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DETERMINANTS OF FARMLAND TENURE SECURITY IN GHANA

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Abstract

Applications of the neo-classical land tenure security hypotheses in Sub-Saharan Africa (SSA) have largely failed to establish meaningful links between land tenure security and the rather axiomatic outcomes of improved access to finance and farmland productivity. While some authors blame the phenomenon on structural and institutional bottlenecks, others stress the need for changes in methodological approaches. We argue that since farmlands under continuous cultivation are hardly appropriated under SSA's predominantly customary land tenure regimes, a tenure insecure farmer would, instead of fallowing, continue to cultivate his land while secure right holders may decide to leave their lands idle without fear of appropriation. The main objective of this paper is to highlight alternative measures and indicators of land tenure security within the context of Ghana's diverse land holding and use arrangements. The convention has been to equate land tenure security to individualisation and formal land titling. Some have argued that individualisation and formal land titling may exclude other social and cultural factors that influence land tenure security. The paper has proposed a two-stage measure of tenure security based on the premise of non-loss of lands under cultivation and proceeded to test the hypothesis using data from four agro-ecological zones of Ghana. The results show that many factors often thought to improve land tenure security such as land titling, being native to an area, cultivating perennials, and boundary demarcation, among others had a positive significant effect on the decision to leave land idle and the period of time lands could be left without loss of rights. The paper concludes that narrow definitions of tenure security as formal documentation of land ignores context specific factors such as ancestry and household wealth that affect tenure. Our paper recommends flags the need for innovative approaches in the operationalisation of land tenure security, especially in jurisdictions with pluralistic land tenure systems such as Ghana.

Keywords: Land Tenure, Tenure Security, Ghana

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INTRODUCTION

Neo-classical theory has over the years profoundly articulated the privatization of land rights as a precondition for investment and economic growth. The theory posits a strong relationship between tenure security and farm investments, arguing that producers' willingness to invest their full effort to make long-term improvements in land is determined by expectations of their rights to land over time (Marshal, 1890; Mill, 1848). Individualization of land rights is perceived to provide incentives for investments in land as the associated tenure security improves access to credit and reduces the incidence of dis-incentivizing conflicts over land. The theory argues that well-defined and protected land rights influence efficiency and economic growth by providing securitythat increases the willingness of individuals to invest as well as improves access to credit to finance investments. Is important to stress that the neo-classical land tenure security-productivity nexus has profoundly influenced land research agenda in sub-Saharan Africa (SSA) and fuelled much of the widespread efforts to harmonize and formalize land markets in the region.

Despite cogent arguments linking tenure security (approximated as private land rights) to improved access to finance, investment and productive efficiency, empirical studies have largely failed to establish the hypothesized strong relationship between secure land rights, investment, and agricultural productivity on African croplands. Although land rights across SSA are derived from mostly informal arrangements and secured by a combination of customary and statutory arrangements, many perceive the largely privatized statutory arrangements as more efficient in protecting people's interests in land. As a result, several studies have restricted definition of tenure security to formal market based procedures such as monetised transactions and deed registration. The fact that land rights established through traditional processes and secured by social norms and beliefs have provided relative tenure security overtime has often been overlooked.

The question of what constitutes tenure security within the context of the largely customary land tenure systems is crucial for both policy and research. While not disputing the relevance of formal land transactions and documentation, we view these procedures as contributing to the perception of tenure security and not the ultimate indicator of tenure security. The thrust of our argument is in the land use behaviour of tenure (in)secure households. How would a tenure (in)secure farmer behave? Is a farmer without land title insecure? Our paper argues that since it is mostly idle or uncultivated farmlands that are likely to be appropriated, it would take farmers with high degree of tenure security to leave their land idle and for relatively longer periods of time. We then proceeded to use data from Ghana to estimate the factors that determine the decision and length of time farmers leave their farms.

This paper contributes to the debate on the conceptualisation and measurement of land tenure security in Sub-Saharan Africa, using the Ghanaian context to highlight other socio-economic factors other than land titling that influence land tenure security. The paper is motivated by the failure to find links between land tenure security on the one hand and farm investments, access to credit and productive efficiency on the other, using conventional neo-classical definition of land titling as land tenure security. The paper follows Goldstein and Udry (2009) to argue that other factors such as individual positions in a local political hierarchy and influence in a community may provide more secure rights to land and therefore enable the individual to fallow land for relatively longer periods.

The justification of our approach is in the land tenure system of Ghana. About 80 percent of land in Ghana is held under customary law – acquired by discovery, conquest, as gift, or by purchase (Agbosu et.al. 2007). Allodial title to land depends on the descent group. Among the matrilineal descent groups in Ghana like the Akan, allodial title land was vested in the stool or the "oman". Unallocated or abandoned land belongs to the stool whilst all allocated land is mainly under the control of the matrilineage. Once allocated to the family, land is inherited by one of a man's brother's or sister's sons and is ideally not subdivided. Those excluded from family land by the succession process were able to establish use rights on new lands allocated to them by lineage heads (Kasanga, 1988). Among the patrilineal descent groups such as Ewe and Dangme, allodial, title to land is vested in the family and in the 'quarters[4]' among most of the Ga. Thus, the patrilineage maintains a general authority over lineage land but its leadership varies significantly among groups depending on the level of centralization and degree of stability. Generally, male children succeed their fathers although there may be differences depending on the locality.

In the Northern part of Ghana allodial title is vested in the Earth priest and chiefs. Like most patrilineal societies, land in Northern Ghana is mostly passed on to male children. Clan and family heads exercise the right to reallocate abandoned or uncultivated lands to other interested members of the clan or family.

The paper is organized as follows: Section 2 explores empirical applications of the neo-classical land tenure hypotheses and the reasons advanced by researchers for the apparent failure to establish the posited strong relationships between land tenure security and the anticipated outcomes of improved land investment, access to finance and productive efficiency. It also provides an overview of common definitions and measures of tenure security. In section 3 we present the econometric specification and estimation of our tenure model. The results, discussions and conclusion are presented in sections 4 and 5.

Land Tenure Security and Productivity Nexus

The early twentieth century witnessed the emergence of different schools of thought with divergent views on the role of land tenure security in productivity of the agricultural sector of developing countries. The first school which we like to refer to as the "land reformist school" argued that land tenancy arrangements in Least Developed Countries (LDCs) were responsible for the apparent inefficiency in the agricultural sector. According to this school, land tenure arrangements such as sharecropping resulted in inefficient allocation of resources and also reduced tenants' motivation to improve agricultural land (Georgescu-Roegen, 1960; Issawi, 1957; Heady, 1947; Shickele, 1941). To counter the constraints imposed by insecurity inducing land ownership and use arrangements, the reformists' school proposed measures such as rental rate reduction, land redistribution, introduction of minimum term lease systems and the abolition of sharecropping as policy instruments. These measures, the proponents argued, would limit the growth of so-called undesirable land use arrangements and mitigate their effects on resource allocation decision making among tenant farmers.

[4] The six towns that make up the Ga state of Ghana include, Ga Mashi (Central Accra), the capital, Osu (Chritiansborg), La (Labadi), Teshi, Nungua and Tema. Each of these towns is divided into Akutsei or quarters

On the other side of the debate was the "equal efficiency" school which argued that land tenure had no bearing on productive efficiency and that poverty of the agricultural sector was due to factor endowment (mainly a large body of unskilled labour relative to land and capital). The equal efficiency school also rejected reformists' arguments in support of land reform, stressing that those arguments were founded on normative welfare criteria rather than the positive criterion of economic efficiency (Cheung, 1968, 1969a). With time, the contending schools of thought introduced empirical dimensions to either support or discredit views articulated in favour or against their respective positions. These contending schools of thought have contributed to the literature on comparative productive efficiency of different land tenure systems in Africa and Asia in particular.

The neo-classical hypotheses outlined above have for several decades, provided the theoretical bases for research on land tenure security and productivity in SSA. Several authors (for example, Hagos and Holden, 2006; Tikabo and Holden, 2004; Ahmed et al., 2002; Gavian and Ehui, 1998; Hayes et.al, 1997; Laffont and Matoussi, 1995; Place and Hazell, 1993; Migot- Adholla et al., 1991; Atwood, 1990; Feder and Onchan, 1987; Harrison, 1987; Shaban, 1987; Ip and Stahl, 1978) have drawn variously from the neo-classical hypothesis of land tenure.

Many studies in Africa including those mentioned above have produced mixed results with the greater majority failing to establish the hypothesized strong links between tenure security, investments and productive efficiency. The evidence seems to suggest that the impact of individualized titling on smallholders' access to credit is negligible. In the case of Rwanda and Ghana, World Bank funded studies did not find any significant correlation between individualization of land rights and access to credit. No significant relationship was found between the percentage of households receiving formal credit or any credit and the proportion of land held with "complete transfer" rights (Migot-Adholla et al., 1991; Place and Hazell, 1993).

On the relationship between land title and investment, most empirical studies have produced inconclusive results. In Ghana for example, Migot-Adholla et al. (1991) found that increasingly individualized land rights did not have any effect on agricultural investment and yields. The study made similar findings for Rwanda and Kenya. In areas of Kenya with land registration, no link was found between land titling and long-term investments to improve land (Barrows and Roth, 1989). In Zimbabwe, Harrison (1987) found little variation in the productive performance between smallholder farmers with no land title and large scale commercial farmers with land titles. Few studies, however, found evidence of higher efficiency on individualized plots. Laffont and Matoussi (1995) found significant evidence of Marshalling inefficiency in a study in Tunisia; Ahmedet al. (2002) found significant inefficiency on sharecropped land but not so on land under fixed-rent contracts. Unlike in Africa, the evidence on the relationship between titled land rights and productivity has been more consistent in Asia and Latin America, where some link has been established between yields, farm investments and tenure security (Shaban, 1987; Salas et.al, 1970; Villamizar, 1984; Feder and Onchan, 1987).

In response to the failure to observe expected relationships between tenure security and productivity, many authors argue that tenure security is endogenous and remedies suggested the use of more rigorous econometric approaches to account for the perceived endogeneity of tenure security. Many of the more recent investigations of the tenure security-productivity hypotheses have

therefore focused on resolving the issues of endogeneity in tenure security mostly through the use of multi-stage econometric modelling (Twerefou, et.al, 2011; Hayes et.al, 1997; Besley, 1995). The findings of these studies have, however, not been radically different in terms of resolution of the ambiguity surrounding the relationship between tenure security and expected improvements in investments in the SSA context.

Goldstein and Udry (2008) employed a revolutionary approach to investigating the tenure security productivity nexus. In their study of investment and agriculture productivity in Ghana, they demonstrated that individuals who hold powerful positions in a local political hierarchy have more secure tenure rights and as a consequence invest more in land fertility and have substantially higher output. They argued that farmland tenure security was inherent in the length of time plot holders could fallow or leave the land idle and still maintain their rights over these plots. Goldstein and Udry (2008) further showed that the intensity of investments on different plots cultivated by an individual corresponded to that individual's security of tenure over those specific plots and, in turn, to the individual's position in the political hierarchy relevant to those specific plots. The underlying difference in the approach used by Goldstein and Udry (2008) and other related studies has little to do with the mechanics of modeling and much with the definition and measurement of tenure security.

The variance in approaches and findings make the question of what constitutes tenure security within the context of SSA in general and Ghana in particular crucial for both research and land management policy reform. The security of property rights in land is a multi-phased process involving customary legitimization of rights followed by formal or statutory validation of those rights. Toulman (2005) describes the processes of securing land rights as a two step process with the first step involving the recognition of a claim as being legitimate by neighbours and others within the vicinity, usually in accord with local norms and values. The second step involves validation involving recognition of the claims by the state. Toulman (2005) argues that in practice, the lack of state recognition may not matter if land is not under particular pressure, and if local systems work reasonably well. It is important to stress that the latter validation without the former may not be enough to secure even usufruct rights in several African jurisdictions. Ault and Rutman (1979) argued that there was no private ownership of land in most of Africa and that security of tenure was guaranteed as long as tribal laws and customs were obeyed strictly.

A common feature of indigenous land tenure systems in SSA is the fact that rights to farm land are established through use. Once land is cleared and crops are planted, rights to the land and the produce are removed from clan or kinship control and vested in the individual cultivator. When use is discontinued, the land reverts to the common pool. One factor often overlooked in operationalization of land tenure security is the fact that rights to a piece of land by indigenes under customary usufructory arrangements are virtually never lost while the said land is under cultivation. The rights tend to become weaker if land is fallowed or use is discontinued for relatively extended periods (Goldstein and Udry, 2006; Quisumbin et.al., 2001). This implies households are more secure with plots they fallow or vacate for technically optimal periods of time without losing their rights to the plots.

Measures of Tenure Security

Land tenure security has been defined as the individual's perception of his/her

rights to a piece of land on a continual basis, free from imposition or interference from outside sources, as well as the ability to reap the benefits of labor or capital invested in land, either in use or upon alienation (Place, Roth and Hazell, 1994). Because tenure security is not directly observed, devising an objective index of tenure security to correlate with agricultural performance and other outcome variables has so far been problematic (Roth and Haase, 1998). Several measures of tenure security have been employed by researchers. The most common is a self-reported indicator which represents some underlying variable. This indicator takes the value 1 if the underlying variable takes positive values and 0 when the underlying variable takes negative (Alemu, 1999; Holden and Yohannes, 2002; Matchaya, 2009). The self-reported binary indicator of tenure security suffers from problems inherent in questions about people's perception of the security of their tenure. For example depending on how questions are posed there is the likelihood that individuals may frequently report insecurity in anticipation of some form of help or may not correctly understand the question (Matchaya, 2009). The second problem with the self-reported binary indicator of tenure insecurity has to do with the failure to take into account the underlying cause of insecurity. The binary perception of insecurity is usually obtained by asking individuals whether they fear losing their land in the future. It is obvious that the response to this question will vary significantly if the dimension of fallowing is added, i.e., if the farmer is asked whether he or she fears losing her land if it is not cultivated for a specified period of time.

Some studies have measured land tenure security by documentation or registration of land rights (Feder and Onchan, 1987; Hayes et.al., 1997). Under this categorization, registered lands with title deeds are considered secure while unregistered lands are perceived insecure. This definition is criticized for assuming land titles are analogous to security while ignoring context specific customary laws and institutions that underpin land ownership and tenure security. The rights gamut approach which associates tenure security with the type of rights held over land, that is, whether the plot holder exercises complete or preferential rights (Place and Hazell, 1993; Hayes et.al, 1997) and forms of land transactions—land is acquired though purchase, rental, sharecropping, and gift (Ahmed, et.al., 2002; Gavian and Ehui, 1998).

While the various measures of tenure security may in one way or the other contribute to tenure security, the bottom line to the definition of tenure security lies in a plot holder's answer to the question of whether he/she feels secure enough to leave his/her farmland idle for a given period of time.

Empirical Analysis

Econometric Specification of Tenure Security

The theoretical model for land tenure security is based on the argument that households who hold more land than they are able to cultivate face the risk of losing their plots either through appropriation by state authorities or through encroachments by other land users. As a theoretical basis for assessing the determinants of tenure insecurity, the study draws from Alemu (1999) who hypothesized that relative farm size influenced households' perception of their tenure security. The hypothesis is premised within the framework of the Ethiopian land administration (Proclamation 31, 1975, "Public Ownership of Rural Land") under which households with relatively large farms risk losing the farms through redistribution if they exhibited a lack of

capacity to cultivate the farms either by fallowing or renting out the lands in question.

Within the Ghanaian context, some attributes of the land tenure system indicate that the relative farm size hypothesis is applicable to some extent (Alemu, 1999). Thus, farm size may be viewed as indicative of tenure (in)security. While under communal systems idle land may be taken up by relatives or natives, private owners of large farms may have to spend huge amounts of resources to police and protect idle lands or risk encroachments. Even in situations where land rights were well-defined and documented, inability to cultivate or develop land for long periods of time may often lead to encroachment and subsequent litigation. Under such circumstances, tenure insecurity arising out of disputes or potential conflicts over land would directly relate to farm size. In testing the Alemu (1999) hypothesis, the study adopts and modifies the framework used by Holden and Yohannes (2002). Holden and Yohannes (2002) modeled the land tenure security-farm size relationship as:

$$I^s = I^s\left(F^r\right) \qquad (1)$$

where I^s denotes the probability of the household losing its land due to appropriation by government. F^r represents relative farm size. This implies $\frac{\partial I^s}{\partial F^r} > 0$. However, if the household is well endowed in terms of resources, it would either cultivate all its farmland or use its resources to police and protect its rights. Under such conditions, farm size would not necessarily induce tenure insecurity and equation (1) becomes

$$I^s = f\left(F^r, R\left(F^r\right)\right),$$

where R denotes household resource endowment with the first order conditions being

$$\frac{\partial I^s}{\partial F^r} = \frac{\partial f}{\partial F^r} + \left(\partial f/\partial R\right)\left(\partial R/\partial F^r\right) < 0 \; or \; > 0 .$$

If $\left(\partial f/\partial R\right)\left(\partial R/\partial F^r\right)$ dominates $\frac{\partial f}{\partial F^r}$, then household resource endowment and other socioeconomic factors cancel the effect of insecurity arising out of the inability to cultivate or develop large tracts of idle land. Also imbedded in *R* are those power factors of the household that allows it to maintain ownership of fallowed or abandoned land. The net effect of the derivatives would most likely differ by location as well as other cultural and demographic factors. Tenure security, measured by the length of time the farmer can leave his plot uncultivated and still maintain ownership (duration of tenure security) is assumed to belong to a Heckman process with the decision to leave land uncultivated taken in two stages. The household either feels secure leaving their land or not, and based on their evaluation of their tenure security decide on the duration of time they could leave their lands idle and still maintain ownership or use rights.

The estimable model which controls for household demographic and geographic factors is specified as:

$$F^P = f\left(F^r, L_i^T, L^v, L_i^c, S^T, TLU, H_i^c\right) \qquad (2)$$

where F^P (measured in years) is the duration land could be left idle without loss of title; F^r is relative farm size. L^v is the value of land; L_i^T is land ownership and land tenure variables such as land titling and demarcation of boundaries; C_i^D is a vector of crop dummies; *TLU* is livestock holding is a proxy for household wealth and capital; H_i^c is a vector of household head characteristics including sex, age and education; L_i^C represent location dummies; S^t is ancestry of

the household which takes the value 1 for an indigene and 0 for non-indigene.

It is expected that households with large tracts of land will be unable to cultivate the land thus increasing the likelihood of encroachment and litigations and therefore tenure insecurity demonstrated in inability to leave land idle. The value of land is expected to exert a negative effect on the decision and duration households could leave their land. For land ownership and tenure variables, the expectation is that ownership with deed will have a positive effect on the period households fallow their plots. The presence of trees or perennials on land, like the case with permanent structures, is expected to have a positive coefficient while a negative sign is expected on annual staple crop dummies. Wealthy households may use their resources to cultivate as well as police their land. TLU may also be considered as an indicator of social status and therefore the ability of the household to influence power within the community. A positive sign is expected on the TLU coefficient. The sign of the age variable is expected to be positive since older members of community may be able to exert some influence on social and political structure. Age squared is added to highlight the assumed non-linear behaviour of the age variable. Female-headed households are perceived to be less influential in the community than male-headed households. It is expected that the limited influence of female-headed households would increase their level of insecurity and hence reduce the duration they fallow their plots. It is expected that household heads with higher levels of education will be more informed about land tenure issues and land titling process. This knowledge is expected to improve their ability to document and protect their lands and hence feel less insecure. The effect of location is expected to differ depending on factors such as resilience of the land tenure system, population and general level of development in the particular location. The number of years a household leaves land idle is likely to be influenced positively if the household head is an indigene and negatively if non-indigene.

The household either feels secure leaving their land or not, and based on their evaluation of their tenure security decides on the duration of time they could leave their lands idle and still maintain ownership or use rights (duration of tenure security). The number of years land could be left unused without loss of title is given by:

$$F^P = \varpi_1 \beta_1 + \varepsilon_1 \quad (3)$$

where F^P is the number of years land could be left uncultivated which depends on the vector of ϖ explanatory variables including household socioeconomic characteristics and the provenance of land. The probability of leaving land without loss of title is given by

$$T^L = \Pi_2 \Omega_2 + v_2 \quad (4)$$

where $\left(\varpi \ \ and \ T^L\right)$ are observed, whereas F^P is observed only when $T^L = 1$. Ω_2 denotes household socioeconomic factors that influence land tenure security while v_2 is a vector of random error. Given that households first assess their tenure security to decide whether they could leave their land or not, and based on their decision, choose the number of years they could leave their lands, the use of a single stage procedure to estimate the factors that influence households tenure security (i.e. whether they can maintain ownership of lands they leave idle) and the duration of time they could leave land raises the issue of sample selection bias. The key problem is that in regressing the duration of fallow on characteristics of those who decide to fallow, we are not observing the equation for the population as a whole. Those who decide to fallow will tend to have longer duration of fallow than those who did not.

Hence the results will tend to be biased (sample selection bias).

A binary choice (probit) model and censored regression model (Tobit) are specified as follows. For the probit,

$$y_i^* = x'_i\beta + \epsilon_i$$
$$y_i = 1 \; if \; y_i^* = 1$$
$$= 0 \; otherwise$$

y_i^* is the decision of fallow and takes the value 1 if the farmer decides to fallow and 0 if the farmer does not.

In the of the censored model,

$$y_i^* = x'_i\beta + \epsilon_i$$
$$y_i = y_i^* \; if \; y_i^* > 0$$
$$= 0 \; if \; y_i^* \leq 0$$

where i = 1, 2, . . . ,N, and ϵ_i is assumed to be NID (0, δ^2) and independent of x_i . The vector y_i^* in this case is the duration of fallow while y_i is the decision to fallow. y_i^* is only observed if $y_i = 1$. This model is a censored regression model where observations may be censored from below.

Data Description

The analysis in this paper is based on tenure security information on 6,310 plots, collected from a sample of 2,928 farm households. The households were drawn from 23 districts located in three distinct agro-ecological zones of Ghana, namely, the Northern Agriculture Zone (Northern Region of Ghana), the Afram Basin (Ashanti and Eastern Regions of Ghana), and the Southern Horticultural Belt (South-East Coastal Plains). Known as the Farmer Based Organization survey, the data collected by the Institute of Statistical, Social and Economic Research (ISSER) of the University of Ghana was intended to facilitate the monitoring and evaluation of the Millennium Challenge Compact signed between the government of Ghana and the Millennium Challenge Corporation (MCC) of the United States of America.

The Farmer-Based Organizations survey collected information on the overall living circumstances and farming activities of members of FBOs and their respective households. In-depth household data was collected using two sets of questionnaires; a household questionnaire and a community questionnaire: The survey collected information on a wide range of household attributes including the demographic, education and health characteristics; migration; household transfers; information seeking behaviour of households; household assets and participation in financial markets (borrowing, savings and lending behaviour); household agriculture activities including land ownership and transactions and agriculture processing and, non-farm enterprises of households. Information was also collected on the location of households, community facilities and farm sizes using geographic position system units (GPS). The community questionnaire was essentially a market price survey.

RESULTS AND DISCUSSION

Definition and Measurement of Key Variables

Table 1 presents the description and measurement of variables contained in the models. The results show that about 14 per cent of households think they will lose their land if left unused for a given period. The period of time households can leave their lands without the fear of losing the land averages at about 0.5 year. The median period households could leave their lands without losing ownership or use rights was 1 year, an indication that half of the households are tenure insecure and fear losing their lands if they left it for more than a year. As expected, the greater majority (84%) of households were male-headed. On average, households have been cultivating their plots for about 9 years. The average household farm size was estimated at about 4.3 acres.

Less than 1 per cent of plot owners had deeds covering their rights over plots they cultivated. About 39 per cent of plot holders were cultivating land owned by the extended family or clan while 37 per cent were cultivating plots they received as gifts. The information in Table 1 shows that the necessary conditions for relatively high tenure insecurity (incidence of disputes, limited documentation of land rights and communal ownership rather than individual ownership) existed and therefore provided a unique opportunity for testing the study's hypotheses.

Table 1. Definition and Measures of Variables

Variable	Description	Mean	Std. Dev.
Sex	1= Male, 0= Female	0.844	0.362
Age of Household Head	In number of years	47.098	12.746
Age of household head square	In number of years	2257.858	1243.072
Household size	Number of people	6.547	3.236
Dependency ratio	(Members below 15 and above 64(/ (members above 15 years and below 65 years)	1.078	0.917
Ancestry	Dummy (1= indigene, 0 = non- indigene)	0.751	-
Basic education	Number of school years	5.455	5.251
No basic education	Number with no basic education		
Major occupation of household head	(1= farm employment 0= non-farm employment)	0.868	-
Reads proficiently	Number able to read a sentence in English well	0.232	0.422
Read fairly	Number unable to read well in English		
Livestock Holding	Number of all livestock (in TLU)	0.082	0.718
Land Holding	Number of acres of land owned by household	4.306	5.359
Non-farm income (per capita)	Amount in Ghana Cedis	336.461	2001.058
Value of output per area	Amount in Ghana Cedis	61.311	390.075
Gifted land	Dummy (1=gifted land, 0= not gifted land)	0.370	-
Sharecropped land	Dummy (1=sharecropped, 0= not sharecropped)	0.188	-
Family land	Dummy (1= family land, 0= not family land)	0.391	-
Years of land ownership	Number of years	9.172	6.655
Ownership with deed	Dummy (1= yes, 0=No)	0.081	-
Land Fragmentation Index	Number of parcels/farm size in acres	0.560	0.783
Number of physical structures on plot	Number	0.202	0.650
Type of rights	Dummy (1 = complete rights, 0= preferential rights)	0.168	-
Boundary demarcation	Dummy (1 = well-demarcated, 0 = not well demarcated)	0.674	-
Decision to leave land uncultivated	Dummy (1= left land uncultivated, 0= fear losing land if left idle)	0.136	-
Period of time land is uncultivated	Number of years	0.518	0.764
Estimated value of land	Value in Ghana Cedis	600.083	1300.527
Incidence of disputes	Dummy (1= Had disputes, 0= Had no disputes)	0.048	-
Duration of land ownership	Number of years	8.548	7.326
Southern horticultural belt	Dummy (1=southern, 0=otherwise)	0.244	-
Northern agric. Zone	Dummy (1=northern, 0=otherwise)	0.373	-
Perennials Crops	Dummy (1=southern, 0=otherwise)	0.053	-
Vegetables	Dummy (1=southern, 0=otherwise)	0.142	-
Non-perennial cash crops	Dummy (1=southern, 0=otherwise)	0.201	-
Distance to markets	**Kilometers from nearest major market**	**2.314**	**16.561**

We tested for sample selection bias using the two step Heckman model suggested by Deaton (1997). The test revealed no significant selection bias therefore we estimated the decision to leave land and the duration oftenure security using the maximum likelihood probit and the tobit models respectively (Table 2). Heteroscedasticity in the duration of tenure security is corrected for by estimating Powell's Censored Least Absolute Deviations (CLAD) estimator. The CLAD estimator unlike the standard estimators of the censored regression model is robust to heteroscedasticity, consistent and asymptotically normal for a wide class of error distributions (Arabmazar and Schmidt, 1981).

Maximum likelihood estimates of the determinants of the decision to leave land (the proxy for the perception of tenure security) and the duration of tenure security are presented in Table 2. Relative household land holding had an unexpected positive sign. From the Alenu (1999) hypothesis, one would expect apriori that, households with large farms relative to their resource endowments and available family will be more tenure insecure due to their inability to manage or protect the lands. Our suspicion is that households that own large tracts of land may not be significantly affected by the loss of a fraction of these lands. The positive relationship between tenure security and farm size is an indication that the Alemu, (1999) farm size effect on tenure security varied significantly in the context of Ghana. Two reasons may likely explain the inverse farm size-tenure security relationship. In the first instance, households that own large tracts of land are usually big and influential households who are able to exert significant influence on traditional authority and land governance systems in the community. Secondly, the apparent feeling of tenure security among households that hold large tracts of land may also be as a result of the abundance which would inadvertently reduce land litigations. This assertion is confirmed by the sign of location dummies. In southern Ghana where land is scarce and litigations are common, more farm owners fear loss if they left their lands uncultivated.

Household head's age and age squared had the expected positive and negative signs respectively even though only the square of age was significant at the 10 per cent level for duration of tenure security. The signs on age and age squared mean that younger people are more likely to lose land they leave idle compared with older people. The result underscores the Goldstein and Udry (2006) assertion that people who held political authority or those able to influence the local political structure were more tenure secure. In the Ghanaian society, decisions on land are taken by stools and skins and the likelihood of having a seat in the village 'Cabinet' increases with age.

The value of household land had an unexpected significant positive effect on the decision to leave land idle but exhibited the expected negative sign in the duration of security model. This observation is plausible as it would take more than one season for land vacation to be noticed by other claimants. The results seem to suggest that the source of insecurity in Ghana is not a direct function of farm land size but rather the value of farmland. This contrasts with the findings by Holden and Yohannes (2002) which established a direct relationship between relative farm size and tenure insecurity in Ethiopia. While households with large farm holdings in Ghana may not fear redistribution by the state as is the case in Ethiopia so long as proper and commensurate compensations are paid, rising value of land may lead to land grabbing by more powerful farmers or developers.

The ancestry variable was strongly correlated with tenure security meaning

relative to settlers, indigenes felt more secure leaving their lands idle for longer periods. This result is consistent with findings by Goldstein and Udry (2006) that plot holders who obtained their lands through the political processes of matrilineage and patrilineage (family land) were less likely to lose land that they leave idle for a specified period.

Land fragmentation was found to be positively related to the duration of tenure security. The division of farm plots into several smaller crop fields is regarded as a risk spreading strategy that households employ to minimize loses. The cultivation of own farms (with deed) is positively correlated with tenure security and statistically significant at 1 per cent level. Other tenure-related characteristics like the presence of boundaries, absence of land disputes and the exercise of complete rights (having the right to use and transfer those rights) had significant positive effects on the duration of tenure security. This is an indication that formal land documentation significantly improves tenure security even in the case of farmlands.

Table 2. Determinants of Land Tenure Security

Variable	Decision to vacate/fallow land		Duration of Tenure Security (with Powell's CLAD)	
	Coefficient	Robust Standard Error	Coefficient	Standard Error
Household Characteristics				
Sex	0.564**	0.191	0.325**	0.101
Age	-0.006	0.007	-0.003	0.005
Age square	0.004	0.000	0.001*	0.000
Ancestry	0.872***	0.111	0.517***	0.080
Dependency ratio	-0.046	0.062	0.019	0.043
Household Size	0.042**	0.015	-0.004	0.012
Number of school years	0.141***	0.012	-0.016*	0.009
Ability to read and write	0.105	0.113	0.015	0.091
Farm employment	0.203*	0.122	0.001	0.093
Assets and Wealth				
Livestock Holding (in TLU)	-0.159*	0.069	0.223*	0.105
Land Holding	0.008	0.007	0.001	0.007
Value of household lands	0.149**	0.044	-0.003**	0.001
Value of output	0.001	0.000	-0.001	0.001
Investment in land improvement	0.163	0.112		
Number of physical structures	0.090	0.061	0.501***	0.033
Land Tenure Security				
Sharecropped land	-0.580***	0.128	-0.662***	0.131
Family land	-0.238*	0.111	0.387***	0.089
Gift land	-0.088	0.105	-0.021***	0.094
Land title	1.170***	0.135	0.562***	0.095
Years of land usage	-0.008	0.005	-0.012*	0.005
Absence of land-related disputes	-4.690***	0.176		
Well-defined boundary	-0.186	0.096	0.169*	0.074
Complete rights	-0.075	0.103	0.319***	0.073
Index of land fragmentation	0.067	0.066	0.083*	0.042
Crop and Location				
Southern horticultural belt	-0.357**	0.130	-0.158*	0.095
Northern agricultural zone	0.701***	0.137	-0.244*	0.104

Distance to major market	.0019032	.001749	-0.003	0.003
Cultivate perennial crops	0.707***	0.142	0.531***	0.152
Cultivate vegetables	0.202	0.126	0.087	0.092
Cultivate cereals	0.083	0.114	-0.018	0.085
Constant	-4.595***	0.372	-1.720***	0.240
Log pseudo likelihood	-1847.08			
F				
Prob > F	0.0000			
Pseudo R^2	0.3213			
Total observations	6310			
Uncensored observations			883	
Left-censored observations at years of fallow <=1			5413	

CONCLUSION

Our paper examined the determinants of farmland tenure security in Ghana using an innovative approach that extends the scope of definition and measurement of land tenure security. We adopted an approach to the measurement of land tenure security to reflect local context land ownership and management scenarios. In most parts of Ghana, usufruct farmland rights are hardly curtailed as long as the occupant continues to cultivate land. Our definition of tenure security was premised on the assumption that a plot holder not sure of the security of tenure would continue to cultivate his land to safeguard his rights. On the other hand, plot holders who perceive their rights to be secure could leave (fallow) their land for a period of time. Unlike land titling, this measure allowed us to test how other tenure security variables such as land deeds influence the decision to leave land and the duration land could be left idle. The two-stage measure of tenure security was modelled as a function of household, farmland tenure and location characteristics.

It was observed that being an indigene or being old increased the length of time lands were left uncultivated without loss of title. Indigenes usually acquire farmland rights through socio-political processes of matrilineage and patrilineage. Also, the older a household head the higher the probability of participation in community decision making at the highest level. These two combine to improve tenure security even without formal land titling.

Although we did not observe Alemu's (1999) relative farm size effect which positively related tenure security to farm size, we found that the value of land inversely correlated with the duration of tenure security. The value of land variable, however, positively influenced the decision to leave land idle and negatively affected the duration households left lands idle. Nonetheless, the results show that increasing value of land has the potential to trigger litigations which could lead to loss of land if left uncultivated for significantly longer periods of time. After testing the relationship between our tenure security measure and other land rights variables we observe a strong positive relationship between land titling and both the perception and duration of tenure security. Presence of boundary, having complete rights, cultivation of family (or clan) lands and land fragmentation positively increased

the duration of tenure security. As expected, the most insecure form of land arrangement was found to be sharecropping. Our results also showed that the planting of perennial crops significantly improved both farmers' perception and duration of their tenure security.

While our approach to the measurement of tenure security may not be revolutionary, it nonetheless flags the need for innovative approaches in the operationalisation of land tenure security, especially in jurisdictions with pluralistic land tenure systems such as Ghana. Several of the studies that have failed to establish strong links between land tenure security and interest variables like farm investment, access to finance and productive efficiency often do all but fail to question the measurement of tenure security. The state of the art in the measurement of land tenure security has often approximated land tenure security with formal land titling and monetized transactions where cash or kind payments are made for land. While not disputing the importance of formal land documentation, questions of the existence of other equally or even more effective forms of securing land ownership and use rights must not be ignored.

The argument of our paper is that a farmer who is tenure insecure may develop the capacity to continuously cultivate his land. In such circumstances he or she may feel secure and make long-term investments even without land title. Thus classifying holders of non-registered farmland as being insecure could lead to hypothetical deficiencies. These hypothetical deficiencies may well explain why several studies in SSA have failed to identify the widely hypothesized positive relationship between tenure security and farm investments or land productivity.

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APPENDIX

HECKMAN SAMPLE SELECTION

Heckman selection model	Number of obs	= 6307
(regression model with sample selection)	Censored obs	= 3976
	Uncensored obs	= 2331
	Wald chi2(27)	= 279.80
Log pseudolikelihood = -7400.264	Prob > chi2	= 0.0000

falperiod1	Coef.	Std. Err.	Z	P>z	[95% Conf.	Interval]
falperiod1						
indigene	.1261251	.0540152	2.33	0.020	.0202573	.231993
TLSU1	.0407614	.0415841	0.98	0.327	-.0407419	.1222648
Sex_tenure	.3059728	.0550472	5.56	0.000	.1980822	.4138635
age	.0083282	.0044564	1.87	0.062	-.0004062	.0170627
agesq	-.0000616	.0000458	-1.35	0.178	-.0001514	.0000281
yrsown	-.0047927	.0039478	-1.21	0.225	-.0125302	.0029448
South	-.0397148	.0644133	-0.62	0.538	-.1659625	.0865329
North	.0443805	.0791638	0.56	0.575	-.1107777	.1995387
hhsize	.0001068	.0088023	0.01	0.990	-.0171455	.017359
deed	.4870481	.0849482	5.73	0.000	.3205526	.6535435
sharecrop	.0817378	.0751222	1.09	0.277	-.0654991	.2289747
familand	.3854297	.0611519	6.30	0.000	.2655742	.5052852
freeland	.3947657	.0710789	5.55	0.000	.2554537	.5340778
lfrag2	.0394441	.0361098	1.09	0.275	-.0313298	.110218
perecas	-.0107322	.0956682	-0.11	0.911	-.1982384	.176774
vegspi	.0660993	.0657788	1.00	0.315	-.0628248	.1950234
nontrecas	-.0520249	.0622655	-0.84	0.403	-.174063	.0700132
sfms2	.0085394	.0050115	1.70	0.088	-.0012829	.0183618
job	-.0801124	.0696124	-1.15	0.250	-.2165502	.0563253
mktdist	-.0013323	.0008399	-1.59	0.113	-.0029785	.0003139
Nostruc1	.2955658	.0317962	9.30	0.000	.2332464	.3578853
fulrigth	.1484545	.057092	2.60	0.009	.0365562	.2603529
boundry	.2087835	.0501194	4.17	0.000	.1105513	.3070157

ab_read	-.0475315	.0660117	-0.72	0.471	-.1769121	.081849
yrseduc	.0047217	.0066496	0.71	0.478	-.0083114	.0177548
lvalue2	-.000014	5.54e-06	-2.53	0.011	-.0000249	-3.17e-06
dratio	.0137192	.028258	0.49	0.627	-.0416655	.0691039
_cons	.9539949	.1885866	5.06	0.000	.5843719	1.323618
select						
can_falow	-.2642449	.0574731	-4.60	0.000	-.3768901	-.1515997
TLSU1	1.064572	.116321	9.15	0.000	.8365873	1.292557
indigene	.1105933	.0386169	2.86	0.004	.0349056	.186281
Sex_tenure	.0355044	.0487129	0.73	0.466	-.059971	.1309799
age	-.0066733	.0026733	-2.50	0.013	-.0119128	-.0014338
agesq	.0001157	.0000282	4.10	0.000	.0000604	.000171
yrsown2	.0047609	.0025356	1.88	0.060	-.0002089	.0097307
South	-.0920057	.0484441	-1.90	0.058	-.1869543	.002943
North	-.1303124	.0524515	-2.48	0.013	-.2331154	-.0275094
hhsize	.0002011	.0062151	0.03	0.974	-.0119802	.0123825
deed1	.5220069	.0682216	7.65	0.000	.3882951	.6557187
sharecrop1	-.3522535	.0461869	-7.63	0.000	-.4427782	-.2617288
familand1	.1070054	.0413466	2.59	0.010	.0259676	.1880433
freeland1	.0147961	.0391579	0.38	0.706	-.0619519	.0915442
lfrag2	.0131932	.0261348	0.50	0.614	-.03803	.0644164
perecas	-.0092261	.079505	-0.12	0.908	-.165053	.1466007
vegspi	-.0310075	.0480717	-0.65	0.519	-.1252263	.0632113
nontrecas	-.024499	.0438253	-0.56	0.576	-.110395	.061397
sfms2	-.0075889	.0035226	-2.15	0.031	-.0144931	-.0006846
job	.0439897	.0485008	0.91	0.364	-.0510701	.1390494
mktdist	.0003323	.0011094	0.30	0.765	-.0018421	.0025066
Nostruc1	.2372274	.0254876	9.31	0.000	.1872726	.2871823
fulrigth	.1235422	.0391428	3.16	0.002	.0468238	.2002607
boundry	-.0300018	.0371669	-0.81	0.420	-.1028475	.0428439
ab_read	.0502673	.0474133	1.06	0.289	-.0426612	.1431957
yrseduc	-.0075638	.004712	-1.61	0.108	-.0167991	.0016716
dispute	.1203818	.0817776	1.47	0.141	-.0398993	.280663
lvalue3	-.0410836	.0332499	-1.24	0.217	-.1062522	.0240851
dratio	-.0075003	.0224764	-0.33	0.739	-.0515533	.0365527
inv	-.0182412	.0441304	-0.41	0.679	-.1047353	.0682529
_cons	-.4142079	.1186791	-3.49	0.000	-.6468147	-.1816011

/lnsigma	-.0270537	.1300325	-0.21	0.835	-.2819127	.2278053
rho	-.6691557	.1253329			-.849413	-.3490697

sigma	.973309	.1265618		.7543395	1.255841
lambda	-.6512952	.2023247		-1.047844	-.2547462

LR test of indep. eqns. (rho = 0): chi2(1) = 9.45 Prob > chi2 = 0.2021