Can smallholder farmers grow? Perspectives from the rise of indigenous small-scale farmers in Ghana

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This paper examines the process of growth and the drivers of transition using a quantitative survey of Ghanaian medium- and large-scale farmers. The paper departs from the competing visions on whether to promote small-scale or large-scale farms in Sub-Saharan Africa (SSA) primarily by arguing that an important transition of onetime small-scale farmers is taking place in Ghanaian agriculture and potentially in other SSA countries. This transition is largely unresearched, although it is a critical feature of agricultural transformation with implications for agricultural development strategies in the SSA sub-region.

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Abstract

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1. Introduction

Agriculture in Sub-Saharan Africa (SSA) has for decades been characterised by the predominance of smallholder farmers with fewer than two hectares of farmland. However, the global food price crisis of 2007–2008 accelerated the recent race to acquire large tracts of fertile land in Africa, compounding the challenges facing agriculture development in SSA, such as low productivity, inadequate access to input and output markets, and lack of infrastructures. Notably, the policies set up to confront these challenges have traditionally focused on smallholder-led development strategies. However, the failure of decades of interventions to transform agriculture has led many scholars to call into question the effectiveness of smallholder-led development strategies for solving challenges in African agriculture. Debate continues on how to effectively transform Africa's agricultural production systems from largely smallholding and semi-subsistence farms, to more commercially oriented systems focusing on large farms.

In his 2008 article *The Politics of Hunger*, Collier reignited the debate about whether Africa should promote large-scale farms or smallholder farming to spur agricultural commercialization and growth. He argues that Africa has a lower chance of achieving accelerated agricultural growth and poverty reduction if the strategy continues to focus on smallholder farmers; instead, he calls for a shift in priority to large-scale commercial farmers, contending that "the world needs more commercial agriculture, not less." Supporting this view, others have cited the Cerrado farms in Brazil (Ferreira Filho and Vian 2014; Cremaq 2010), in addition to pointing to the highly commercialised agricultural sectors of the West, in particular the United States and Canada, which account for more than 20 percent of global agricultural supply (USDA 2013).

Furthermore, Collier and Dercon (2014) argue that development strategies need to shift focus and resources away from smallholder farm models, and open up new forms of

commercialisation involving serious large-scale investment in commercial agriculture and hybrid models that involve interaction between smallholder farmers and larger farmers. In short, the smallholder-led agricultural development model has extensively been criticised, with scholars questioning its continuing relevance for Africa (Vink 2014; Collier 2008).

Proponents of a smallholder-led approach point to a broad-based development strategy, emphasizing that any policy that excludes the millions of smallholders during the process of agricultural modernisation will sideline a large segment of the rural population and will likely lead to social tension and leave many trapped in poverty (Breisinger, Diao, Kolavalli, Al-Hassan, and Thurlow 2011). Hazell (2010) argues that despite recurring predictions that they will soon disappear, small farms have proven remarkably resilient. Drawing on the Asian Green Revolution, Rosegrant and Hazell (2000) indicate that the smallholder-led approach has been successful in reaching large numbers of small farms, and thereby transforming rural economies and lifting huge numbers of people out of poverty.

Parallel to the debate over the best strategy for agricultural transformation in SSA, many smallholder farmers have on their own transitioned to become medium- and large-scale farmers. These farmers have been a noteworthy part of changing farm structures in Africa over the last two decades, yet they have only recently begun to feature in the debate on agricultural transformation (Chapoto, Mabiso, and Bonsu 2013; Sitko and Jayne 2012). Using survey data from Ghana, this article examines the process of transition among one-time small-scale farmers who have become medium- and large-scale farmers. It moves beyond the previous literature, which suggests that small farmers tend to remain small by showing that indigenous small farmers can grow organically and emerge as medium- or large-scale farmers, contrary to the conventional belief that only farmers with urban backgrounds can grow. These farmers have been able to transition because

they are risk takers, have strong aspirations, or have been exposed to others outside of their communities. Some of them also started farming with relatively larger farm sizes or were born to more educated parents.

The rest of the article is organised as follows. Section 2 discusses some of the changes taking place in African agriculture, including the recent trends in Ghanaian agriculture, while Section 3 presents the conceptual framework that underpins the analysis. Section 4 describes the data and empirical approach, and Section 5 presents the results. Section 6 offers our concluding remarks.

2. Agricultural transformation in Sub-Saharan Africa

In the last two decades, several African countries have witnessed significant and sustained growth in agriculture and the overall economy (The Economist 2011a, 2011b; Roxburgh et al. 2010). The following discussion looks at the experiences of selected African countries and the context of Ghana.

2.1. The experience of selected African countries

Increased agricultural commercialisation plays a major role in agricultural growth, with both smallholders and large-scale farmers contributing to varying degrees. Potentially underlying this increase in agricultural growth are increases in population density and the expansion of cultivated land. Figure 1 shows that there have been distinctive trends in land area harvested and population density in selected African countries, especially where appreciable increases in agricultural growth have been recorded.

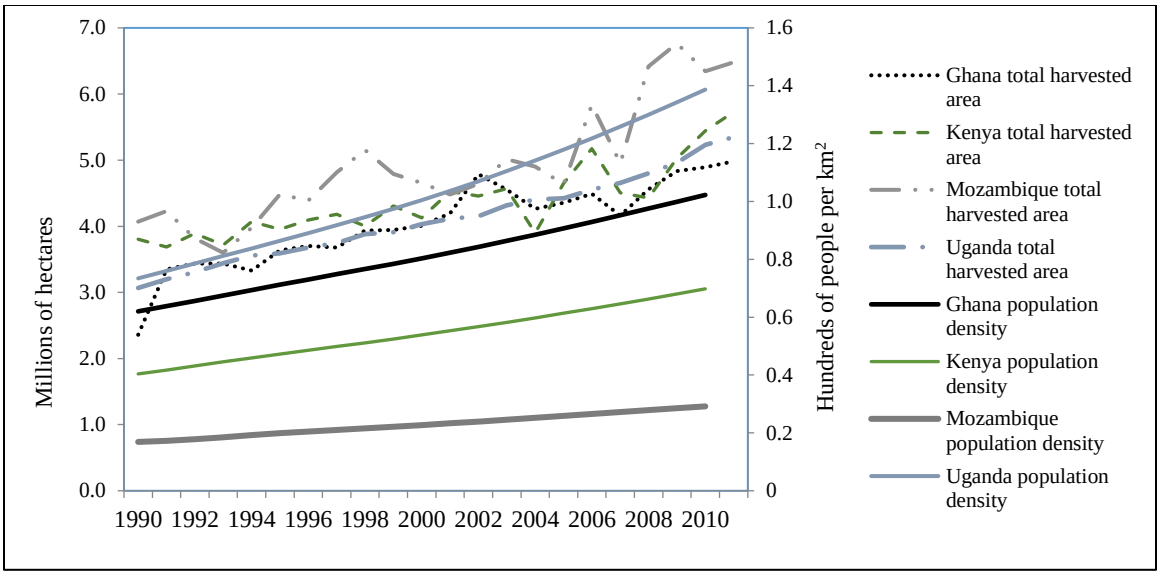

Figure 1. Agricultural land expansion and population density in selected African countries

Note: The dashed series (land area harvested) are read off the left axis, while the solid series (population density) are read off the right axis; km^2 = square kilometres.
Source: FAO 2013 and UNESA 2013.

Figure 1 makes clear that increases in population density are positively correlated with total land area harvested. However, it is expected that as land available for conversion to agricultural use vanishes, the correlation may decline and even become negative while intensification and outmigration of labor from agriculture increases. What is not quite clear, are the empirical microeconomic processes underpinning this relationship and how, if at all, they are associated with increased agricultural commercialisation at the farm household level. Recent evidence suggests that part of the land expansion may be explained by foreign land-based investments, particularly in land-abundant countries (Deininger and Byerlee 2012). However, increases in both farm size and production by a subset of farmers may also explain these trends, although those factors have not been studied.

Countries that have experienced high agricultural growth also exhibited some increases in productivity between the 1990s and 2011. Figure 2 shows that the increases in labour productivity were, however, lower than increases in land productivity (in terms of value of production)—this

is illustrated by the productivity growth trajectories that are steeper than the 45-degree line. Moreover, Fuglie, Wang, and Ball (2012) show that African agricultural productivity growth has generally been limited compared to other parts of the developing world, such as Asia and Latin America, underscoring that agricultural growth in Africa has been driven mainly by increases in land area cultivated.

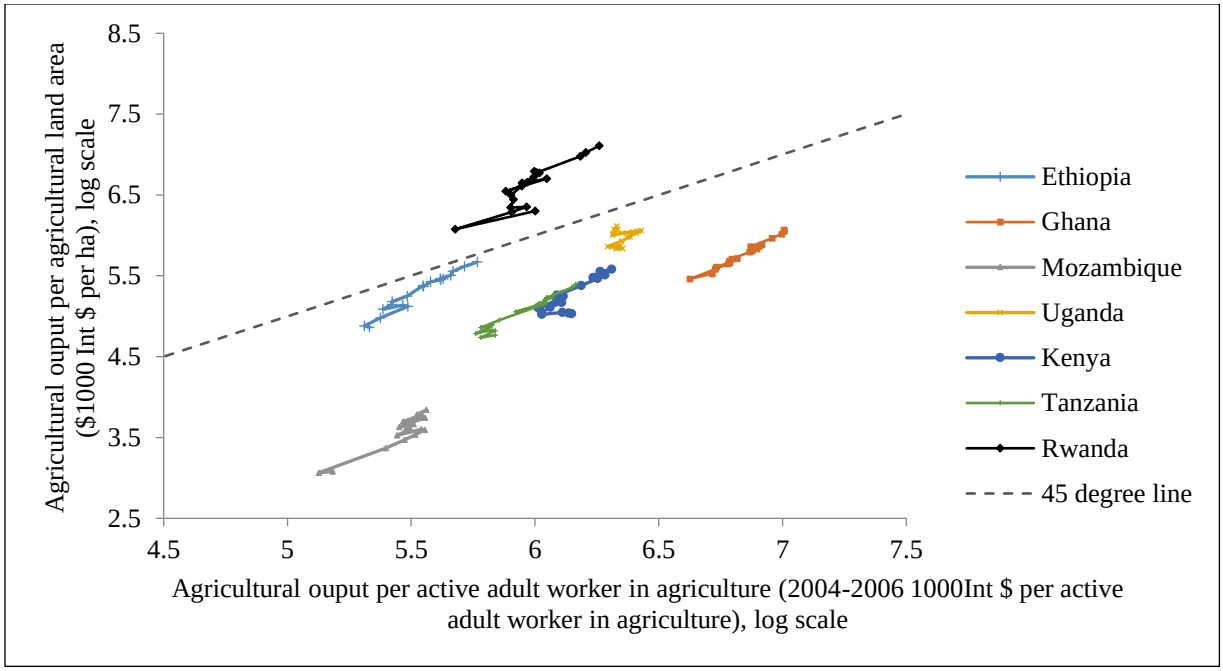

Figure 2. Land and labour productivity in selected African countries, 1993–2011

Note: Int = International; $ = US dollars; ha = hectare.
Source: Authors' representation using FAOSTAT data, following Hayami and Ruttan (1971) and Fuglie, Wang, and Ball (2012).

In Ethiopia, Dorosh and Rashid (2012) indicate that agricultural growth has largely been driven by increases in total land area cultivated, followed more recently by increases in yields, within a context of improved public investments and agricultural policy. At the same time, Ethiopia's population has also grown rapidly, at an annual rate of 2.8 percent (UNESA 2013), suggesting that population growth may have contributed to the increase in land area cultivated. In Mozambique, agricultural growth in recent years has been driven by the expansion of land area

cultivated and increased population, leading to increased agricultural commercialisation (Morris, Binswanger-Mkhize, and Byerlee 2009). Farm household survey data reveal that the total land area cultivated in Mozambique increased from about 4.2 million hectares (ha) in 2002 to about 5.6 million ha in 2008, with the average farm size increasing by 12.4 percent in the same period (Arndt et al. 2012). Deininger and Byerlee (2012) reported that a major part of the increase in the land area cultivated is attributed to increase in land-based investments, many of which have been foreign-financed. However, Arndt et al. (2012) contend that much of the increase in agricultural production in Mozambique can also be attributed to population growth, such that when one adjusts for these two factors, agricultural growth is found to be weak.

In Tanzania, another African country that has registered sizeable agricultural and economic growth, the land area cultivated has also increased from 4.9 million ha in 1998/99 to 7.8 million ha in 2009, resulting in increased production and agricultural commercialisation (Binswanger-Mkhize and Gautam 2010; Liwenga, Kangalawe, and Masao 2012; United Republic of Tanzania 2008). While several large-scale land acquisitions have been associated with increase in land area cultivated, Binswanger-Mkhize and Gautam (2010) find that farm households are expanding their cultivated area as well, although increases in land and labour productivity appear marginal in the country. Similar trends have previously been documented in Uganda (Pender, Jagger, Nkonya, and Sserunkuuma 2004), where the expansion of cultivated land took place in the context of increasing population.

2.2 Changing farm structure in Ghana

Ghana has undergone sustained economic growth accompanied by substantial poverty reduction in the last two decades (World Bank 2012). At the same time, the area under cultivation has increased substantially, with the total land area harvested more than doubling—from 2.4 million

ha in 1990 to about 5 million ha in 2011 (FAO 2013). Population density has also increased, especially in southern Ghana[1] (Ghana Statistical Service 2012a; Diao, Cossar, Houssou, and Kolavalli 2014).

At the microeconomic level, data from the Ghana Living Standards Survey (GLSS) suggest that the predominance of small farms in the country's agriculture is abating. Between 1998 and 2012, the share of small-scale farmers decreased by 3 percent in the country (Table 1). At the same time, the share of farmers cultivating between 2–5 ha increased by 24 percent, and the share of those cultivating between 5–10 ha grew by 28 percent. Similar patterns of growth can be observed among farmers who cultivated more than 10 ha during the same period. More important, small-scale farmers (that is, those with fewer than 2 ha) cultivated only 14 percent of the total farmland in 2012, even though they constitute 50 percent of the country's farming population, while medium-scale farmers with farms between 2–20 ha cultivated 72 percent of the total farmland in the country.

[1] The southern Ghana region includes Greater Accra, Ashanti, Central, and Eastern regions.

Table 1. Changes in farm structure in Ghana, 1998–2012

Farm size categories	Number of farming households			% in total farm households		% change 1998–2012*	% of total cultivated area	
	1998	2005	2012	1998	2012		1998	2012
0–2 ha	1,557,856	1,725,024	1,508,509	55.6	49.3	-3.2	16.8	14.0
2–5 ha	863,656	957,722	1,070,565	30.8	35.0	24.0	31.9	33.3
5–10 ha	257,032	256,620	328,354	9.2	10.7	27.7	21.8	23.2
10–20 ha	93,272	110,076	114,504	3.3	3.7	22.8	15.3	15.3
20–100 ha	27,768	46,143	33,667	1.0	1.1	21.2	10.2	10.7
>100 ha	1,424	6,958	1,740	0.1	0.1	22.2	4.1	3.5
Total	2,801,008	3,102,543	3,057,338	100	100	9.2	100	100

Note: * = percentage change from 1998 to 2012; ha = hectare.
Source: Ghana Living Standards Surveys Rounds 4, 5, and 6 (Ghana Statistical Service, 1998, 2005, 2012b).

In short, the number of smallholder farmers has declined between 1998 and 2012, while the number of medium-scale farmers has increased in the country. Meanwhile, standard household surveys often fail to capture a large number of medium-scale farmers. For example, in Ghana, very little is known about these farmers, hence our attempt to begin to fill this void by examining the characteristics and behavior of this emerging class of medium-scale farmers and the factors that may explain their dynamism. This evidence will bring new perspectives to the debate on African agricultural development, which has long been dominated by the choice between large and small farms.

3. Conceptual framework

We base our analysis on the theories of agricultural transformation and evolution of farming systems. At the macroeconomic and sector levels, agricultural transformation is seen as entailing a decline in the share of agriculture in a country's labour force and total output over time (Johnston and Kilby 1975; Lewis 1955; Schultz 1964; Timmer 1998). As part of this transformation process, the economy transitions from subsistence-oriented agricultural production toward an integrated production and exchange system based on greater specialisation and market transactions

(commercialisation) while capturing economies of scale (Johnston and Mellor 1961; Lewis 1955). The transition of smallholder farming from subsistence to commercialised enterprises is a key feature of agricultural transformation (Johnston 1970; Johnston and Mellor 1961). Through agricultural commercialisation, rural farm households increasingly participate in the market economy to earn higher incomes, accumulate assets, and are lifted out of poverty and food insecurity as the process of structural transformation takes root (Gabre-Madhin and Haggblade 2004; Haggblade and Hazell 2010; Jayne, Minde, and Argwings-Kodhek 2002). Simultaneously, there is movement of labour out of the farming sector into the non-farm sectors, including non-farm rural employment, rural-urban migration, value-added processing of agricultural primary products, and trade (Haggblade, Hazell, and Reardon 2007). Adoption of agricultural technology is an integral part of the agricultural transformation process, resulting in increased on-farm production and productivity, and greater reliance on markets for farm inputs, outputs, and services.

Underlying this sector-level transformation of agriculture is a transformation at the microeconomic level, which involves rational farmers and households engaging in constrained optimisation (Schultz 1964) in the context of evolving farming systems (Boserup 1965; Ruthenberg 1980). In this regard, we consider farmers to be rational individuals making decisions to maximise expected utility over time, but inhibited by the evolving constraints that characterise their farming systems. Over time, different constraints may relax or become further pronounced through, for example, some government intervention, other external factors, or increased population pressure.

Collectively, as numerous farmers make decisions over time in response to changing opportunities and constraints presented by their farming systems, agricultural transformation takes place under specified conditions. However, the nature or path of the transformation will vary

fundamentally by farming systems; its evolution largely depends on biophysical, historical, institutional, and socioeconomic factors. Boserup (1965) argues that a fundamental driver of the evolution of farming systems is rising population pressure, which induces innovation as farmers adopt more intensive cropping systems and modern technologies. In contexts where land is not as constraining but perhaps labour is, the nature of induced innovation and agricultural intensification will entail an expansion of farmland, and the conversion of fallow land into more intensely used farmland. This will, in turn, result in the reduction of shifting cultivation practices. This process is often facilitated by the availability of labour-saving farm technologies, such as mechanisation, barring prohibitive fixed-transaction costs, and institutional constraints.

In contrast, in areas with a binding land constraint or where institutions that govern land use preclude expansion, there is likely to be more intensification of farming, with irrigation technologies facilitating multiple cropping cycles in the same year, in contrast to rain-fed farming systems that do not permit multiple cropping in the same year. In addition, chemical technologies such as fertiliser, herbicides, and pesticides become more readily adopted, as does the use of improved seed varieties, which allow for increased output per unit of land area (Boserup 1965; Stryker 1976). Market incentives also play a critical role and motivate the degree of intensification, both in terms of input and output (relative) prices, such that the profitability of different enterprises may shape the nature of farm intensification and commercialisation. Classic examples include horticulture, coffee, and cocoa export market incentives that have enhanced profitability in parts of Africa—for example, Ghana, Kenya, and Rwanda—and led to both land expansion and intensification. Another related factor is that of public policy and investments. For example, investments in infrastructure that lower transport and transaction costs may relax constraints and enable farmers to intensify their production and commercialise.

There are also heterogeneous constraints within the same geographical locality and farming system, such that some farmers can take advantage of the available technologies or invest in land expansion while others fail to do so, owing to farmer-specific conditions. These conditions may include initial endowment levels, natural abilities, farmer's aspirations, and social-institutional constraints that discriminate by farmer type or gender. For this reason, some farmers in the same locality may be found to be transitioning from smallholder to medium to large-scale commercial farmers while others remain largely subsistence oriented (although the latter may also potentially benefit from their transitioning peers through spillover effects). For example, if a transitioning farmer invests in a tractor, he or she might hire out that tractor to other farmers in the village after plowing his or her own fields, thus relaxing the capital constraints of other farmers that fail to purchase a tractor. In essence, farmers do not operate in a vacuum, but interact with one another, thereby influencing each other's constraints and the collective farming system over time.

Furthermore, policies can also play a major role in driving farm transition or provide the needed incentives for successful farm transition. Indeed, several policies and programs aimed at increasing farm production and productivity have been enacted in Ghana since the colonial period. (See Dapaah (1995) and Asuming-Brempong and Kuwornu (2013) for a thorough description of these policies). While our focus is not to evaluate these policies, the overall pattern suggests that they have had mixed results. For example, while, the economic reforms of 1983 have led to cropland expansion and increased commercialisation of domestically produced food in the country (Braimoh 2009), earlier efforts to mechanise agriculture in the 1980s failed. More important, farmers have not significantly intensified the use of improved technologies (Nin-Patt and Mcbride 2014; Houssou, Johnson, Kolavalli, and Asante-Addo 2016), and it is unlikely that recent programs have contributed to the farm transition and growth that started 20 years ago among the surveyed

farmers.

Using this conceptual framework, especially the microeconomic level factors, the authors hypothesise that the dynamic of farm transition—measured by the time taken to grow from small to medium- and large-scale farming status—can be influenced by several factors. Of great interest are the source of growth, farmer's aspiration, risk aversion, exposure, education level, parents' stock of education, startup assistance, and initial farm size.

4. Data and methodology

4.1. Data

This paper uses data from quantitative data from the 2013 IFPRI/SARI Survey, which targeted mostly medium- and large-scale farmers and tractor owners. We conducted a household survey from October to November 2013 in eight districts of the transitional and Savannah zones of Ghana. The survey covered 1,843 farming households and was aimed at characterising the transition of smallholder farmers who have become medium- and large-scale farmers and assessing the patterns of demand for agricultural mechanisation among these farmers (See Authors for further details on the survey methodology). Consistent with the objective of this paper, the quantitative analysis focuses on the subset of medium- and large-scale farmers who started at a small-scale; these totaled 915 farming households.

4.2. Methodology

To understand the dynamics of land expansion in Ghana and the emergence of medium- and large-scale farmers, we use mixed methods. Insights gained from qualitative narratives gathered prior to the farmer survey were tested quantitatively and used to explain findings that emerged from the econometric models using the survey data (See Authors for further details on the qualitative research).

Identifying the drivers of farm transition is essential to understanding the process of farm size growth. Therefore, in the quantitative assessment, we model the factors that explain how fast a farmer grows using a multinomial logit model. We define the dynamics of farm transition or how fast a farmer grows as the time taken to graduate from small-scale to medium- or large-scale. In our case, farm transition has three categories: Category 1: transitioned from a small-scale farmer (fewer than 5 ha) to a medium (5–20 ha) or a large-scale farmer (more than 20 ha) within five years; Category 2: transitioned from a small-scale farmer within six to ten years; and Category 3: transitioned from a small-scale farmer more than ten years after becoming a farmer. The advantage of the multinomial logit model is that it allows the analysis of decisions across more than two categories, allowing the determination of choice probabilities for different categories (Madalla 1983; Wooldridge 2002), and it is also computationally simple (Tse 1987). The probability that the *i*th farmer transitions in period *j* can be stated as (Greene 2003):

$$\text{Prob}(Y_i = j) = \frac{\exp\left\{x_{ij}^{'}\beta\right\}}{\sum_j^M \exp\left\{x_{ij}^{'}\beta\right\}} \text{ for each } j=1,., \quad M \text{ alternative.} \tag{1}$$

The probability of *i*th farmer transitioning in period *j* between a set of *M* periods is a function of the explanatory variables $x_{ij}^{'}$ and the β coefficients (Greene 2000):

$$\text{with } Y = \begin{cases} 1 = \text{transitioned within 5 years} \\ 2 = \text{transitioned within 6 to10 years} \\ 3 = \text{transitioned after 10 years.} \end{cases}$$

Any change in the set of exogenous factors (*ceteris paribus*) will affect the response probabilities P(*y*=*j*|*x*), j=1, 2,…, *M*. For a given *x*, the probability of observing *j*th outcome is:

$$\text{Prob}(Y_i = j|x_i) = \frac{\exp\left\{x_{ij}^{'}\beta\right\}}{1+\sum_j^M \exp\left\{x_{ij}^{'}\beta\right\}}. \tag{2}$$

The estimated parameters of the multinomial logit model only give the direction of the effect of the explanatory variables on the dependent variable, but these estimates do not provide a direct interpretation of the actual magnitude of change or its probabilities. Differentiating equation (2) with respect to each explanatory variable provides the marginal effects of the explanatory variables given as:

$$\frac{\partial P_j}{\partial x_k} = P_j\left(\beta_{jk} - \sum_{j=1}^{M-1} P_j \beta_{jk}\right) \qquad (3)$$

The marginal effects or marginal probabilities measure the likely change in the probability of a farmer transitioning (in terms of farm size) in a particular period with respect to a unit change in an independent variable from the mean (Greene 2000). The empirical specification for examining the influence of the explanatory variables on farmers transitioning from small-scale to medium- and large-scale in a specific period (*Y*) is given as follows:

$$Y_{i=1,\ldots M} = \beta_0 + \beta_1 X_i + \beta_2 A_i + \nu_i, \qquad (4)$$

where *X* is a vector of the potential drivers of farm size dynamics, *A* represents the control variables defined above, and *v* is the error term. Table 2 presents the variables used in the model.

Table 2. Model variables and their summary statistics

Dependent variable: farm transition (Less than five years, five to ten years, more than ten years)	Time taken to transition from small-scale (less than 5 ha) to medium- (5 ha to 20 ha) or large-scale farmer (more than 20 ha)	Multinomial	2.2	0.8	1	3
Explanatory variables						
Source of growth	Whether farmer started out in agriculture or not	Binary	0.8	0.4	0.0	1.0
Aspiration level	Farmer's actual level of aspirations in terms of income, children's education, assets, and social status combined	Continuous	0.5	5.0	-3.2	96.4
Exposure index	Index on how exposed the farmer is to the media or through outside travel	Continuous	2.7	1.1	0.6	6.0
Risk averse	Whether farmer is risk averse or not	Binary	0.9	0.3	0.0	1.0
Farmer's level of education is primary	Farmer has attended school for 7 years or less	Binary	0.1	0.3	0.0	1.0
Farmer's level of education is secondary	Farmer has attended school for eight years or more	Binary	0.2	0.4	0.0	1.0
Initial farm size (ha)	Number of hectares farmer started farming with	Continuous	1.5	1.1	0.1	4.9
Startup assistance received	Whether farmer received startup assistance from parents/relatives or government/NGOs or not	Binary	0.8	0.4	0.0	1.0
Parents' stock of education (years)	Total number of years farmer's parents attended school	Continuous	0.5	3.1	-18.0	28.0
Cereals as lead crops	Cereals or cowpeas were the lead crops when started farming (reference is high value crops: cash crops, vegetables, and horticultural crops)	Binary	0.5	0.5	0.0	1.0
Roots and tubers as lead crops	Roots and tubers were the lead crops when started farming (reference is high value crops: cash crops, vegetables and horticultural crops)	Binary	0.1	0.3	0.0	1.0

Note: Std Dev = standard deviation; Min = minimum; Max = maximum.

Source: IFPRI/SARI survey on medium- and large-scale farmers and mechanisation (2013).

5. Results and discussion

We first present in this section, key characteristics of the emergent medium- and large-scale We then test some of the factors identified by farmers as key for their successful transition using the quantitative survey data.

5.1. Transitioning from small-scale farming: Selected characteristics of Ghanaian medium and large-scale farmers

Given the debate on whether agricultural growth strategies should focus on medium- and large-scale or small-scale farmers, we examine some of the characteristics of the Ghanaian medium and large-scale farmers in Ghana. Table 3 shows that the majority (85 percent) of the medium- and large-scale farmers (referred to as "emergent farmers") in the survey districts started small, with less than 5 ha of farmland, while only 12 percent started as medium-scale farmers, and 2 percent started as large-scale farmers. Estimates of the initial farm size show that 50 percent of the emergent farmers cultivated only 1.2 ha of land initially, whereas those who started as medium or large cultivated considerably larger areas of farmland initially.

Table 3. Patterns of transition among medium and large-scale farmers

Variables	Medium- and large-scale farmers	Started as		
		Small	Medium	Large
Number of farmers	1,075	915	134	26
% of cases	100	85.1	12.5	2.4
Initial farm size (ha)				
Mean	4.1	1.6	9.05	65.7
Median	1.6	1.2	8.1	39.7
Sources of growth (%)				
Started out in farming	79.3	80.9	73.1	53.8
Held a job before farming	10.5	9.5	14.9	23.1
Working alongside farming	10.2	9.6	11.9	23.1

Note: Small = 0–5 ha; Medium = 5–20 ha; Large = more than 20 ha; ha = hectares.
Source: IFPRI/SARI survey on medium- and large-scale farmers and mechanization (2013).

Research has tended to suggest that it is only individuals who enter farming laterally (using income from nonfarm jobs as start-up capital for farming) or those with urban backgrounds who

can emerge to become medium- or large-scale farmers (Sitko and Jayne 2012; Muyanga, Sitko, Jayne, and Hichaambwa 2013). Therefore, a key factor in understanding the rise to medium- and large-scale farming in the Ghanaian case is the source of growth, which indicates where the emergent farmers originated. Table 3 shows that 79 percent of the medium- and large-scale farmers started out in farming, 11 percent grew from the non-farm sector, and 10 percent worked alongside farming. The most important fact here is that unlike results by Sitko and Jayne (2012) and Muyanga, Sitko, Jayne, and Hichaambwa (2013) who reported that in Zambia and Kenya more than 50 percent of the emergent farmers entered farming laterally; most of the emergent farmers in the survey districts grew organically by starting out as small-scale farmers. It is therefore important to examine how these indigenous farmers are able to grow organically. As a first step, we start by looking at how these farmers acquired their land and their tenure security status. An examination of these factors can provide insights into the land-related factors that may have influenced growth among these emergent farmers in Ghana.

Disaggregating the emergent farmers into those who started out in farming and those who entered farming from the non-farm sector, the results in Table 4 show that the majority of the farmers obtained land free of charge and owned it without title deeds. More specifically, irrespective of type of entry into farming, about 70 percent of the farmers indicated that they obtained part of their land free of charge from relatives, 21 percent reported that they obtained part of their land free from chiefs, and 23 percent reported that they inherited their land. These results are contrary to the findings in Zambia where most of the emergent farmers bought their land and owned it with title (Sitko 2014). In Ghana, 94 percent of the emergent farmers in the survey districts controlled land under the customary tenure system with no title. However, despite the predominance of the customary tenure system, Houssou, Chapoto, and Asante-Addo (2016) report

that more than 60 percent of the farmers indicated that they did not have any fear of losing their land even if left unused indefinitely. This pattern is also consistent with the fact that access to land in most West African countries is increasingly facilitated through "vernacular land markets" (Mathieu et al. 2003; Kasanga and Kotey 2001). In sum, one can conclude that the customary tenure system has not inhibited farmland expansion among these farmers, a conclusion that is consistent with Bruce and Migot-Adholla (1994) and Lambrecht and Asare (2016).

Table 4. Sources of land acquisition and tenure security among emergent farmers

Variables	Overall	Growth from	
		Farm sector	Nonfarm sector
Number of farmers	915	740	175
Source of land (%)			
Given free by a relative	69.3	69.5	68.6
Inherited the land	22.6	23.5	18.9
Given free by chief	20.7	20.9	19.4
Just walked in	5.4	5.3	5.7
Purchased without title	3.5	3.4	4.0
Sharecropping with landowner	2.6	2.8	1.7
Given free by government	1.1	0.7	2.9
Purchased with title	1.9	1.6	2.9
Current tenure status (% reporting)			
Customary (no title)	93.8	93.6	94.3
Titled land	8.4	8.2	9.1
Percent of farmers who can leave their lands unused indefinitely	63.3	62.3	67.4

Note: The percentages do not add up to 100 because some farmers have multiple plots with different tenure statuses.
Source: IFPRI/SARI survey on medium- and large-scale farmers and mechanisation (2013).

The emergent farmers have adopted agricultural technologies, but to varying degrees (Table 5). Notably, the adoption of improved crop varieties and the fertilizer use rate are low among these farmers. This suggests that the low technology adoption rate has not been an obstacle to farm size growth among the emergent farmers. As a result, the cereal yields obtained by these farmers have been generally low, with less than 2 tons per ha compared with potential yield of 4 tons to 6 tons per hectare (Ragasa et al. 2014). Therefore, it seems fair to say that on average, the emergent farmers have gone to expand their farm size without greatly increasing their productivity

in terms of crop yields. However, they have become more commercialised, with more than 70 percent of their production sold on the market.

Table 5. Technology adoption and crop yields among emergent farmers

Variables		Overall	Growth from	
			Farm sector	Nonfarm sector
Number of farmers		915	740	175
Technology adoption	Tractor plowing	75.6	77.3	68.6
	Maize obatanpa seed	29.0	29.6	26.1
	Maize hybrid seed	6.5	7.0	4.3
	Improved jasmine rice seed	12.2	8.2	30.8
	Weedicide use	87.3	87.4	86.9
	Pesticide use	19.2	16.9	29.1
	Fertiliser use (% reporting)	83.9	83.9	84.0
	Fertiliser use intensity (kg/ha)	227.21	224.08	240.41
Yield (kg per hectare)	Maize	1,381.4	1,364.3	1,455.9
	Rice	1,403.0	1,336.2	1,709.1
	Millet	671.7	648.3	827.7
	Sorghum	669.8	641.0	956.3
	Soybean	825.7	822.5	845.3
	Cassava	3,072.8	3,284.0	2,521.5
	Yam	7,674.4	7,677.3	7,656.3
	Commercialisation index (%)	72.8	73.4	70.3

Source: IFPRI/SARI survey on medium- and large-scale farmers and mechanization (2013).

5.2. Factors influencing how fast a farmer grows

We present in this section results of the multinomial logit model examining the drivers of dynamism among emergent farmers. Dynamism is measured by the time taken to transition from small-scale to medium- or large-scale farming status. In order to capture farm size dynamics sufficiently, we limit our sample to 790 emergent farming households who have been farming for at least 10 years. In the model, the transition after 10 years is used as the reference category, while the transition within 5 years and the transition within 6–10 years represent the first and second levels of the dependent variable.

In Table 6, Column 1 shows the determinants for transitioning within 5 years, whereas Column 2 presents the determinants for transitioning within 6–10 years relative to transitioning after 10 years. The estimated marginal effects and their signs reflect how a unit change in the

explanatory variables changes the probability of transitioning within 5 years or within 6 to 10 years relative to transitioning after 10 years (the reference category), all other variables held constant. Given that some of the factors may act together to influence how fast a farmer emerges, we interacted the source of growth with three key variables, aspirations, risk aversion, and farmer's exposure. Columns 3 and 4 present the models with these interaction terms.

The results suggest that the source of growth has a strong effect on farm transition. Likewise, risk aversion is a key determinant of the pace of farm transition. The initial land size also has a positive and statistically significant effect on farm size dynamics, with a threshold beyond which the initial farm size has a negative effect on farm transition. Parents' stock of education also emerges as a key driver of farm size dynamics among the emergent farmers, especially among those who transitioned within 6–10 years. The results show that farmers' aspirations, risk aversion, and exposure interact with the source of growth to influence farm size growth. These results show that a multitude of factors influence farm transition either individually or in combination. Contrary to findings from other countries, our results suggest that smallholder farmers can grow organically in Ghana. The survey results are also broadly consistent with farmers' narratives of the drivers of their successful transition. We discuss the most important results below.

5.2.1. Does the source of growth influence farm transition?

The results show that the source of growth has a significant effect on farm transition among farmers who transitioned within 5 years. There were no differences between those who transitioned within 6–10 years and those graduating after 10 years in terms of source of growth. More specifically, farmers who started out farming within their communities (hereinafter referred to as "indigenous farmers") have a 10 percent lower probability of graduating within 5 years compared with farmers

who entered farming from the nonfarm sector (herein after referred to as "entering laterally"). Taken as a whole, these results imply that the source of growth does influence farm transition. But, these findings also show that small indigenous farmers can grow organically, even though they may take a longer time to transition from small-scale farming into medium- and large-scale farming. These results contrast with those from Zambia, Kenya, and Mozambique, where farm growth was found to be associated only with nonfarm backgrounds or lateral entry into farming (Muyanga, Sitko, Jayne, and Hichaambwa 2013; Sitko 2014; Sitko and Jayne, 2012).

5.2.2. Does aspiration level influence farm transition?

The results in Columns 1 and 2 of Table 6 show that a farmer's aspiration alone does not influence how fast he transitions to become a medium- or a large-scale farmer. But, when interacted with the source of growth, farmer's aspiration influences farm transition among farmers who graduated within 5 years (Table 6, Column 3). In short, the results suggest that the effect of aspirations on farm size dynamics is lower among farmers with indigenous backgrounds compared with farmers who entered farming laterally. Thus, even though farm growth is organic (meaning that small-scale farmers can also grow), the process of farm growth is generally faster among farmers who entered farming laterally and have higher aspirations. This result aligns well with the narratives on interest and self-motivation among successful farmers.

Table 6. Drivers of farm size dynamics among emergent farmers

Independent variables	Multinomial logit model			
	Base model of transition		Model with interactions	
	Within 5 years	Within 6-10 years	Within 5 years	Within 6-10 years
Source of growth (1, 0 otherwise)	-0.097***	0.002	-0.387***	0.247
	(0.03)	(0.04)	(0.07)	(0.10)
Aspiration level	0.001	0.004	0.047***	0.026
	(0.00)	(0.00)	(0.02)	(0.03)
Exposure index	-0.014	-0.003	-0.050**	-0.035
	(0.01)	(0.01)	(0.02)	(0.03)
Risk averse (1, 0 otherwise)	-0.091***	-0.059	-0.214***	0.229
	(0.03)	(0.04)	(0.06)	(0.10)
Farmer education (reference: no education)				
Primary (1–7 years)	0.012	-0.021	0.034	-0.037
	(0.04)	(0.05)	(0.04)	(0.05)
Secondary (8 years and above)	0.016	-0.026	0.048	-0.050
	(0.03)	(0.05)	(0.03)	(0.05)
Parents' stock of education (years)	-0.002	0.010*	-0.003	0.011**
	(0.00)	(0.01)	(0.01)	(0.01)
Initial farm size (ha)	0.089**	0.143***	0.166***	0.081
	(0.04)	(0.05)	(0.04)	(0.06)
Squared of initial farm size	0.001	-0.029**	-0.014*	-0.016
	(0.01)	(0.01)	(0.01)	(0.01)
Received startup assistance (1, 0 otherwise)	-0.006	-0.023	0.022	-0.053
	(0.03)	(0.04)	(0.03)	(0.04)
Lead crops when started farming (reference: high value crops)				
Cereals (1, 0 otherwise)	0.005	0.016	0.029	-0.009
	(0.03)	(0.04)	(0.03)	(0.04)
Roots and tubers (1, 0 otherwise)	-0.010	-0.029	0.039	-0.068
	(0.05)	(0.06)	(0.05)	(0.06)
Interaction terms				
*Aspiration level*source of growth*			-0.047***	-0.021
			(0.02)	(0.03)
*Risk averse*source of growth*			0.199***	-0.383***
			(0.07)	(0.12)
*Exposure index*source of growth*			0.068***	0.016
			(0.03)	(0.04)
District dummies (reference: Ejura)				
Techiman	-0.218***	0.053	-0.171***	0.023
	(0.06)	(0.07)	(0.06)	(0.07)
Kintampo North	-0.178***	-0.073	-0.120**	-0.118*
	(0.06)	(0.07)	(0.49)	(0.07)
Yendi	-0.055	-0.043	-0.018	-0.071
	(0.37)	(0.06)	(0.04)	(0.06)
Gushiegu	-0.040	0.000	0.002	-0.032
	(0.04)	(0.06)	(0.04)	(0.06)
Kassena Nankana East	-0.097	0.034	-0.089	0.020
	(0.06)	(0.08)	(0.06)	(0.08)
Bawku Municipal	-0.153***	-0.205**	-0.117**	-0.236***
	(0.06)	(0.09)	(0.06)	(0.09)
Sissala East	-0.030	0.011	-0.009	-0.010
	(0.04)	(0.06)	(0.04)	(0.06)
Number of observations	790			790
Log likelihood	-735.12			-718.31
Chi-squared	184.93***			197.45***

Note: Marginal effects are reported. Standard errors in parentheses. Significance levels: *** = p<0.01; ** = p<0.05; and * = p<0.1.

Source: IFPRI/SARI survey on medium- and large-scale farmers and mechanisation (2013).

5.2.3. Does exposure level influence farm transition?

The results show that the level of exposure measured by how exposed the farmer is to the media or through outside travel does not influence farm size growth; when observed in combination with the source of growth, however, exposure becomes a key driver of farm growth. In other words, the probability of graduating within five years is significantly higher among farmers with indigenous backgrounds who are more exposed compared with farmers who entered farming laterally.

5.2.4. Does risk preference influence farm transition?

With regard to risk preference, the findings suggest that risk aversion is a key determinant of the pace of farm transition among farmers who graduated within five years (Table 6, Column 1). In other words, it takes much more time for risk averse farmers to graduate to medium or large-scale farming, as the results show that they have a 10 percent lower probability of transitioning into medium-and large-scale farming within five years. Furthermore, the results indicate that risk and source of growth interact to affect farm growth. These results are interesting as the overall effects indicate that risk aversion significantly delays the pace of transition among indigenous farmers compared to those who entered farming laterally.

5.2.5. Does farmer's education and parents' stock of education influence farm transition?

With regard to schooling, the results suggest that farmer's education does not influence how fast he or she transitions. But, parents' stock of education emerges as a key driver of farm size dynamics among farmers who transition within 6–10 years. In other words, an additional year of schooling among farmer's parents increased the probability of transitioning within 6–10 years by 1 percent relative to graduating after 10 years. Thus, farmers born to more educated parents may emerge faster to become medium- and large-scale farmers.

5.2.6. Does initial farm size matter for farm transition?

As expected, the initial land size has a positive and statistically significant effect on farm size dynamics among emergent farmers. Thus, an additional hectare in the initial farm size increases the probability of transitioning within 5 years by 9 percent and within 6–10 years by 14 percent, respectively. However, the relationship is not linear; there is a threshold above which the initial farm size has a negative effect on the time taken to transition as the square of initial farm size displays a negative relationship with farm transition, especially among farmers who graduated within 6 to 10 years.

5.2.7. Do parental assistance and initial crops influence farm transition?

The assistance received from parents does not influence farm size growth in the multinomial logit model, but this factor may have helped a few emergent farmers to rise as indicated in the narratives. Lastly, the model results show that the type of crops a farmer planted when starting his farming career does not influence the pace of farm transition.

6. Concluding Remarks

This study combines farmers' narratives and a quantitative survey of Ghanaian medium- and large-scale farmers to examine the process of growth and the drivers of transition among emergent farmers in the country. The paper primarily argues that an important transition of onetime small-scale farmers is taking place in Ghanaian agriculture and potentially in other SSA countries. This transition is largely un-researched, although it is a critical feature of agricultural transformation with implications for agricultural development strategies in the SSA sub-region.

While the number of medium and large-scale farmers is rising in Ghana, this transformation is significantly associated with a successful transition of mostly indigenous small-scale farmers rather than entry of medium and large-scale farmers into agriculture, indicating that

small-scale farmers are successfully breaking through the barriers of subsistence agriculture into more commercialised production systems in the country.

Most of these emergent farmers have obtained their farmland free of charge and they exercise their land rights under the customary tenure system, which seems not to inhibit farm size growth. Despite the transition to medium- and large-scale farming, crop yields have increased only marginally, but the yields of some of the emergent farmers have grown faster than others. Among those are farmers who enter farming laterally, risk takers, farmers with strong aspirations, those that are exposed to the outside world, those who started out with higher farm sizes, and those who were born to more educated parents.

The emergent farmers can potentially be used as prime agents of change through targeted assistance to help other peer farmers grow. For instance, if one expects that medium- or large-scale farmers can play a more direct role in leading the diffusion of agricultural technologies at the local level, it would be imperative to understand how they relate with the less commercialised farmers in their villages. The latter may experience a similar transition and commercialisation path through interactions with the emergent farmers. These spillover and externality-related issues should be examined in future research. Lastly, this study was conducted in the Northern and Transitional zones of Ghana, where population density and urbanization are lower compared to the south. Therefore, our conclusions may not apply to this part of the country. Likewise, more research is needed to assess whether our results apply to other West African countries.

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