeed, Simla Tokgoz, and Maximo Torero, 2016.

1530. *Understanding compliance in programs promoting conservation agriculture: Modeling a case study in Malawi.* Patrick S. Ward, Andrew R. Bell, Klaus Droppelmann, and Tim Benton, 2016.

1529. *A model of reporting and controlling outbreaks by public health agencies.* Alexander E. Saak and David A. Hennessy, 2016.

1528. *Boserupian pressure and agricultural mechanization in modern Ghana.* Frances Cossar, 2016.

1527. *Agricultural mechanization and agricultural transformation.* Xinshen Diao, Jed Silver, and Hiroyuki Takeshima, 2016.

1526. *Delegation of quality control in value chains*. Alexander E. Saak, 2016.

1525. *Structural transformation and intertemporal evolution of real wages, machine use, and farm size–productivity relationships in Vietnam.* Yanyan Liu, William Violette, and Christopher B. Barrett, 2016.

1524. *Can contract farming increase farmers' income and enhance adoption of food safety practices?: Evidence from remote areas of Nepal.* Anjani Kumar, Devesh Roy, Gaurav Tripathi, P. K. Joshi, and Rajendra P. Adhikari, 2016.

1523. *Effectiveness of food subsidies in raising healthy food consumption: Public distribution of pulses in India.* Suman Chakrabarti, Avinash Kishore, and Devesh Roy, 2016.

1522. *Findings across agricultural public expenditure reviews in African countries*. Stephen D. Mink, 2016.

1521. *Risk and sustainable crop intensification: The case of smallholder rice and potato farmers in Uganda.* Bjorn Van Campenhout, Emmanuel Bizimungu, and Dorothy Birungi, 2016.

1520. *Varietal integrity, damage abatement, and productivity: Evidence from the cultivation of Bt cotton in Pakistan.* Xingliang Ma, Melinda Smale, David J. Spielman, Patricia Zambrano, Hina Nazli, and Fatima Zaidi, 2016.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

www.ifpri.org

IFPRI HEADQUARTERS

2033 K Street, NW
Washington, DC 20006-1002 USA
Tel.: +1-202-862-5600
Fax: +1-202-467-4439
Email: ifpri@cgiar.org

IFPRI ADDIS ABABA

P. O. Box 5689
Addis Ababa, Ethiopia
Tel.: + 251 (0) 11-617-2500
Fax: + 251 (0) 11-646-2927
Email: ifpri-addisababa@cgiar.org

IFPRI ACCRA

CSIR Campus
Airport Residential Area, Accra
PMB CT 112 Cantonments,
Accra, Ghana
Tel.: +233 (0) 21 780-716
Fax: +233 (0) 21 784-752