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Synthesis Report II

The Changing Face of African Farmland in an Era of Rural Transformation

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EXECUTIVE SUMMARY

Mounting evidence suggests that sub-Saharan Africa has undergone profound rural transformation since the early 2000s, though progress has been highly uneven across countries. Conventional views of African agriculture are in many respects becoming obsolete. Our review highlights the evidence of farm-level transformation in the region, identifies the key sources of dynamism in the sector, and proposes an updated typology of farms that reflects the evolving nature of African agriculture. We underscore the rising importance of an entrepreneurial class of African commercialized medium-scale farmers, and examine the causes and consequences of this phenomenon.

Key findings

The size distributions of farms in many African countries are rapidly changing. In most of the countries for which national rural household surveys exist, and particularly those with substantial potential for cropland expansion, it is no longer true that the vast majority of farmland in Africa is under small-scale cultivation. The national shares of area under cultivation, the value of production, and marketed crop output on farms under five hectares has been declining over time, with corresponding increases in shares among medium- and large-scale farms. Medium-scale farms (defined here as farm holdings between 5 and 100 hectares) account for a rising share of total farmland, especially in the 5- to 25-hectare range where the number of these farms is growing especially rapidly. Medium-scale farms control roughly 20 percent of total farmland in Kenya, 32 percent in Ghana, 39 percent in Tanzania, and more than 50 percent in Zambia. Medium-scale farmers are a diverse group, reflecting several distinct pathways into medium-scale farming, including (1) the successful expansion of small-scale farms into medium-scale farms, generally in the 5- to 25-hectare range, through new land acquisition made possible because of increasingly active land markets; (2) the diversification into farming by rural nonfarm businesspeople and wage earners; and (3) land acquisitions by urban-based professionals, retirees, and rural elites. The relative importance of these pathways varies by country according to differences in potentially available cropland, the economic potential of that land, the ease of acquiring land through customary and statutory tenure systems, and the degree of farm scale bias of agricultural policies. The rapid development of land rental, purchase, and long-term lease markets has encouraged the growth of each of these pathways.

This trend is not happening everywhere. In densely populated countries such as Kenya, Malawi, Uganda, and Rwanda, land scarcity and high land values are impeding the pace of medium-scale farm acquisitions, and the share of land under medium-scale farms is growing slowly if at all. However, as we establish in Section 2, the population-based Living Standards Measurement Survey (LSMS)-type data utilized in this study may underrepresent medium- and large-scale farm holdings, based on comparisons of larger farm censuses and LSMS data from the same year. Therefore, the share of cultivated land, farm production, and marketed output accounted for by medium-scale farms as reported in this review most likely are underestimated.

Causes and consequences of the rise of medium-scale farms

Farm size distributions in Africa have been changing for four reasons: the rise of land markets, the recent era of relatively high global food prices, agricultural policy reforms, and the growing influence of relatively wealthy and politically influential "emergent farmer" interests. The rise of medium-scale farms is affecting the region in diverse ways that are difficult to generalize. Many such farms are sources of dynamism, technical change, and commercialization of African agriculture. They attract private investment in crop buying and input suppliers, and in doing so they improve market access conditions for all surrounding farms regardless of scale. They also may make it more feasible for governments to raise taxes from the farm sector. However, medium-scale land acquisitions may exacerbate land scarcity in favorable rural areas, raise land prices, and crowd out young peoples' access to land for farming.

Medium-scale farmers tend to dominate farm lobby groups and influence agricultural policies and public expenditures to agriculture in their favor. Nationally representative Demographic and Health Survey (DHS) data from six countries (Ghana, Kenya, Malawi, Rwanda, Tanzania, and Zambia) show that urban households own 5 to 35 percent of total

agricultural land, and that this share is rising in all countries where DHS surveys were repeated. This change suggests a new and hitherto unrecognized channel by which medium-scale farmers may be altering the strength and location of agricultural growth and employment multipliers between rural and urban areas.

African states seem to be generally supportive of such changes. They are keen to increase food production and marketed farm output to feed their rapidly swelling cities and reduce dependence on food imports. Putting land into the hands of capitalized, educated, and entrepreneurial African farmers may be viewed as supporting this objective. Medium-scale farms are attracting major new private investment by input suppliers that improve market access conditions for nearby smallholders. Farming areas with a high concentration of medium-scale farms attract greater investment by large-scale grain buyers. In Tanzania, small-scale farms are much more likely to rent mechanization services in areas with a high concentration of medium-scale farms. Other evidence from Tanzania indicates that smallholder household incomes are positively and significantly associated with the share of land in the district controlled by 5- to 10-hectare farms, after controlling for market access, rainfall, and other local conditions.

However, there are warning signs as well. The acquisition of land by outside investors certainly reduces the stock of land under customary tenure that will be accessible to current and future generations of local people. As traditional authorities sell land to outside investors based on willingness-to-pay criteria, their actions are raising the price of land, making it more difficult for young people to acquire land, and raising the likelihood that young people will exit farming and migrate out of the area. The rise of land markets is creating a new class of landless workers in Africa; having sold their land informally to others, they become dependent on the local nonfarm economy for their livelihoods.

Implications for agricultural and land tenure policies

A major policy question for African governments and international development partners concerns the future role of smallholder farms in Africa. While opinions are divided, our interpretation of available evidence is that governments may most effectively achieve their national development goals by explicitly promoting the productivity of smallholder farms to achieve agricultural and economic transformation with poverty reduction. Inclusive forms of rural income growth are likely to accelerate the pace and equity of structural transformation processes. Where competition for land is not intense, new investment in medium-scale farms can be a powerful source of economic dynamism, attracting private sector investments in input and output markets that improve market access conditions and the commercialization potential of small-scale farms. In such areas, questions of "either/or" might be misplaced.

However, in densely populated areas where small-scale farms predominate and where only limited additional land remains available for area expansion, the priority is clear: focus on promoting the productive potential of small farms, realizing that success in this endeavor will lead to progressive movements of individuals and households out of farming and into off-farm jobs as part of the structural transformation process. In short, a successful smallholder-led agricultural strategy will result in a declining share of the labor force in farming over time.

Inclusive forms of rural transformation will require greater attention to supporting smallholder farms even as larger farms gain greater traction in the region. Given the diverse nature of extant customary land tenure systems in Africa and of the threats to tenure security facing different landholders and regions, policies to strengthen tenure security and regulate land transactions in Africa will need to be carefully tailored to the local tenure context and needs of different landholders to affect perceived tenure security and agricultural outcomes. Where land rights derive primarily from community membership, customary tenure systems effectively regulate within-community transactions, and external actors pose the primary threat to land rights, land registration at the community level accompanied by formal recognition of customary tenure institutions may be sufficient to reduce insecurity. In other areas where land rights are already individualized and internal actors pose the greatest tenure security threat, and especially where informal transactions involving outsiders are common, a more costly and time-consuming investment in registering individual land rights and transactions may be needed to secure existing rights and avoid conflicts that customary institutions will not be able to manage.

Implications for national statistical agencies

We do not yet know how generalizable these trends are across the region. However, existing population-based data collection platforms may systematically underreport a dynamic segment of African agriculture: the medium-scale farms. This omission, however understandable, has profound implications. Under the status quo, African governments cannot accurately monitor, much less understand, how farm structure is changing over time. Similarly, policymakers cannot adequately address such routine questions as the magnitude and location of marketed agricultural surplus. These questions are important for guiding strategic policy decisions aimed at stimulating agricultural growth, reducing rural poverty, and managing strategic food reserves and trade policies.

Redressing this informational blind spot will require new modes of data collection. We advocate for the expansion of agricultural sample census surveys to better capture the magnitude, location, and other characteristics of this growth of medium and large farms that currently structured LSMS-type surveys cannot adequately capture. We also advocate for the systematic collection of data on nonlocal land control—that is, ownership or other usufruct rights over rural agricultural land held by urban or other nonlocally residing households. This data collection demand will require new approaches to sampling, listing, and enumeration, as well as questionnaire designs that explicitly capture nonlocal holdings.

The Changing Face of African Farmland in an Era of Rural Transformation

Introduction

Ever since the critical acclaim given to the Green Revolution in Asia starting in the 1980s, it has been widely accepted that a smallholder-led growth strategy would also be the pathway for achieving economic transformation and mass poverty reduction in Africa. At the beginning of the Green Revolution, more than 90 percent of farms in South and East Asia were smaller than two hectares (Johnston and Kilby 1975; Hayami and Ruttan 1971). Because small-scale farms also constitute the vast majority of farms in Africa, agricultural economists have for decades generally accepted that a smallholder-led strategy may have equally promising prospects for the continent's agricultural development (e.g., Mellor 1995; Hazell et al. 2010).

However, parts of sub-Saharan Africa (SSA) are witnessing rapid changes in farm size distributions. In many African countries, "medium-scale" farm landholdings of 5 to 100 hectares now account for a substantial and growing share of farmland (Jayne et al. 2016).[1] Perhaps ironically, the amount of land acquired by this new category of African farmer since 2000 far exceeds the amount of land acquired by foreign investors (Jayne et al. 2014a). This development, in retrospect, should come as little surprise. As the dramatic rise in global food prices initiated major foreign investment in African farmland, it would only be natural for African investors to have made similar investments.

Parallel to these developments, the region is witnessing changes in land tenure institutions that influence who is acquiring land (Boone 2014; Knapman et al. 2017). Parts of the region are experiencing a notable shift in the allocation of customary land, moving from a rights-based approach that secures access to land for local-born members of the community to market-based approaches in which land becomes a commodity for rent or sale. Although SSA's rural areas contain 20.3 million square kilometers (km2) of land, only 25 percent of the region is arable (CIA 2019). With an estimated rural population of 620 million people in 2017, the region is only sparsely populated at 31 persons per km2. However, roughly 72 percent of SSA's rural population resides on only 10 percent of its rural areas (Jayne et al. 2014b). For this majority of the region's rural population, the average population density is 223.2 persons per km2. Hence, even though most of SSA might be considered "land abundant" and sparsely populated, a relatively large proportion of rural Africans face land scarcity, rapidly rising land prices, and perceptions of tenure insecurity (Lawry et al. 2014; Knapman et al. 2017; Wineman and Jayne 2018). As population densities rise and land becomes scarcer in many areas, tenure security is becoming increasingly important, as research evidence shows that security of tenure generally promotes long-term land investments and agricultural productivity (Atwood 1990; Holden et al. 2009; Place 2009; Goldstein et al. 2015).

African policymakers and development organizations are interested in learning whether these new trends in farm size distributions are beneficial for small-scale farm households, which still constitute the vast majority of rural households in Africa, and whether they are promoting or retarding equitable forms of economic transformation in Africa. This study will review the evidence on these policy issues.

To address these questions, this study reviews the evidence on medium-scale farms in Africa, much of it carried out by the authors. Efforts to quantify trends in the numbers of medium-scale farms in Africa and their impacts on rural transformation were initiated in 2014 (Jayne et al. 2014a, 2014b; Sitko and Jayne 2014). This literature remains highly limited by the fact that most African countries do not have accurate data on farms larger than 20 hectares. We therefore collected new primary data on medium-scale farms that are considered statistically representative of farms operating between 5 and 100

[1] Consistent with the taxonomy of many African governments, this paper defines small-scale farms as those with no more than 5 hectares of farmland, medium-scale farms as those with between 5 and 100 hectares of land, and large-scale farms as those greater than 100 hectares. These definitions may not correspond exactly to those used by all national governments in the region.

hectares for particular districts or comparable administrative units in Malawi, Nigeria, and Senegal. Most of the studies attempting to characterize or analyze farm structure in Africa utilize LSMS and other nationwide farm datasets. However, almost all of these datasets provide highly imprecise and most likely underreported estimates of the numbers of farms operating over more than 10 hectares of land (see section 2). Even when utilizing these datasets, as in the cases of Tanzania, Zambia, and Ghana (see section 3), medium-scale farms account for a rising proportion of national farmland, agricultural production, and marketed throughput in the agrifood systems. In still other countries, especially those that are relatively densely populated and facing rising land prices, the data suggest that the number of medium-scale farms has grown relatively slowly or not at all, but we cannot tell with confidence whether this is a valid conclusion or an artifact of sampling designs that almost certainly underreport relatively large farms.

Sections 4 and 5 discuss the causes and consequences of changing farm structure and the rise of medium-scale farms. Though the literature remains thin and nascent, emerging evidence points to mostly positive spillover effects on smallholder farmers in areas where medium-scale farms are concentrated. Section 6 examines the characteristics of medium-scale farmers and the various pathways to becoming a medium-scale farmer. Section 7 looks at how medium-scale farmers are acquiring their land and how these pathways differ from how small-scale farm households tend to acquire land. Section 8 reviews the evidence on changes in land tenure systems and security and how medium-scale farms may be indirectly influencing tenure systems. Section 9 examines differences in land utilization and crop production patterns by farm size category to examine whether relatively large farms are leaving much of their land idle. Section 10 speculates on where and why relatively capital-intensive medium- and large-scale farms are likely to become more common in light of location-specific trends in factor price ratios. Section 11 summarizes the main findings and policy implications of the study, and proposes an updated typology of farms that reflects recent changes in the relative importance of different farm categories and sheds light on the heterogeneity found even among smallholder farms. Section 12 concludes by discussing unresolved issues for further research. This review also addresses how land tenure security by members of local communities and vulnerable groups in particular may be enhanced even when evolving land institutions encourage market-based land transfers and the "commodification" of land in rural Africa, drawing on Woodhouse (2003), Chimhowu and Woodhouse (2006), Ghebru and Lambrecht (2017), Huntington et al. (2018), and Stickler et al. (2018).

Data and methods

We utilize data on farm size distributions from two kinds of sources: (1) available national population-based surveys (Ghana, Rwanda, Nigeria, Tanzania, and Zambia), and (2) primary data collected in collaboration with local agricultural policy research institutes or universities (Senegal, Nigeria, Zambia, and Malawi). From the first category, data on landholding sizes, area cultivated, and the value of crops produced and marketed by small-scale (0 to 5 hectares) and medium-scale (5 to 100 hectares) farms come from the following sources: the 1999, 2005, and 2013 Ghana Living Standards Surveys (GLSS), implemented by the Ghana Statistical Service; the 1994 Kenya Welfare Monitoring Survey I and the 2006 Kenya Integrated Household Budget Survey (KIHBS), implemented by the Kenya National Bureau of Statistics; the National Panel Surveys (NPS/LSMS) 2009, 2011, and 2013, implemented by the Tanzania National Bureau of Statistics; the Uganda LSMS surveys of 2006 and 2014, implemented by the Uganda Bureau of Statistics; and the Crop Forecast Surveys of 2001, 2008, and 2015, implemented by the Zambia Central Statistical Office. Most of these datasets are supported by the World Bank's LSMS unit.

These population-based surveys may be considered appropriate for studying the small-scale sector because historically 90 percent or more of the farm households in most African countries have been no larger than 5 hectares. However, population-based datasets such as the LSMS may be less than ideal for understanding the distribution of farmland ownership and use patterns if larger farms constitute a low proportion of the population (and hence a low probability of being included in the sample) but a sizeable proportion of national farmland. For example, the 2008/09 Tanzania LSMS contains a total of 3,265 households according to our computations, but only 15 households have landholdings greater than 20 hectares. The Uganda LSMS contains 12 farms between 20 and 50 hectares and none over 50 hectares. The Malawi 2010/11 LSMS contains one farm observation between 10 and 20 hectares, one farm between 20 and 50 hectares, and none over 50 hectares. These surveys do not contain a sufficient sample size of farms larger than 20 hectares to make confident state-

ments about their rate of growth.[2] In Kenya, despite widespread anecdotal evidence that large farms connected to the three presidential families of Kenya may account for up to 20 percent of Kenya's agricultural land (e.g., Namwaya 2004), the 2006 KIHBS (the country's most recent population-based large-scale household dataset) contains only four households with landholdings greater than 100 hectares. These findings raise concerns about the ability of population-based surveys to generate reliable estimates of the numbers of medium- and large-scale farms, the areas under cultivation by farms of this size, and the characteristics of these farmers. A recent study by Lowder et al. (2016) has shown that where it is possible to compare farmland ownership and distribution from LSMS and national agricultural censuses (as the authors did for several Latin American countries), the former tend to underreport of large farms and operated area under large farms, and present more tightly clustered and less skewed distributions.

Fortunately for our purposes, Tanzania's National Bureau of Statistics implemented a survey of 10 percent of all farms listed in its 2008 census: the Agricultural Sample Census Survey (ASCS), with a sample size of 53,600 households. The ASCS oversamples medium- and large-scale households and then uses statistical weights derived from census data to generate nationally representative estimates of farm area in each size category. For these reasons, the ASCS is more likely to be representative of large farms than typical population-based surveys. We compare the estimates provided by LSMS and the ASCS regarding the numbers of farms and area controlled by farms categorized as small-scale, medium-scale and large-scale according to our definitions (holdings of 0 to 5, 5 to 100, and more than 100 hectares, respectively). Table 1 compares Tanzania's 2008 NPS and 2008 ASCS to ascertain the potential bias associated with using LSMS data to understand farm size distributions.

Table 1. Farmland owned and land under cultivation in Tanzania, 2008 ASCS vs. 2008 LSMS/NPS

	Farm land controlled			Land under operation		
	LSMS	ASCS	% difference	LSMS	ASCS	% difference
By holdings of:	Million hectares			Million hectares		
0–5 hectares	8.246	8.595	+4.2	8.117	8.130	+0.002
5–100 hectares	3.872	5.861	+51.4	3.816	5.181	+35.8
Over 100 hectares	0.809	1.294	+60.0	0.809	0.942	+16.5

Note: Land under operation = cultivated + fallow + other uses.
Source: Tanzania National Bureau of Statistics 2008/2009 ASCS and 2008/2009 NPS/LSMS.

Table 1 shows that the LSMS and ASCS produce similar estimates of farmland held and under operation among small-scale farms; the two surveys produce nearly identical estimates of land under operation. For medium-scale holdings, the results diverge substantially, with the ASCS revealing 51.4 percent more land being controlled by medium-scale farms at the national level than indicated by the LSMS. The results diverge even more so in terms of national land held by large-scale holdings, with the ASCS indicating 60 percent more land under the control of large-scale farms than indicated by the LSMS. In terms of land under operation (defined as land cultivated, in fallow, and under pasture), the ASCS reports 35.8 percent and 16.5 percent greater operated area under medium-scale and large-scale farms, respectively, than the LSMS. Based on this comparison of agricultural census and population-based surveys, we utilize LSMS and comparable nation datasets cautiously, understanding that they may represent a lower bound estimate of their share of national farmland, cultivated area, and farm production.

[2] The World Bank's recent 2018 Myths and Facts book, which relies on LSMS data (Christianensen and Demery 2018, p. 10), also supports this conclusion.

We also utilize Demographic and Health Survey (DHS) data on household farmland ownership by rural- and urban-resident households, which asks respondents to report the amount of agricultural land that they own. From this, we report the share of total national agricultural land held by urban-based households, as well as the proportion of holdings greater than 20 hectares held by urban households. In several countries, the DHS was implemented several times over the past decade, allowing us to estimate changes in these figures over time. Yet even though the DHS surveys may provide general trends in the proportion of agricultural land held by urban or rural inhabitants, their relatively small sample size and high nonresponse rates for farms of this type (similar to the LSMS surveys) may not present accurate statistically representation of medium and large farms.

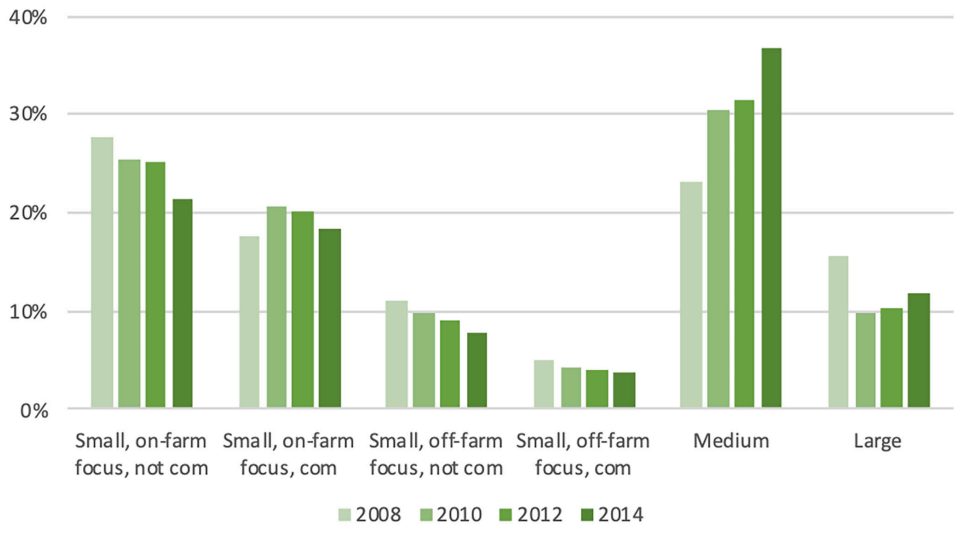
Finally, we draw upon recent surveys of medium-scale farms in conducted by the Lilongwe University of Agriculture and Natural Resources in Malawi, the Bureau d'Analyses Macro-économiques (BAME) of the l'Institut Sénégalais de Recherches Agricoles in Senegal, and by the Federal University of Agriculture, Abeokuta and Michigan State University in Nigeria. These exercises involved the compilation of lists of the full population of 5- to 100-hectare farms in selected districts in consultation with local district agricultural offices, national farmer unions, and village authorities. The population lists serve two purposes. First, they enabled the generation of random samples within selected districts/divisions to obtain statistically representative analysis of medium-scale farms in these areas. Surveys of medium-scale farmers included modules on farmers' sociodemographic characteristics, places of residence, land tenure type, and retrospective life history modules that make it possible to understand how, why, and when in their lives they acquired their medium-scale holdings. Second, they helped us assess the robustness of our numbers of farms in specific size categories with those indicated by population-based and agricultural census data in the same divisions/districts. For example, the Sokoine University of Agriculture and Michigan State University recently conducted a full listing of all farm holdings greater than 10 hectares operating in six districts of Tanzania in 2015–2016 (Mdoe et al., forthcoming). We compare these population lists with estimates generated by the population-based 2012 Tanzania NPS and the 2008 ASCS described above. Our lists generally contain more farms of at least 10 hectares than those indicated by LSMS estimates in the listed districts or states. In sections 11 and 12, we return to the issue of the significance of underreporting of medium- and large-scale farms in national agricultural policy discussions.

Changes in the distributions of farm size, crop production, and marketed output

The size distributions of farms in many African countries are changing rapidly. In most of the countries for which LSMS or similar national rural household surveys exist, and particularly those with substantial potential for cropland expansion, it is no longer true that the vast majority of farmland in Africa is small-scale. The national shares of area under cultivation, the value of production, and marketed crop output on farms under five hectares is generally declining over time with corresponding increases in shares among medium- and large-scale farms (Figures 1 and 2, Tables 2 and 3). In countries with substantial unutilized land, as in Zambia, Tanzania, and parts of Ghana and Nigeria, the share of farm production and marketed output accounted for by farms in the 5- to 100-hectare category is rising quite rapidly. In Ghana, for example, the share of national cropped area under medium-scale farms is close to 50 percent, and medium-scale farms account for more than half of all nationally marketed oilseeds and horticultural crops, even with the caveats noted in section 2 about the underrepresentation of medium-scale farms.

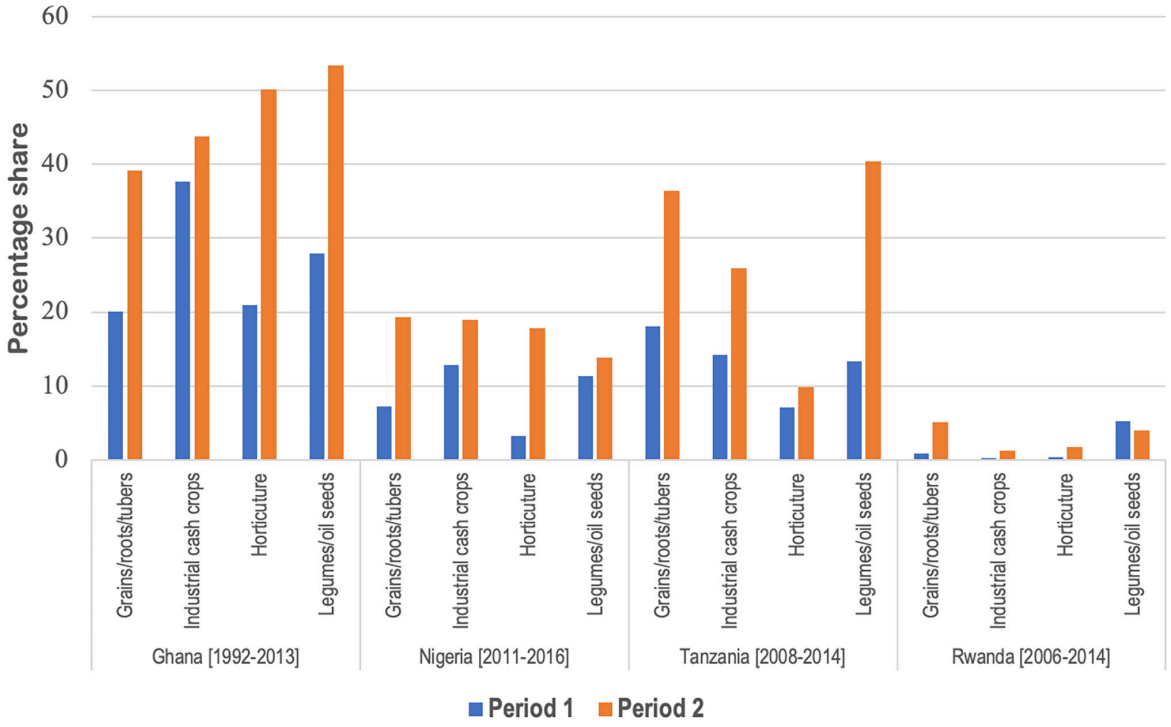
This trend is not happening everywhere. In densely populated countries such as Kenya, Malawi, Uganda, and Rwanda, land scarcity and high land values are impeding the pace of medium-scale farm acquisitions, and the share of land under medium-scale farms is growing slowly if at all. However, as established in section 2, LSMS data may underrepresent medium- and large-scale farm holdings, based on comparisons of larger farm censes and LSMS data from the same year. Therefore, the share of cultivated land, farm production, and marketed output of medium-scale farms as reported in this review are most likely underestimated.

Figure 1. Distribution of land cultivated, by farm category, Tanzania (NPS), 2008, 2010, 2012, 2014



Note: "com" refers to commercialized farms selling at least 25% of their crop production in value terms.
Source: NPS/LSMS, Tanzanian National Bureau of Statistics, Dar es Salaam.

Figure 2. Medium-scale (5- to 100-hectare [ha]) farms' share of national value marketed crop output



Sources: National household survey data (see section 2). All datasets are considered nationally representative official data collected by national statistical services.

Table 2. Changes in the shares of national crop production value by farm size category

	Countries with relatively sparsely populated areas						Relatively densely populated areas			
	Zambia		Tanzania		Ghana		Nigeria		Uganda	
	% share of national value of crop output									
	1999	2015	2009	2015	1999	2013	2011	2016	2006	2014
0–5 ha	79.6	66.3	82.0	70.7	78.0	56.0	93.9	88.0	84.2	95.3
5–10 ha	13.7	18.9	12.1	17.8	11.8	25.9	5.1	6.8	7.6	3.0
10–20 ha	5.1	12.0	2.1	9.3	6.4	12.3	0.7	4.9	3.3	1.6
20–100 ha	1.4	2.8	2.3	2.1	3.5	5.5	0.3	0.3	4.3	0.1
+100 ha	0.0	0.0	1.3	0.1	0.3	0.3	0.1	0.0	0.6	0.0
	100	100	100	100	100	100	100	100	100	100

Sources: National household surveys (see section 2).

Table 3. Changes in the shares of national marketed crop production value by farm size category

	Countries with relatively sparsely populated areas						Relatively densely populated areas			
	Zambia		Tanzania		Ghana		Nigeria		Uganda	
	% share of national value of *marketed* crop output									
	2001	2015	2009	2015	1999	2013	2011	2016	2006	2014
0–5 ha	74.2	52.9	80.2	67.1	79.9	56.6	92.2	80.7	77.1	88.9
5–10 ha	15.0	22.6	12.6	22.0	11.7	22.9	6.8	9.5	10.3	7.3
10–20 ha	8.3	19.6	4.0	8.7	5.6	13.1	0.7	9.2	5.4	3.6
20–100 ha	2.5	4.8	2.4	3.0	2.8	7.0	0.2	0.8	6.3	0.2
+100 ha	0.1	0.0	0.8	0.1	0.1	0.4	0.2	0.0	0.9	0.0
	100	100	100	100	100	100	100	100	100	100

Sources: National household surveys (see section 2).

The rise of medium-scale farms has occurred during a period when Sub-Saharan Africa experienced the highest agricultural production growth rate of any region in the world. SSA achieved 4.6 percent inflation-adjusted annual mean increases in agricultural growth between 2000 and 2016 (World Bank 2017), roughly double that of the prior three decades. The region's per capita gross domestic product (GDP) increased by almost 35 percent in real terms over this period, doubling in some countries (Barrett et al. 2017). Poverty rates have declined significantly for the region as a whole since 2000. Nutritional indicators also show gradual but clear improvement (Masters et al. 2018).

At the same time, the pace of transformation has been highly uneven across the region. Five of the 16 SSA countries analyzed in Jayne et al. (2018) have made little or no progress in reducing headcount poverty rates since 2000, and four experienced real agricultural growth rates below 2.0 percent per year. The diversity in the pace and pathways of economic transformation in Africa warrants caution against overgeneralization.

Given sub-Saharan Africa's impressive rate of agricultural production growth since 2000, it is vital to understand the extent to which medium-scale farms have contributed to agricultural production growth in these countries. The inflation-adjusted growth rates of agricultural value addition in Tanzania, Zambia, and Ghana between 2001 and 2016 was 4.35 percent, 0.61 percent, and 3.50 percent per year, respectively. Table 4 disaggregates the changes in agricultural production growth based on the available large-scale farm surveys available in each country for two points in time. The results show that medium-scale farms in Tanzania accounted for 46.7 percent of the additional value of farm output produced nationally between 2008/09 and 2014/15. Of these medium-scale farms, 26 percent of the additional value of farm output was contributed by farms cultivating 5 to 10 hectares, while 20.7 percent was contributed by farms larger than 10 hectares (even though this category was substantially underreported in this LSMS dataset, as noted in section 2). Small-scale farms cultivating up to five hectares account for the vast majority of farms in the country (92 percent in Tanzania and 90 percent in Zambia), but they accounted for only slightly more than 50 percent of the additional value of farm production in Tanzania between 2008/09 and 2014/15 and in Zambia between 2001 and 2015. In Zambia, farms cultivating more than 20 hectares were not included in the sample; if they were, the share of small-scale farms would be lower while that of medium-scale farms would be higher. Small-scale farms contributed only 40 percent of the additional value of farm production in Ghana between 2005 and 2013. Farms cultivating between 5 and 10 hectares contributed 51 percent, while farms greater than 10 hectares contributed 8.7 percent of Ghana's additional farm output between 2005 and 2013.

In short, medium-scale farms contributed more than 45 percent of the farm production growth experienced in each of the three countries over the specified periods, which is noteworthy considering that the shares attributed to farms over 10 hectares are likely to be underreported, and that farms larger than 20 hectares in Zambia are excluded from the analysis.

Table 4. Contributions to farm output and cultivated area by farm size category, Tanzania, Zambia, and Ghana

		Farm size category (area cultivated)			
Tanzania	**Unit**	**0–4.99 ha**	**5–9.99 ha**	**10 and over**	**National (all farms)**
Change in value of farm output (2014/15 mi-nus 2008/09)	Billions of 2015 (inflation-adjusted) Tanzanian shillings	1,756	858	682	3,296
Share of growth in value of farm output from farm size category (2014/15 minus 2008/09)		53.3%	26.0%	20.7%	
Zambia		**0–4.99 ha**	**5–9.99 ha**	**10–20 ha**	**All farms, 0–20 ha only**
Change in value of farm output (2015 minus 2001)	2015 rebased million Kwacha	4,014	1,901	1,498	7413
Share of growth in value of farm output from farm size category (2015 minus 2001)		54.1%	25.6%	20.3%	
Ghana		**0–4.99 ha**	**5–9.99 ha**	**10 and over**	**National (all farms)**
Change in value of farm output (crop only) (2013 minus 2005)	Millions of constant 2013 Ghana Cedis	1,166.64	1,513.47	254.40	2,934.52
Share of growth in value of farm output from farm size category (2013 minus 2005)		39.7%	51.6%	8.7%	

Notes: Value of farm output includes both crop and livestock production. The Tanzania surveys underestimated the area cultivated of 5- to 20-hectare and 20+ hectare farms by roughly 50 percent (Jayne et al. 2016), so the Tanzania figures most likely underestimate the shares of farm output growth. The Zambia data are considered statistically representative of farms up to 20 hectares; farms over 20 hectares are not included in the sample and therefore are not accounted for in the figures on medium-scale farms contribution to the growth of national production and cultivated area.
Sources: Computed from national household survey data (see section 2).

Causes of changing farm structure

Farm size distributions in Africa have been changing for four main reasons: the rise of land markets, the recent era of relatively high global food prices, greater agricultural policy reforms, and the actions of farm lobbies.

The rise of land markets. Rapid rural population growth has transformed settled areas from land-abundant areas where rural-born people would receive land as a birthright and where even migrants from different regions often could acquire land easily to areas of land scarcity where land values have skyrocketed in recent years. Land purchase and sales markets are developing rapidly in countries where they were considered illegal not more than a generation ago.

Today, land sales markets constitute a major pathway for the expansion of medium-scale farms. There are several types of land sales markets. In some African countries, the purchase and sale of land is now legal. According to the Tanzania 2014/15 LSMS, for example, purchased land accounts for 29.6 percent of all plots held by farm households and 36.5 percent of all cultivated land. Qualitative surveys indicate that both relatively wealthy rural people and urban-based people, and even relatively successful smallholder farmers, are buying land in areas of favorable market access conditions from other households that are relocating to urban or more hinterland rural areas (Anseeuw et al. 2016; Knapman et al. 2017; Muyanga et al. 2019). Another common trend is the privatization and sale of land by traditional authorities. Historically, chiefs and headmen were seen as custodians of unutilized land, allocating it to members of their local communities as needed, but the rising acquisition of landholdings by nonresident people indicate the possibility that customary land is being "sold" based on willingness-to-pay criteria. In some countries, such as Zambia and Malawi, transfers of land from customary tenure to formal or informally privatized land appear to be associated with the rise of domestic investor farmers. Even where customary land institutions still exist, wealthy outsiders appear to be utilizing them as a means to acquire land (Knapman et al. 2017). This practice often (though not always) results in a transfer of land from customary tenure (under the authority of chiefs or their representatives) to statutory tenure with freehold or long-term lease titles (Knapman et al. 2017). One likely outcome of such trends is that customary lands are being privatized more quickly, with less being available as a birthright of future generations of rural-born youth.

An era of high global food prices. Food prices in Africa rose substantially after the global food price surge of 2007/08.[3] This rise has fueled increased demand for farmland as both global and domestic investors recognized that quality farmland in parts of Africa was undervalued.[4] The sustained agricultural growth that many African countries have experienced in the recent period of high local and world food prices also suggests that new land acquisitions during this period reflect perceptions of the profitability of agriculture as a business for those able to mobilize sufficient land, capital, and management expertise.

Policy reforms. An underappreciated contributory factor to changes in farm size distributions has been the contentious agricultural market and economy-wide policy reforms undertaken during the 1980s and 1990s. These policy reforms removed major barriers to private trade. The effects of the reforms were mostly dormant until the mid-2000s, when the sudden spike in world food prices enabled thousands of small-, medium-, and large-scale private firms to respond rapidly to profitable incentives, thereby rapidly building up the region's agrifood systems (Jayne et al. 2010). Reductions in trade barriers and state control of agricultural markets has enabled domestic food prices to become better aligned with import parity conditions compared with earlier years. Small-, medium-, and large-scale private firms have invested all along agricultural value chains in response to these policy reforms, which are part and parcel of the ongoing agrifood systems transformations in the region.

Farm lobbies and political capture. After roughly a decade of intense struggle between African governments and international lenders over the course of agricultural policy between 1985 and 1995, local interests regained control over the

[3] The international prices of maize, rice, and wheat over the 2006–2018 period, adjusted by two different global deflators (the U.S. GDP deflator and the global Manufacturing Unit Values Index), are on average 49 percent, 46 percent, and 39 percent higher than their inflation-adjusted 1990–2005 averages, based on the World Bank Pink Sheet (https://www.worldbank.org/en/research/commodity-markets, accessed July 19, 2019).

[4] Rural land values in favorable market access areas of Tanzania have doubled in real terms between 2009 and 2013, rising more rapidly than wage rates or other inputs into agricultural production (Wineman and Jayne 2018).

policy agenda starting in the early 2000s, often in an environment of nascent multiparty political systems. Many parties adopted populist stances offering greater tangible benefits to constituencies, such as input subsidies and support prices for local farmers in the name of food self-sufficiency. These developments enhanced the voice and influence of national farmers unions that ostensibly lobbied for the interests of the farming community. However, farmers are not a homogeneous group and particular policies affect them in different ways. Farmers unions in some countries chose to lobby forcefully for a system of agricultural subsidies and land allocation that channeled the majority of public agricultural expenditures to relatively large farms (Binswanger et al. 1995). Most national farmers unions in the region support policies that raise food prices (rewarding farms that produce the largest marketable surpluses); promote the conversion of land from customary tenure to statutory land; and promote access to land through market transactions, farm block programs, and input and credit subsidy programs that allow bigger farms to participate disproportionately in the programs. The common rhetoric used to justify these positions is that public support should go to "progressive" farmers who view "farming as a business" and have entrepreneurial experience to transform African agriculture. These positions reflect the interests of relatively capitalized "emergent" farmers, and at a minimum suggest the possibility that some national farmers unions have been captured by these interests (Sitko and Jayne 2014). Because investor farmers tend to be more educated and have more extensive social connections with traditional and state authorities, they also tend to have advantages with respect to navigating both customary and statutory land institutions to access land. For these reasons, and especially since the rise of world food prices in the mid-2000s, the profitability of commercial farming has increased—a trend associated with the increase in medium-scale land acquisitions in the region.

Even in the face of these trends, a small-scale farm-led agricultural transformation strategy could still succeed in Africa, as it did in much of Asia, provided that African governments provide sustained support for smallholders through policies and public expenditures targeted toward them. Ethiopia and Rwanda appear to be pursuing such a strategy with reasonable success, but it is difficult to find convincing evidence—based on agricultural marketing, trade, and land policies as well as the levels and composition of public budgets to agriculture—that many African governments are committed to inclusive smallholder-led agricultural development. As the political importance of commercialized medium-scale farmers continues to rise, as it has in many but not all of the countries examined, their interests may continue to influence the composition and design of public agricultural budgets and policies, much as large farm interests have in other parts of the world.

Consequences of changing farm structure

As a fairly new area of research, the evidence base to understand the effects of changing farm structure in Africa remains thin. Based on the few studies undertaken so far, we highlight both positive and potentially negative effects from the rapid acquisition of land by medium-scale farms.

One the positive side, medium-scale farms are pulling in major new private investment in value chains that improve market access conditions for nearby smallholders. For example, farming areas with a high concentration of medium-scale farms attract greater investment by large-scale grain buyers in Kenya, Zambia, and Tanzania (Sitko et al. 2018). Small-scale farmers are significantly more likely to sell to large grain trading firms if they are located in districts with a high concentration of medium-scale farms, even after controlling for agroecological and market access conditions (Burke et al. forthcoming). The large marketable surpluses of medium-scale farms initially attract investment by large-scale grain traders, but once these traders establish their buying stations they improve market access conditions for all farms in the area. Using Tanzania LSMS data, van der Westhuizen et al. (2018) find that small-scale farms are much more likely to rent mechanization services in areas with a high concentration of medium-scale farms. In the 21 regions of mainland Tanzania with the lowest concentration of medium-scale farms, only 3 percent of small-scale farms rent tractors; by contrast, in the 5 regions with the highest concentration of medium-scale farms, 23 percent of smallholders rent mechanization services. Mechanization rental services have sprung up in areas with a high concentration of medium-scale farms, catering to their demand for tractor services, which has made it more feasible for small-scale farmers to rent tractors, reduce their labor input into farming, and reallocate their labor to higher-return nonfarm activities, while still deriving income from farming. Wineman et al. (2019) also show important "spillover benefits" whereby the presence of medium-scale farms tends to improve small-scale farmers' access to agricultural inputs and services. Other studies in the emerging "spillovers" literature tend to find positive

synergies in some cases and no clear statistical relationship in others (Ali et al. 2019; Lay et al. 2018; Deininger and Xia 2016).

Direct comparisons of farm productivity between small- and medium-scale farms are scarce because almost all of the existing farm survey datasets from Africa (including LSMS) contain very few observations of farms greater than 10 hectares. New evidence that matches small-scale (up to 5 hectares) vs. medium-scale (5 to 100 hectares) farms in Kenya using relatively large samples shows a distinct advantage to medium-scale farms in three alternative measures of productivity including total factor productivity, net value of agricultural output per hectare, and agricultural labor productivity (Muyanga and Jayne 2019). The productivity advantage of medium-scale farms was due to differences in technical choice related to mechanization, which substantially reduces labor input per hectare, and from greater intensity of cash input use. Medium-scale farms also are more likely to be early adopters of, and comply with the protocols of, new farm technical innovations and practices.

Chamberlin and Jayne (2018), using Tanzania LSMS data, find that districts with a high concentration of farmland under medium-scale farms are associated with significantly higher farm and nonfarm incomes of small-scale and nonfarm households. Exploiting inter-district variation in farmland distribution patterns in Tanzania, their study finds that household incomes from farm, agricultural wage, and nonfarm sources are positively and significantly associated with the share of land in the district controlled by 5- to 10-hectare farms (after controlling for market access, rainfall, soils, and other local conditions). These positive spillover benefits are smaller and less statistically significant in districts with a relatively high share of farmland controlled by farms over 10 hectares in size. Anecdotal interviews of key informants in rural areas suggest that medium-scale farms, particularly those in the 5- to 20-hectare range, share many social and economic ties with small-scale farm households, participate in the same rural institutions, and hence may be more likely to have mutually beneficial economic synergies. By contrast, many large farms are controlled by people of other ethnic backgrounds or reside outside the area, and may not share strong social ties with local rural communities.

Also noteworthy is that the rise of commercialized medium-scale farms is likely to facilitate means by which governments may raise taxes or contributions that can be reinvested into public goods in relevant rural areas. This has yet to occur in many cases, but the surplus production of commercialized medium-scale farms represents in principle a future opportunity for Ministries of Finance and local communities to raise revenues for reinvestment in local public goods. There may be synergies as well between medium-scale and large-scale farms, though statistically representative large-scale farm survey data are almost totally unavailable in Africa to address this issue.

This nascent literature requires additional evidence before robust conclusions can be made, but initial evidence indicates that the rise of medium-scale farms may be contributing strongly to the development of agricultural output and factor markets; investment incentives by small-, medium-, and large-scale agribusiness firms; and general equilibrium multiplier effects associated with the region's dynamism over the past decade (Jayne et al. 2018). As described in section 4, the causality between economic dynamism and the rise of commercialized medium-scale farms clearly runs in both directions.

However, there are some warning signs as well. The rising acquisition of land by outside investors reduces the stock of land under customary tenure that will be accessible to current and future generations of local people. To the extent that traditional authorities are selling off land to outside investors based on willingness-to-pay criteria, their actions are raising the price of land in ways that are likely to exacerbate access to land for young rural people and increase their likelihood of exiting farming or migrating out of the area (Chimhowu and Woodhouse 2006; Bezu and Holden 2014; Kosec et al. 2018; Knapman et al. 2017). Ghebru and Lambrecht (2017), Ghebru and Girmachew (2017), and Ghebru and Girmachew (2019) indicate that smallholders' perceived tenure security in Ghana, Nigeria, and Mozambique is negatively correlated with the degree of local land market activity. Households residing in communities with more vibrant land markets perceive greater risk of losing land through private disputes or government expropriation. As the customary land tenure system comes under greater stress with the increased commodification of land, the protections that traditional systems historically have provided to safeguard individuals' rights to land are starting to break down. Badiane (2019) noted that one of major historical differences between poor rural households in Africa and Asia was that at least most of those in Africa had some

rights to land. In recent years, however, researchers are detecting increasing signs of rural landlessness in much of Africa as well (e.g., Mueller and Chan 2015).

Although migration and a movement of the agricultural labor force tend to be associated with structural transformation and rising incomes over time, these outcomes are unlikely to be achieved by restricting youth access to land as a means to compel them to migrate into nonfarm activities. As discussed in section 10, a balance is necessary to promote new dynamic segments of the farm sector in a way that retains secure access to land for local rural people.

It would be oversimplifying matters to conclude that medium-scale investor farmers are the main source of tenure insecurity for local rural people. The empirical evidences show that members of the local community, often family members, are a major source of land insecurity of indigenous rural people. Lawry et al. (2014), Ali et al. (2011), and Ghebru and colleagues' work on land tenure systems indicate that the interests of vulnerable groups such as women and youth often require special interventions in areas where land markets are developing rapidly, and that these interventions will need to be context specific and hence vary by location (Ghebru and Lambrecht 2017; Ghebru and Girmachew 2017).

On the whole, the development of land purchase and sale markets is one aspect of more wholesale changes in social systems, in some ways uprooting the traditional social fabric and creating new power structures. The rise of land markets is creating a new class of landless workers in Africa, who sell their land informally to others and become dependent on the local nonfarm economy for their livelihoods (Mueller and Chan 2015). These land purchase market developments produce winners and losers in the short run, and the evidence is not fully clear whether the short-run losers become long-term winners through processes of economic transformation and growth. Policymakers will need guidance on how to minimize these hardships, protecting those who are most vulnerable, as the processes of economic transformation gradually raise living standards for the majority of the population.

"Stepping up" vs. "Stepping in": Characteristics of medium-scale farmers?

Studies were conducted in Zambia, Kenya, Malawi, Senegal, Tanzania, and Nigeria to understand the characteristics of these medium-scale farms and how they became medium-scale farms (Jayne et al. 2016; Anseeuw et al. 2016; Muyanga et al. 2019; Bourgoin et al. forthcoming). We were particularly interested in understanding the extent to which current medium-scale farms started out as small-scale farms, acquired more land, and expanded their farm operations ("stepping up"); or formerly were engaged primarily in nonfarm jobs, invested in land, and began farming either as an owner-operator or by hiring a farm manager to run the farm ("stepping into" medium-scale farming). We highlight three insights from these studies.

The first few studies of medium-scale farmers (covering recall periods between 2005 and 2013, summarized in Jayne et al. 2016) indicated that less than 25 percent of them started out as being primarily engaged in small-scale farming and successfully expanded their operations into medium-scale status. Ghana was the lone exception to this, where the majority of medium-scale farms did start out as small-scale farms (Chapoto et al. 2013). In Zambia, Kenya, and Tanzania, the majority of medium-scale farmers initially were engaged primarily in nonfarm activities; they used their savings to invest in relatively large landholdings to begin farming or expand their farming operations. As shown in Table 5, roughly 60 percent of randomly sampled medium-scale farms in four districts of Zambia and Kenya "stepped in" to medium-scale farming using revenues from nonfarm sources to buy land and start farming. Many of these farmers were relatively wealthy or privileged rural people (e.g., civil servants, rural businesspeople, extension agents, religious leaders, traditional headmen or chiefs) or urban-based people. Emergent farmers who reside in urban areas and hire managers to run their farms have become common enough in the region that the term "telephone farmers" has emerged to describe them. The urban-based residence trend of many medium-scale farms is reinforced by data in nationally representative DHSs, which ask questions of both rural and urban households about whether they own land and if so, how much land. As reported in Table 6, urban-based individuals control a significant proportion of total national land in the five African countries examined. In almost all cases, the proportion of land owned by urban people has increased between the first and most recent survey. For example, in Ghana, between 2008 and 2014 the proportion of national land owned by urban residents increased from 26.8 to 31.9 percent. In Kenya and Zambia, urban-based individuals and families control close to one-third of all national land con-

trolled by individuals and families. In Malawi, by contrast, the share of national land controlled by urban households was only 3.0 percent in 2004, and rose to only 6.5 percent by 2010. However, taken together, an important segment of farms in the 5- to 100-hectare category were owned by people who invested into agriculture using revenues from nonfarm employment, acquiring land from local authorities or from increasingly active and sanctioned land markets.

We hypothesize that the importance of nonfarm investment into medium-scale farming in the 2005–2013 period was driven in part by the unusually high world food prices that prevailed during this time. Many wealthy people in both rural and urban areas found that food production could be an attractive investment, especially in areas where traditional authorities were willing to allocate relatively large tracts of customary land at low cost to the investor. As shown in Table 5, a sizeable proportion of medium-scale farms—particularly those that acquired land from nonfarm income sources—started their farms after 2005 when world food prices rose dramatically. In Zambia, for example, 63 percent of these farms were started since 2005. As might have been expected, substantial resources appeared to flow into agriculture from outside the sector, not only by international investors but also by local investors (Jayne et al. 2016).

However, more recent surveys of medium-scale farms indicate that the pace of land investment by urban and rural elites may have slowed in recent years. This might have been anticipated as world food prices – which remain relatively high compared to the 1990s and early 2000s -- have declined from their unusually high levels between 2006 and 2012, and may be cooling the profitability of farming compared to a decade ago. Moreover, population growth and commercial interest have continued to boost land prices in favorable farming areas, also reducing the profitability of commercialized farming compared to a decade ago. Recent studies in Zambia, Senegal, and Nigeria indicate that perhaps 60 percent of medium-scale farmers surveyed in 2017 and 2018 have "stepped up" from small-scale status. For example, the 2018 survey of medium-scale farms in Ogun and Kaduna States by Muyanga et al. (2019) shows that the practice of "stepping up" from small-scale to medium-scale farming as a pathway to agricultural commercialization in Nigeria was more predominant than "stepping in" into medium-scale farming from nonfarm activities (Table 5). The study of medium-scale farmers in Senegal by Bourgoin et al. (forthcoming) similarly shows that the majority of randomly surveyed medium-scale farms started out as small-scale farmers who utilized land markets and other forms of land acquisition to expand their farming operations. The Senegal case study does show major investment by people involved primarily in nonfarm businesses in areas close to major urban centers, such as Niayes; in most other areas, however, most medium-scale farms started out as small-scale farms primarily engaged in farming. In Nigeria, land accessibility and mechanization rental markets were found to be the most important factors that enabled small-scale farms to "step up" into medium-scale status, pointing to the importance of land and mechanization markets for the "stepping up" process. These results from Nigeria, Senegal, and Zambia point to a small but growing class of entrepreneurial commercialized African farmers who are using the proceeds from their existing small-scale farming operations to expand into the 5- to 20-hectare category. The growing dynamism and upward mobility among some segments of smallholder farmers is associated both spatially and temporally with increasingly active land, labor, agricultural input, output, and finance markets, which is making it easier for individuals to overcome binding constraints on farmland expansion and productivity.

However, even the medium-scale farmers who "stepped up" from small-scale farming might be considered atypical of most small-scale farm households, given that their initial landholding size at the time they started farming was 4 hectares in Nigeria, 14 hectares in Kenya, and 29 hectares in Zambia (Table 5). They may have been farming less than five hectares when they started out, but very few small-scale farm households in Kenya or Zambia possess landholdings of that size—which suggests the relatively unique circumstances of the small-scale farmers who tend to "step-up" into medium-scale status.

Although these recent studies indicate that half or more of the current medium-scale farms were formerly small-scale farmers, an exceedingly small fraction of small-scale farm households ever become medium-scale farmers. The average probability that a small-scale farmer (up to 5 hectares cultivated) will become a medium-scale farmer (5 to 100 hectares cultivated) is about 4 or 5 percent. Many more small-scale farms are expected to exit partially or fully out of farming than to become medium-scale farmers in the years to come. Much will still depend on government policies and the composition of their spending on agriculture.

Table 5. Characteristics of medium-scale farmers: "Stepping up" vs. "Stepping in"

	Nigeria, 2018		Kenya, 2013		Zambia, 2013	
	Primary mode of entry into medium-scale farming (i.e., 5–100 ha operations)					
	Stepping up: Growth from small-scale farming (n=476)	Stepping in: Acquisition of land from nonfarm employment (n=534)	Stepping up: Growth from small-scale farming (n=120)	Stepping in: Acquisition of land from nonfarm employment (n=180)	Stepping up: Growth from small-scale farming (n=118)	Stepping in: Acquisition of land from nonfarm employment (n=164)
% of cases	47.1	52.9	40	60	42	58
% men	95.4	98.1	82.5	80.0	92.9	91.4
Year of birth	1974	1963	1945	1947	1966	1960
Years of education of head	7.0	8.0	7.5	12.7	8.2	11.0
Have held a job other than as a farmer (%)	19.2	88.9	17.5	83.3	32.9	100.0
Formerly or currently employed by the public sector (%)	13.5	53.3	12.5	56.7	5.8	59.6
Initial landholding size when started farming (ha)	4.0	11.7	14.0	22.6	28.8	106.6
Current landholding size (ha)	7.8	25.6	32.7	50.1	38.2	74.9
% of land currently under cultivation	78.8	62.3	54.1	46.6	46.9	24.7
Decade when land was acquired by individual:						
1979 or earlier (%)	32.1		43	24	10.6	6.2
1980–1989 (%)			20	20	14.8	7.4
1990–2005 (%)	26.7		14	32	32.2	23.8
2005 or later (%)	41.2		23	25	42.0	63.4

Notes: the "stepping-in" category includes individual who purchased more than 5 hectares of land to initiate their farming activities.
Source: Expanded from Jayne et al. (2016) to include 2018 data from Nigeria as reported in Muyanga et al. (2019).

Table 6. Agricultural landholding distribution patterns (DHSs, various years)

	Ghana		Kenya		Malawi*		Tanzania~		Zambia*	
	2008	2014	2009	2014	2004	2010	2005	2010	2007	2014
n=households	11,777	11,835	9,057	36,430	13,664	24,825	9,735	9,623	7,164	15,920
% of urban HHs owning agriculture land	23.4	21.9	35.3	47.7	31.4	38.6	41.7	37.9	27.4	24.8
% of rural HHs owning agricultural land	66.7	58.7	78.1	79.2	86.6	87.4	92.3	87.4	88.3	88.1
% of HHs (nationally) owning agricultural land	46.0	38.5	67.0	66.0	77.4	79.3	79.0	74.5	67.2	61.7
% of national landholdings held by urban HHs	26.8	31.9	22.0	32.1	3.0	6.5	11.8	32.7	16.8	22.0
% of landholdings of 20 ha or more held by urban HH	36.9	42.7	34.3	41.2	1.2	7.6	17.2	78.9	21.7	29.3

Notes: HH = household. In the DHS surveys for Zambia, Malawi, and Kenya, landholdings greater than 95 ha were reclassified as 95 ha; for Ghana, landholdings greater than 95 acres were reclassified by the DHS curators as 95 acres (38 ha). These caps on the reported landholding size may result in underestimates of the land controlled by urban households.
Source: DHSs, https://www.dhsprogram.com/Data/

How are medium- and small-scale farmers acquiring their land?

Medium-scale farms are growing most rapidly in areas where land is still relatively cheap (e.g., Zambia, Tanzania, northern Ghana) and least so in areas where additional land is scarce and land prices are highest (e.g., Rwanda, Kenya, Southern Ghana). Small-scale and medium-scale farm households acquire land in four main ways: (i) inheritance; (ii) renting land; (iii) obtaining land from traditional authorities, either allocated for free as a social right or via purchase or long-term lease; and (iv) purchasing land or obtaining a long-term lease from another owner/household.

Inheritance. Historically, inheritance has been a major form of land access for rural-born people. However, inheritance is declining in most countries, especially those with already high population densities. In the 2014–2015 Tanzania LSMS survey, for example, inheritance accounts for 33.2 percent of all plots and 38.3 percent of all area under cultivation. Inheritance accounts for 40 percent of plots in Ethiopia, 14 percent in Nigeria, 70 percent in Niger, and 62 percent in Uganda. Because of rising life expectancies in SSA—from 48 years in 1980 to 60 years in 2015—rural youth will need to wait longer to inherit land (Jayne et al. 2014b). Continued subdivision and fragmentation will continue to limit the amount of land that today's rural youth will be able to inherit. For these reasons, it is increasingly unlikely that rural African youth will inherit land in the future, and those who do will tend to inherit much smaller parcels than in the past and at a later stage in their lives. Lack of inheritance options is a major reason for youth outmigration (Bezu and Holden, 2014; Kosec et al. 2017; Muyanga et al. 2019).

Land rental markets. Most LSMS surveys indicate that rural household participation in land rental markets is rising. Most studies of land rental markets indicate that they are welfare-enhancing, by transferring land from labor-deficit, land-rich households to land-constrained households with available labor to work the land (Chamberlin and Ricker-Gilbert 2016; Deininger et al. 2017).

Allocation of land by traditional authorities. In some areas, new land cannot be allocated because all land under customary tenure already has been allocated. In areas where significant amounts of unallocated land still remain under customary tenure systems, the rise of investor farmers is competing with future generations of rural youth for land (Jayne et al., 2016). This is where land registration and certification may provide the greatest benefits in terms of securing access to land for locally born rural people (Ghebru and Lambrecht 2017; Ghebru and Girmachew 2017).

Land markets for purchase and long-term lease. Because of growing scarcity, land increasingly is recognized as having value. Over the past 20 years, land purchase markets have sprung up rapidly, even in customary tenure areas where traditionally it has been considered taboo (Woodhouse 2003; Chimhowu and Woodhouse 2006; Sitko and Chamberlin 2016). Purchase and long-term leases provide better leverage for the farmer to undertake permanent improvement on the land, such as irrigation and soil conditioning, compared with short-term tenancy that is not amenable to land development and conditioning. The rising importance of land purchase markets may therefore be a source of productivity improvement for those able to secure long-term rights to land. Moreover, growing participation in legal and clandestine land purchase and sale markets are a major source of rising land prices in parts of rural Africa. Using Tanzania LSMS data, Wineman and Jayne (2018) identify the following factors as correlates of land values in the country: the net value of crop output per acre, soil quality, and market access conditions—all of which are proxies for a region's agricultural commercialization potential. The growth of small and medium-sized towns are improving market access conditions in farming areas once considered remote, thereby raising land values in such areas. As a result of all these land allocation processes, farmland ownership is becoming more concentrated, as measured by the Gini coefficient of owned land (Table 7).

Table 7. Changes in the concentration of farmland ownership

	Period	Movement in Gini coefficient
Ghana (cult. area) (GLSS)	1992 → 2013	0.54 → 0.69
Kenya (cult. area) (KIHBS)	1994 → 2006	0.51 → 0.55
Tanzania (landholdings) (LSMS)	2008 → 2012	0.63 → 0.69
Tanzania (area controlled) (ASCS)	2008	0.89
Zambia (landholding) (CFS)	2001 → 2012	0.42 → 0.49

Source: Computed from national household survey data (see Section 2). All datasets are considered nationally representative official data collected by national statistical services.

Changes in land tenure systems and security

Since at least the 1980s, land tenure researchers have documented the changing dynamics between customary and statutory tenure systems wrought by informal land sales.[5] The processes by which investor farmers acquire customary land have been highly variable, but early observers noted that a common motivation of such acquisitions was undertake commercialized crop production.[6] However, the formal legal status of customary tenure and the scale of these interactions give the contemporary urban investor-farmer phenomenon unique features. In prior decades, almost all SSA countries resisted conferring legal state recognition of customary tenure systems; since the 1990s, however, the trend has been toward formal recognition of customary tenure. Until the 1990s, most SSA countries had an official or unofficial policy of extinguishing customary tenure by promoting individual titling. These efforts generally failed because of titling costs and the striking resilience of customary tenure systems. Meanwhile, informal transfers in accordance with customary norms (including to investor farmers) accelerated, especially during the past decade of relatively high world food prices (Lawry et al. 2014; Chimhowu and Woodhouse 2006).

With the advent of formal recognition of customary tenure, investor farmers must obtain otherwise customary land through a combination of familial or personal connections and quasi-legal documentation. In many SSA countries, transfers of customary land are strictly controlled, at least on paper. The informal or vernacular land market responds to this regulatory burden by adapting available formal legal instruments to secure the transfer, such as reassigning significant amounts of land under a nebulous third tenure category, neither customary nor statutory. For example, a significant amount of land in Liberia is under "Tribal Certificates." Under the now repealed Public Lands Law, Tribal Certificates were issued as part of the first steps in transferring land from customary tenure to private individualized ownership (Stevens 2014). In practice, the onerous statutory process means that most acquisitions stopped at the Tribal Certificate, which has become a de facto deed of ownership for many (Stevens 2014). In some parts of Liberia, Tribal Certificates comprise as much as 50 percent of the land area.[7] Although more research is needed, Tribal Certificates can cover hundreds or even thousands of acres, and in at least some cases are used to secure farms with cash crops and for high-value land near cities and major transit routes. Similar approaches have been pursued in other African countries to make it legal for governments or traditional authorities to sell land to investors (Boone 2014).

Given the scale of the acquisitions, communities in customary tenure systems may have differing view of investor farmers.

[5] USAID Country Profiles of Land Tenure, 1986; Is Indigenous Tenure A Development Constraint?, Bruce, 1986.

[6] Ibid.

[7] From data collected by the U.S. Agency for International Development Land Tenure Office.

Are they sources of economic dynamism and employment, or are they exploiters? Historically, the nature of land conflict in sub-Saharan Africa has centered on dynamics between *autochthonous* members of a community (i.e., those with a real or mythic link to a community's original inhabitants or settlers) and strangers or newcomers (Boone 2014). As with emergent investor farmers, strangers have been attracted to certain lands because of the potential for commercial crops (e.g., cocoa in Ghana and Côte d'Ivoire; rice in Tanzania; maize in Zambia). Conflicts with long-established customary communities invariably would follow. However, as Boone argues, whether the conflicts remained localized or impacted, security at the national level depended on whether the central government consistently favored autochthonous communities or the stranger, newcomers. An open question is how the emergent investor-farmer phenomenon maps onto these well-documented dynamics across sub-Saharan Africa. Will African investor farmers be regarded as strangers or not? Will their status with the community depend on the extent to which they rely on personal and familial connections to acquire land, compared with outright purchase from traditional authorities? Which farmers will SSA governments favor in a context of rising land scarcity and palpable tenure insecurity? On one hand, many SSA governments embrace, to greater or lesser degrees, the need to respect and protect customary land rights. On the other hand, investor farmers present an opportunity for significant gains in crop production and economic growth, but perhaps at the expense of customary tenure holders.

In rural areas of favorable market access and commercialization potential (e.g. Zambia's Copperbelt), investor farmers may represent a significant source of tenure insecurity for customary landholders as they leverage their connections with traditional leaders and state government to wrest control of customary land (Huntington et al. 2018). In other areas less attractive to investor farmers, the main sources of tenure insecurity tend to be internal to communities. For example, in the more remote areas of Zambia's Eastern Province, tenure is relatively secure (Huntington et al. 2018), with only 20 percent of respondents reporting that encroachment on their land is likely and with the most likely threats being relatives and neighbors within the village. Further, households reported significant concerns about land reallocation by chiefs and village headmen. This reallocation appears to be motivated not primarily by demand for land from elite external actors, but by the land requirements of other village residents or family members, especially if the plot of land in question is not under cultivation at the time of reallocation.

Are investor farms displacing indigenous farms?

Evidence to date points to some degree of displacement of indigenous small-scale farm households in areas of favorable commercial potential. There is little evidence of displacement in more remote areas, primarily because relatively few investor farmers are locating in such areas.

Based on their analysis of six household datasets collected across rural farming areas of Ethiopia, Guinea, Liberia, and Zambia, Stickler et al. (2018) find that a clear majority of respondents, most of whom have no documentation of their land rights, do not perceive a significant risk of land appropriation by either internal or external actors.[8] This is an important finding, since many land registration policies are based on the premise that unregistered rights are inherently insecure. Still, significant minorities in Liberia and Zambia (10–30 percent) reported that the land they currently possess could be appropriated by internal or external actors in the near future (1-5 years).

Across all datasets, female-headed households were significantly more likely to report a risk of internal appropriation than male-headed households. No such differences were found for risk of land appropriation from external sources; in fact, in two areas of Ethiopia and Zambia, male-headed households were more likely to report external sources of land insecurity. The greatest threat to tenure security also differed across country datasets, ranging from threats within the community to those deriving from outside authorities or investors. Respondents in Guinea reported family members as the most likely threat to their tenure security (9 percent of at-risk plots), while the largest proportion of respondents in Liberia (23 percent) feared appropriation by neighbors. By contrast, farmers in the Chipata District of eastern Zambia indicated that local authorities were the greatest threat (23 percent of fields). Only in the primarily pastoral region of Afar in northern

[8] Although the response categories were standardized within datasets and grouped into standard categories across datasets, respondents may nevertheless have reported threats differently according to their perceptions or interests. For example, an urban family member could be reported as either a family member (internal threat) or an urban elite/investor (external threat).

Ethiopia did outside investors rank as the largest threat, albeit still relatively small (6 percent of respondents) (Stickler et al. 2018).

In contrast, very few respondents (1–2 percent) in any dataset reported having actually lost land to involuntary reallocation. Land conflict was reportedly relatively rare, ranging from 19 percent of households situated near to the town of Chipata in Zambia to just 1 percent in Guinea and Zambia's remote Luangwa Valley (Stickler et al. 2018). Boundary disputes were the most common kind of land conflict across all study sites, suggesting that some form of boundary clarification and/or recording process could strengthen tenure security. There were no significant differences between female- and male-headed households with respect to past experience of land conflict.

A number of recent studies suggest that customary tenure systems, which confer undocumented rights to users, provide a greater degree of tenure security than previously thought (Childress et al. 2018; Lawry et al. 2014; Stickler et al. 2018). It is therefore important to next consider the effectiveness of alternative types of interventions to register land rights with respect to impacts on (i) perceptions of tenure security; (ii) long- and short-term productivity-enhancing investments; (iii) land productivity; and (iv) youth behavior, including decisions to migrate or pursue farming. Lawry et al. (2014) stress that attempts to implement new tenure systems may not necessarily produce the intended benefits of improved tenure security—local context and the performance of existing land institutions are decisive. It is generally accepted that interventions to register individual farmland rights in Africa through private, freehold titles have largely failed to deliver the anticipated improvements in tenure security and crop yields and actually may have decreased tenure security in cases where formal land administration systems proved less capable than customary systems of protecting rights (Atwood 1990; Carter and Wiebe 1990; Lawry et al. 2014; Mighot-Adholla et al. 1994; Place 2009). Evidence also suggests that individual land titling may have had particularly negative impacts on the rights of secondary and vulnerable land users, such as women and the poor (Meinzen-Dick and Mwangi 2008). However, in other cases, formalization of land rights, such as through certificates, has improved tenure security and land-based investments on affected plots (Holden et al. 2009; Goldstein et al. 2015; Melesse and Bulte 2015). In Burkina Faso, a rural land governance pilot involving participatory land use planning, the development of community land use charters, and capacity building for dispute resolution reduced the predicted probability of serious land conflicts by more than half (56 percent) and of severe land conflicts by 96 percent (Linkow 2018). These findings are significant given that earlier research suggested that high levels of perceived concern about land conflicts in Burkina Faso was associated with a reduction in agricultural productivity of over 40 percent (Linkow 2016). Similarly, a randomized control trial (RCT) in Zambia found that beneficiaries of a pilot to map and register customary land rights and strengthen customary land governance institutions felt that their fields were more secure from reallocation or unauthorized appropriation by both internal and external actors (Huntington et al. 2018).

The evidence generally supports the hypothesis that land security interventions have increased short- and long-term productivity-enhancing investments and agricultural productivity in Africa. For example, an RCT in Benin found that the first stage of a government intervention to map and register customary land rights increased beneficiary investment in perennial cash crops and trees by roughly 40 percent and also increased fallowing by female-headed households (Goldstein et al. 2015). Similarly, Ethiopia's program to map and register use rights to farmland parcels increased investments in trees and soil conservation structures and led to productivity increases of 35–45 percent (Holden et al. 2009; Melesse and Bulte 2015), and Rwanda's pilot farmland use rights registration program led to a 10 percentage point increase in beneficiaries' investment in soil conservation and a 19 percentage point increase for females (Ali et al. 2011). In Zambia, early RCT evidence finds that customary land registration increased investment in long-term productivity-enhancing practices by both the average beneficiary household (e.g., planting basins increased 7 percent and manure increased 6 percent) and by vulnerable subgroups, including households headed by youth and elders, as well as poor and land-constrained households (Huntington et al. 2018).

The evidence on the impact of different land interventions on land rental markets is mixed. Research on Ethiopia's farmland certification program also found that the program increased land rental market activity, including for women, suggesting that landholders felt more confident in their ability to uphold their rights to rented-out land (Holden et al. 2009). Likewise, in Zambia, beneficiaries of customary land registration were 1.67 times more likely to report borrowing

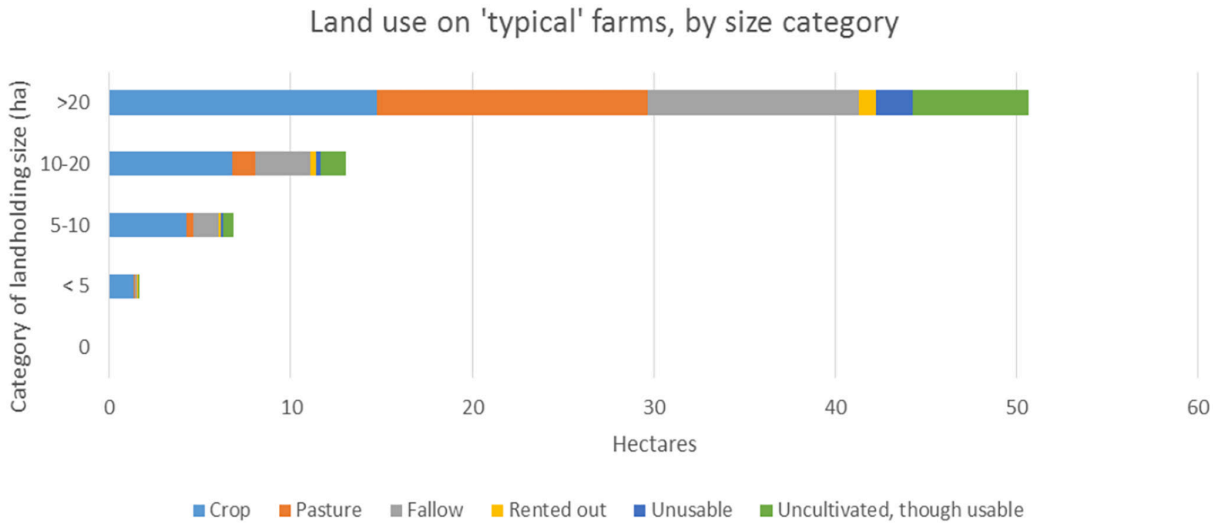
or renting in land compared to those in the control group (Huntington et al. 2018). However, in Benin, Goldstein et al. (2015) found a 1.6 percentage point decline in the proportion of parcels rented or sharecropped out in villages benefiting from the first phase of customary land registration. The authors hypothesize that this finding indicates that landowners may have reclaimed parcels they had previously rented or sharecropped out, or delayed land transactions to assert their land rights prior to the issuance of land certificates in the next phase.

There is very limited evidence on the impact of land interventions on land sales markets, which may be partly explained by the fact that many countries in Africa only recognize use rights to farming parcels and continue to prohibit or heavily restrict land sales. Nonetheless, evidence from Rwanda's pilot land registration program found that land market activity actually declined, suggesting that the risk of distress sales leading to landlessness may be overestimated (Ali et al. 2011).

Differences in land utilization and crop production patterns by farm size category

Evidence to date from Tanzania, Kenya, and Nigeria suggests that the cropping patterns of medium-scale farms do not differ greatly from those of small-scale farms (Wineman et al. 2019; Muyanga and Jayne 2019; Muyanga et al. 2019). However, in most cases, small-scale farms utilize a higher proportion of their land, as shown in Figure 3 below.

Figure 3. Land use patterns by landholding size category, Tanzania, 2008



Source: Wineman et al. (2019) based on 2008 ASCS.

Boserupian intensification in an era of rural transformation[9]

Drawing on Boserupian and induced innovation principles, we review evidence on how the farm technologies and practices associated with integrated soil management and sustainable intensification may vary spatially according to the heterogenous ways in which economic transformation and population dynamics are influencing agricultural factor prices. According to the induced innovation hypothesis, farming practices are influenced by the economic system that determines the relative costs of agricultural land, labor, and capital inputs (Hayami and Ruttan 1971). Historically in Africa, land has been abundant while labor and capital have been relatively scarce (Boserup 1965; Binswanger and McIntire 1987). Consequently, most of the region has displayed labor-saving, capital-saving, and land-using farm production practices.

[9] This section draws heavily on Jayne et al. (2019).

Since 2000, much of Africa has witnessed rapid economic transformation and demographic change, featuring rural migration to urban and other rural areas, a generally rapid but highly varying transition of the labor force from farm to off-farm employment (Filmer and Fox 2014; Yeboah and Jayne 2018), and rural households' growing engagement in the cash economy (Bryceson 2019). Real per capita incomes have grown by 35 percent between 2000 and 2015, doubling in some countries but barely rising in others (Barrett et al. 2017). Intrarural migration has contributed to localized differences in (i) rates of rural population growth, (ii) the pace at which rural spaces have become economically linked to urban areas, (iii) rural employment patterns and wage rates, (iv) farmers' market access conditions, and (v) land scarcity and the rate of increase in land values (Jayne et al. 2014). Many areas of rural Tanzania, for example, saw a doubling of real land values within the six-year period 2008–2014, whereas land values barely rose in other, more remote areas of the country (Wineman and Jayne 2018). More than 25 percent of rural youth in densely populated areas of Kenya are unable to inherit land (Yamano et al. 2009), and markets for land rental and purchase are becoming increasingly important means of acquiring land for farming (Deininger et al. 2017).

Consequently, the cost of land relative to labor and capital/cash inputs is likely to become increasingly important in influencing the types of technologies and integrated soil fertility management (ISFM) practices that farmers elect to use. Employment patterns have shifted rapidly from farm to off-farm activities in rural areas connected to dynamically growing towns and cities (Christiaensen and Todo 2014). In such areas, expanding opportunities for cash-earning off-farm employment is putting upward pressure on rural wage rates. By contrast, the opportunity cost of agricultural labor has not strayed far from the one-dollar-a-day level in remote rural areas.

These powerful but spatially variable trends in SSA have produced heterogeneous localized impacts. Figure 4 presents the implications for the trajectory of farming systems. Farming areas are categorized according to whether they are connected to economically dynamic towns or in economically stagnant areas, and whether they are densely or sparsely populated. Capital-using and labor-saving technologies such as herbicides and mechanization may be increasingly attractive in farming areas experiencing rising real household incomes and rising wage rates (the northeast quadrant of Figure 4). Even in densely populated and economically dynamic areas where both land values and labor costs are increasing and cash constraints on input purchases are becoming less binding (the northwest quadrant), capital inputs are likely to increasingly substitute for land and labor in farm production.

Unsurprisingly, evidence points to the rising use of capital inputs such as herbicides, pesticides, fertilizers, and mechanization in parts of Africa. Haggblade et al. (2017) reports that the value of pesticide imports in West Africa tripled between 2005 and 2015. In Ethiopia, which has experienced major economic dynamism since 2000, herbicide use increased sixfold between 2000 and 2015 (Haggblade et al. 2017). In Ghana, another country experiencing rising per capita incomes and rural labor force shifts toward nonfarm employment, more than 60 percent of farmers used herbicides in the most recent 2015 nationally representative rural household survey. Tamru et al. (2017) show the rapid expansion of herbicide use in Ethiopia. Haggblade et al. (2017) report that the cost of weeding a hectare in Southern Mali using herbicides is now roughly half as much as using hired labor. Consistent with the induced innovation hypothesis, this shift to capital-using and labor-saving production technologies is associated with evidence of a general decline in the costs of these chemicals and an increase in the costs of agricultural labor (Haggblade et al. 2017).

Mechanization is another capital-using, labor-saving technology that has increased in economically dynamic areas where nonfarm employment is pulling rural labor out of agriculture (Takeshima and Lawal 2018; Adu-Baffour et al. 2019). The percentage of farmers using mechanization for land preparation has risen especially rapidly in sparsely populated areas where labor is scarce and where medium-scale farms have invested, which has encouraged the development of tractor rental markets, as in central and northern Ghana. In Tanzania, van der Westhuizen et al (2018) report that more than 20 percent of smallholder farmers rented mechanization services in 2014/15 in five regions characterized by economic dynamism, compared to less than 4 percent in more remote areas of the country. This study also documents that the increased smallholder demand for mechanization services is associated with a decline in the price of mechanization services relative to that of agricultural wage labor.

Figure 4. Economic transformation and population density effects on the agricultural technologies and practices demanded by farmers and priorities for integrated soil fertility management (ISFM) practices

Economic dynamism

High population density	***Examples:*** Rwanda, Nigeria, Ethiopia, highland Tanzania, southern Ghana ***Hypotheses:*** • Rising participation in agricultural factor markets • Rise of labor-saving and capital-using technologies (fertilizers, chemicals, mechanization) and ISFM • Land scarcity leads to rising use of land-saving technologies ***Priorities:*** Capital-using ISFM that supports the efficiency of fertilizer use	***Examples:*** Northern Ghana, most of rural Tanzania ***Hypotheses***: • Labor scarcity in agriculture • Rise of labor-saving/capital-using technologies (e.g., mechanization, chemicals) • Rise of large-scale farm investment featuring capital-using, labor-saving technologies ***Priorities:*** Labor-saving ISFM that supports farmers' efficient use of fertilizers
	Examples: Southern Malawi, Madagascar ***Hypotheses***: • Slow wage increases, abundant labor availability for agriculture • Land scarcity • Youth outmigration • Some potential for labor-using/ land-saving ISFM investments ***Priorities:*** Labor-using ISFM that raises AEN	***Examples***: Democratic Republic of Congo, Zimbabwe ***Hypotheses***: • Limited incentives for extensification or intensification • Little use of ISFM • Potential for capital-intensive land investments ***Priorities***: Land-using and labor-using ISFM

Low population density

Economic stagnation

African farmers also are starting to use inorganic fertilizers more intensively. According to the World Bank (2017) World Development Indicators, fertilizer use intensity for SSA increased from 9 to 16 kilograms per hectare between 2000 and 2016. This growth is driven partly by subsidy programs in some countries but also reflects increased commercial demand and incentives to maximize the net value of output per hectare of land in areas where the land frontier has been reached. In densely populated parts of central and western Kenya, for example, more than 90 percent of farms purchase fertilizers (Sheahan et al. 2013). The southwest quadrant of Figure 4 suggests that economically depressed but land-scarce densely populated areas may be suitable for encouraging labor-using ISFM practices because the cost of labor has remained relatively low. However, labor costs may start to rise even in these areas as they experience rapid outmigration of young adults or become more closely connected by markets to economically dynamic areas.

In conclusion, applying induced innovation concepts to contemporary Africa, we anticipate that continued economic transformation and shifting demographic patterns will influence the types of ISFM technologies and practices that will

be considered attractive to farmers and therefore likely to be adopted. Nonetheless, these trends will have spatially heterogeneous impacts. Especially where nonfarm employment is competing against agriculture for labor and exerting upward pressure on farm wages, capital inputs should continue to gradually substitute for labor in farm production. Long-term trends in many areas are encouraging intensification of capital inputs, including fertilizer use. Farm productivity growth will be progressively less limited by cash constraints and more limited by management and soil quality challenges. For example, cash constraints on fertilizer use appear to be less binding, while soil and management factors that limit crop response to fertilizers—which are serious even now—may become progressively more binding. If incomes and returns to labor continue to rise in economically dynamic areas of Africa as they have over the past 15 years (Barrett et al. 2017), farmers may have little incentive to use labor-intensive ISFM practices unless the contribution to yields is high and can be achieved within a short time frame.

Policy implications

Medium-scale farms have become a major force in many African countries' agricultural sectors. Since 2000, the amount of agricultural produce that these farms contribute to countries' national food supplies has risen rapidly. In some countries, like Tanzania and Zambia, medium-sized farms now account for roughly 40 percent of national marketed agricultural produce (Jayne et al. 2016). In contrast, small-scale farms still predominate in land-constrained, densely populated areas like Kenya and Rwanda. Medium-scale farms are on the rise mainly where there is substantial, undeveloped land.
Even though much remains unknown and the story is still unfolding, we believe that medium-scale farms are an important driver of rural transformation in much of Africa, with mostly positive results. The prolonged surge in global food prices starting in 2006 ushered in major and much publicized investment in African farmland by foreign investors. What happened largely under the radar were huge farmland investments by African professionals, entrepreneurs, civil servants, and retirees, augmented by millions of relatively successful small-scale farmers who expanded into the lower end of the medium-scale farm category (operating from 5 to 20 hectares). In Ghana, Zambia, Tanzania, and Kenya, the amount of land acquired by these medium-scale African farmers since 2000 has far exceeded the amount acquired by foreign investors (Jayne et al. 2014a).

Medium-scale farmers are a diverse group. Many are relatively wealthy and influential, often professionals, entrepreneurs, or retired civil servants. Many accumulated wealth from nonfarm jobs, invested in land, and became part- or full-time farmers. Many are based in rural areas and have political or social influence with local traditional authorities. Others are urban "telephone farmers" who retain jobs in the cities, hire managers to attend to their farms, and occasionally visit on weekends. In more recent years, since investor interest in agriculture may have subsided as food prices have fallen from their 2006–2012 high, the composition of entry into medium-scale farming appears to have shifted, with most of them being formerly small-scale farm households who successfully expanded their operations. The increasing dynamism of agricultural land, labor, finance and agro-input markets for mechanization and inputs may be supporting the aspirations of entrepreneurial smallholder farmers to successfully expand their farming operations. In the study of medium-scale farms in Ogun and Kaduna States by Muyanga et al. (2019) for example, roughly 60 percent of those interviewed stated that they were former smallholder farmers who were able to save from their farm sales to rent, buy, or lease new land to expand their operations into medium-scale status. However, even though the majority of medium-scale farms may have formerly been small-scale farms, only a very small proportion of small-scale farmers will ever step-up into medium-scale operations. The vast majority of small-scale farm households will remain small-scale and their share of the total population will dwindle over time as they age and the majority of their children increasingly move into off-farm sources of employment.

Medium-scale farmers bring new sources of capital and know-how to African agriculture. In some countries, they have become a politically powerful group that are well represented in farm lobbies and national agricultural strategies. They have solidified African governments' commitments to support agriculture. They get their land from traditional chiefs or by purchasing land from others, including small-scale farm households. Displaced smallholders, especially young people, tend to move off farms in search of other sources of employment.

We identified four reasons for the recent growth of African medium-scale farms. First, rapid population growth, urbanization, and rising incomes have contributed to massive growth in demand for food in African countries. Africans with the

resources to respond to this demand are doing so. Many Africans with money and resources found farming to be a lucrative investment opportunity, especially during this sustained period of high global food prices since the mid-2000s. Second, policy reforms in the 1990s removed major barriers to private trade and improved the conditions for private investment in African agrifood systems. One example of this was the removal of restrictions on private movement of food commodities across district borders. The effects of these reforms exploded after world food prices suddenly skyrocketed after 2007. They enabled thousands of small-, medium-, and large-scale private firms to respond rapidly to profitable incentives. Third, as land becomes more highly valued in response to growing rural population density and land scarcity, both formal and informal land markets have developed, making it possible for individuals with money and resources to acquire land. Finally, medium-scale "emergent" farmers have become a powerful political force in many African countries with growing influence over government agricultural and land policies.

The rise of the medium-scale farms has raised legitimate concerns as to whether their land acquisitions are marginalizing small-scale farmers. The evidence to date is mixed. Medium-scale farms are clearly providing access to markets and services for nearby smallholder farms. Medium-scale farms have attracted tractor rental providers who now offer mechanization services to smallholders. This allows them to farm their land with much less labor input, freeing up opportunities to work in off-farm pursuits. Large trading firms have established buying depots in areas with a high concentration of medium-scale farms, thereby improving access to output markets for smallholders as well (Sitko et al. 2018). Medium-scale farms also inject cash into the local economy through their expenditures, stimulating off-farm employment opportunities for many rural people who were formerly dependent on subsistence farming (Chamberlin and Jayne 2018). Medium-scale farms have also contributed a significant portion of the additional growth in agricultural output in selected countries where comparable nationally representative data are available.

Implications for ministries of agriculture

A major policy question for African governments and international development partners concerns the future role of smallholder farms in Africa. The dynamic role of medium-scale farms does not divert agricultural ministries from maintaining a commitment to support smallholder farms as a vehicle to accelerate agricultural and economic transformation with poverty reduction. The evidence presented earlier indicates that where competition for land is not intense, new investment in medium-scale farms can attract private sector investments in input and output markets that improve market access conditions and the commercial potential of small-scale farms. There appear to be strong synergies between small and relatively large farms in such areas, and therefore questions of "either/or" might be misplaced.

However, in densely populated areas where small-scale farms predominate and where additional land for area expansion is limited, the priority is clear: focus on promoting the productive potential of small farms, realizing that over time success in this endeavor will lead to progressive movements of individuals and households out of farming and into off-farm jobs as part of the structural transformation process. In short, a successful smallholder-led agricultural strategy will result in a declining share of the labor force in farming.

Are there examples of successful smallholder-led agricultural growth? Ethiopia may come closest to this, having registered 6.2 percent real average annual agricultural production growth from 2000 to 2018 (see the World Bank Development Indicators (last accessed November 2018.) It is largely a smallholder-led growth story, made possible by strong government support for smallholder farming, including improved infrastructure, agricultural research and development, extension support, and diverse farmer support services such as soil testing. Other key ingredients of an effective smallholder-led strategy include a hospitable environment for private sector investment and competition, which might have enabled Ethiopia to progress even faster.

Our view of the role of medium-scale farms is that they should be encouraged to develop under a land tenure policy that does not conflict with land tenure security of indigenous rural people or foreclose area expansion opportunities for small-scale farm households. They appear to be a source of rural dynamism as long as they are not displacing indigenous rural people in the process. Land registration and certification procedures, in sync with customary social norms and institutions, will be needed to provide such protection (Holden et al. 2009; Lawry et al. 2014; Huntington et al. 2018).

Unfortunately, many African governments, sometimes unwittingly, are already making decisions about which scale of farming to promote by their agricultural sector expenditure patterns. Rather than investing in infrastructure, technologies, and extension services that benefit the majority of farmers regardless of size or wealth, many public investments are being captured by the most privileged farmers, mainly medium-scale farmers. For example, in Zambia, about 50 percent of the government's agricultural budget goes to subsidy programs benefiting the most privileged 5 percent of farmers (Jayne et al. 2010). Similarly, government preoccupation with clearing the way for land market transactions, despite extensive rhetoric to the contrary, has focused on trying to create processes whereby large investors can gain access to land.

We conclude with an updated *typology of African farms*, arguing that old perceptions of unimodal smallholder-based agricultural systems are increasingly obsolete.

Group 1: Traditional semisubsistence farm households. These are small-scale farms (up to 5 hectares), primarily in semisubsistence farming, devoting most of their labor to farming because of limited off farm opportunities, low levels of education, and highly constrained productive assets. They remain close to or below the poverty line. Until 1990 or so, this group constituted the vast majority of SSA farm households. They are still the majority in many African countries and their numbers continue to grow, albeit slowly, because the children of these households are rapidly getting out of farming and entering off-farm employment. In areas experiencing sustained economic dynamism, this group will continue to decline as a proportion of the population. This group constitutes 60 to 70 percent of the rural population in most rural household surveys, and in most countries this share has clearly declined over time.

Group 2: Relatively commercialized and productive smallholder farm households. These are small-scale farms (up to 5 hectares), with much greater access to productive assets and therefore higher levels of productivity than Group 1. They are contributing to rural transformation because they have education and entrepreneurial skills that enable them to devote some of their labor time to viable off-farm forms of employment. This allows Group 2 to diversify and increase their incomes, and effectively capitalize their farm operations compared to Group 1. Some are relatively productive and well above the poverty line; some may eventually "step up" to Group 3 below. Off-farm income is an important feature that distinguishes Group 2 from Group 1. This group constitutes 15 to 20 percent of households in rural farm surveys and tends to be rising. Some of them may eventually transition into Group 3.

Group 3: Farmers "stepping up" from small-scale to medium-scale holdings. These are commercialized medium-scale farmers operating 5 to 100 hectares, formerly small-scale farmers who have successfully expanded their operations ("stepping up") and contributed to rural transformation processes. Most of these former small-scale farmers are now operating in the 5- to 20-hectare range, and their sociodemographic characteristics are similar to Group 2. A higher share of this group's children remain in farming because of relatively superior returns compared to Group 1. This group typically constitutes 5 to 10 percent of the rural farm population in rural household surveys and is rising. The purchasing power of groups 2 and 3 are expanding the demand for nonfarm and off-farm goods and services, thereby expanding employment and earnings in the rural nonfarm economy.

Group 4: New entrants "stepping in" to commercialized medium-scale operations. This group includes urban-based and rural people who relied primarily on nonfarm incomes and then diversified into commercialized medium-scale (5- to 100-hectare) farming operations. They generally have the education, connections, and access to finance to be productive farmers and contributors to rural dynamism and transformation. This group constitutes an unknown share of the total number of farm households in Africa because its members tend to be grossly underrepresented in otherwise nationally representative rural household surveys in Africa, as detailed in Section 2. Based on the example of Tanzania, the one country in Africa where this group has been reasonably well captured (in the 2008/09 Tanzanian ASCS), they constitute roughly 5 percent of all farms but hold up to 40 percent of total farmland under cultivation. Their major challenge to expansion is knowledge and trust—finding trusted managers who will effectively manage farm operations on their behalf while they continue to work in the city. This group also contains many retirees who invest in land and return to farming when they have the time to relocate to the rural area and oversee their farm operations. Based on interviews, a relatively large share of these farmers' children are entering farming, inheriting their parents' operations, or using family capital to expand into their own medium- or large-scale farming operations.

Group 5: Large-scale farms operating more than 100 hectares. This group has not been well surveyed in otherwise nationally representative datasets such as the LSMS and General Living Standards surveys, but it includes foreign-controlled farms, descendants of European settler farmers, African elites, and state-supported farm blocks. Their role in African agriculture varies widely across countries based largely on historical and current government policies.

Policy implications for land tenure policies (land ministries)

The available evidence suggests that the wholesale conversion of customary land rights and traditional land administration systems into private, individual, freehold titles administered solely by formal government authorities is unlikely to yield sustainable social and economic outcomes in the near term. Instead, more flexible interventions to document customary land rights and strengthen customary or hybrid government-customary land administration institutions are needed to increase landholders' perceived tenure security and agricultural investment and productivity outcomes. Though direct comparisons of different approaches to strengthening land tenure are complicated by the varying nature of the interventions and institutional arrangements, it is clear that land policies in Africa need to recognize the continued existence of customary land rights and customary land administration institutions to be have sustainable impacts on perceived tenure security and agricultural development.

Where customary land institutions remain relevant, as in most rural contexts in Africa, land policies that either formally recognize the authorities of these institutions (subject to conformity with national policy principles and objectives, for example with respect to strengthening women's rights) or incorporate them into more comprehensive formal land administration institutions are most likely to succeed. For example, Zambia recognizes the authority of customary institutions to manage customary rural land rights, and a number of other land policies in the region have proscribed legal roles for customary leaders in land registration and administration (e.g., Botswana, Côte d'Ivoire, Ghana, Kenya). These policies represent a more "fit for purpose" approach to land administration that seeks to address current land tenure realities, rather than attempting to replace existing customary institutions or introduce onerous technical standards that go beyond what is currently required to secure land rights.

Given the diverse nature of extant customary land tenure systems in Africa and of the threats to tenure security facing different landholders and regions, policies to strengthen tenure security and regulate land transactions in Africa will therefore need to be carefully tailored to the local tenure context and needs of different landholders to affect perceived tenure security and agricultural outcomes. Where land rights derive primarily from community membership, customary tenure systems effectively regulate within-community transactions, and external actors pose the primary threat to land rights, land registration at the community level accompanied by formal recognition of customary tenure institutions may be sufficient to reduce insecurity. However, community rights registration may be expected have more limited impacts on agricultural investment and productivity as compared to registration of rights and transactions on individual farm parcels, as the latter would strengthen the rights of those who invest in productivity-enhancing investments to future yields or rents. Thus, where land rights are already individualized and internal actors pose the greatest tenure security threat, and especially where informal transactions involving outsiders are common, the more costly and time-consuming investment of registering individual land rights and transactions may be needed to secure existing rights and avoid conflicts that are beyond the capacity of customary institutions to manage (Stickler et al. 2018).

Regardless of the institutional form (customary/government/hybrid) and level of land registration (individual/community), experience suggests that land administration systems must adhere to several other principles to positively impact tenure security and rural transformation. First, for land administration systems to be effective in increasing perceived tenure security, all stakeholders—from the most vulnerable landholders to large private investors—must regard them as legitimate. Second, to be sustainable (both fiscally and in terms of their ability to reflect land transactions), land administration must be decentralized to a level that balances user accessibility (and demand for land services) with recurrent administrative costs. This remains an elusive objective for most land administration systems in Africa and calls into question the long-term sustainability of recent land registration interventions. Finally, it is increasingly acknowledged that secure land rights are a necessary but insufficient condition to promote on-farm investment, productivity growth, broader multiplier/growth linkages between on-farm and off-farm development, and rural economic transformation. To accomplish these

broader policy objectives, land administration systems must be linked to complementary institutions and services (Lawry et al. 2014). These include customary and formal dispute resolution mechanisms as well as rural finance, utility services, and agricultural value chains—for example, by linking service provision to recognized land rights and ensuring that land registration beneficiaries have access to agricultural input and output markets.

Implications for national statistical agencies

We do not yet know how generalizable these trends are across the region. However, it is hard to deny that existing population-based data collection platforms are systematically underreporting a dynamic segment of African agriculture: the medium-scale farms. This omission, however understandable, has profound implications. Under the status quo, African governments cannot monitor (much less understand) how farm structure is changing over time. Similarly, policymakers cannot adequately address such routine questions as the magnitude and location of marketed agricultural surplus. These questions are important for guiding strategic policy decisions aimed at stimulating agricultural growth, reducing rural poverty, and managing strategic food reserves and trade policies.

Redressing this informational blind spot will require new modes of data collection and will certainly not be cost-free. We advocate for the expansion of agricultural sample census surveys, as was recently done in Tanzania, to better capture the magnitude, location, and other characteristics of this growth of medium- and large farms that cannot be adequately captured via population-based LSMS-type surveys. We also advocate for the systematic collection of data on non-local land control: for instance, ownership or other usufruct rights over rural agricultural land held by urban or other nonlocally residing households. This will require new approaches to sampling, listing, and enumeration, as well as questionnaire designs that explicitly capture nonlocal holdings.

Priority issues for future research

With better information in place, a number of key research questions become easier to address. For example, how do changing farm size distributions condition the strength and location of farm, off-farm, and nonfarm growth linkage multipliers that influence rural incomes, economic growth, and the pace of rural poverty reduction? A stylized fact from Asia's agricultural development experience is that relatively unconcentrated land distribution patterns may stimulate rural development more effectively than highly concentrated landholding patterns. Smallholders have high marginal propensities to consume and spend their money in the local rural economy, thereby stimulating growth linkages between farm and nonfarm sectors (Mellor 1995). If a few large-scale farmers dominate production and spend their money outside the local rural economy, then local growth multipliers may be weaker than in areas with more egalitarian land distributions (Johnston and Kilby 1975). As shown earlier in this report, urban-based households control a sizeable and rising share of national agricultural land. To the extent that many of these households are medium-scale investor farmers, they may be altering the relationship between the location of agricultural growth and the strength and location of growth multipliers with the nonfarm economy.

There is also countervailing evidence, much of it more recently from Africa, indicating that large farms may attract public and private investments that provide nearby surrounding smallholders with improved access to markets and services (see section 6). A challenge for identifying the spillover effects on smallholder farms is that they may depend on the size, scale, and number of nearby medium and large farms. Accurately identifying these effects may require GPS data on the location of medium and large farms in relation to smallholder households, or other measures of social, informational, and economic connectedness. Smallholder households may be affected differently from their proximity to commercialized farms of 5 to 10 hectares than much larger farms for many reasons, not least because the social-ethnic-familial connections of 5- to 10-hectare farms to smallholder communities may be much stronger than those of many large farms. Given that farmland in most African countries appears to be becoming more concentrated, with a greater share of total cropland under medium-scale farms, the net impact of farmland concentration is hence an important empirical question.

Although the evidence presented in section 5 above indicates that 80 percent or more of the individuals becoming medium-scale farmers are men, we lack information on the barriers constraining women's entry into medium-scale farming. More detailed gendered analyses of changing farm structures in Africa are overdue, ranging from women's participation in

land rental and purchase markets, the factors influencing women's success or lack thereof in negotiating for land with headmen and household leaders, and other modes of acquiring land either for purchase or lease.

Another potentially fruitful research priority is to understand how changes in rural farmland ownership have been affecting private sector investments in agricultural value chains. Recent work has documented how changes in urbanization and consumer incomes are affecting investment in the downstream stages of the food systems (e.g., Tschirley et al. 2015), but downstream food systems dynamics also are being affected by changes in farmland ownership structure and the multiplier effects resulting from such changes (e.g., Burke et al. forthcoming).

Another issue for future research concerns the broader effects of factor market development in Africa on changes in farmland ownership and use. Rural financial markets and financial inclusion are improving in the region; however, are they enabling people with access to these markets to purchase or lease land, invest in irrigation and soil conditioning, and intensify their use of cash inputs such as fertilizers and improved seeds, in ways that alter the distribution of farm sizes and scale? General equilibrium effects are almost certain to be important.

We have just begun to scratch the surface in our understanding of this important new development in Africa. African policymakers will benefit from immediate investment in improved data collection on medium- and large-scale farms as well as in-depth analysis to understand their potentially wide-ranging impacts on African economies.

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