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Youth access to land, migration and employment opportunities: evidence from sub-Saharan Africa

by
F. Kwame Yeboah
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Abstract

This paper examines the intersections between youth access to land, migration decisions and employment opportunities using nationally representative and multi-year data from multiple African countries. We document evidence on the evolving dynamics in land distribution and ownership patterns, the effect of land access on youth livelihood choices and development of rental and sales market in the region. The report highlights six key findings: First, a progressively smaller proportion of young people are inheriting land due to land scarcity. Second, rural youth who do inherit land will need to wait longer to gain access to it because of significantly longer adult life spans. Third, land scarcity has been driving rapid changes in the land ownership and distribution patterns over the past decade and shaping the employment and migration decisions of rural youth. Fourth, the share of individual labour time devoted to farming is declining over time across age categories and gender, signifying that continued economic transformation processes are underway in Africa. Nonetheless, farming still accounts for significant shares of individuals' labour time, particularly between the ages of 15 to 19 years. As young people progress into their 20s and 30s, the share of their work time in farming significantly declines in favour of off-farm employment opportunities. Fifth, access to land is an important determinant of the share of the labour time that young people devote to farming activities and their decision whether to migrate out of their home area. Other factors such as education, age of the household head and number of male or female siblings also significantly influenced youth livelihood choices. Sixth, we find a strong inverse relationship between participation in land rental markets and the age of household head: younger heads are generally more likely to rent in land than older heads, particularly in countries with relatively active rental markets. Overall, the analysis suggests that policy actions promoting access to land and security of tenure will significantly shape young people's engagement in farming and livelihood options. To be successful, such policies will need to recognize and anticipate the impacts of the evolving dynamics in land distribution and ownership trends and develop effective responses that will foster inclusive, competitive and productive agricultural growth. Policies to promote youth access to land and security of tenure are not necessarily intended to keep youth permanently engaged in farming but rather to stimulate dynamic agricultural productivity growth in ways that drive continued economic transformation and diversification.

1. Introduction

Despite rapid economic transformation and urban population growth over the past two decades, the population of sub-Saharan Africa (SSA) remains mostly rural. In fact, Africa is the only region of the world where the rural population, and the number of rural youth in particular, will continue to grow past 2050 (United Nations, 2017). Farming still constitutes a major source of income for the majority of the region's rural people (Davis et al., 2017; Yeboah and Jayne, 2018). Africa's population and labour force is expanding rapidly with an estimated 11 million young Africans entering the labour force each year over the next decade (Filmer and Fox, 2014). Even under the most optimistic scenarios, estimates indicate that less than a quarter of the new entrants into the region's labour force will find wage employment in the formal sector (Losch, 2016). Agriculture and informal enterprises -- which are mostly linked to agriculture through its extensive forward and backward linkages to the rest of the economy in most African countries -- will need to absorb a large share of these young people into remunerative employment to sustain the region's economic transformation process (Yeboah and Jayne, 2018).

Access to land and subsequent security of tenure are fundamental for young Africans to engage in farming and will significantly shape their livelihood options. Contrary to the widespread perception of land abundance, evidence points to rising costs associated with young people's ability to access land in Africa. Rural youth in Africa have traditionally acquired land through inheritance in customary tenure systems. However, allocable land is becoming increasingly scarce in areas of longstanding settlement, as populations continue to grow amidst fixed land resources (Jayne et al., 2014). Competition for land from urban investors is further reducing the scope for continued youth inheritance in many areas (Jayne et al., 2016). Furthermore, average life expectancies are increasing and even where land is still available, many rural youth now have to wait longer to inherit their share of family land (MIJARC/IFAD/FAO, 2012). An increasing proportion of rural youth are obtaining land through rental markets. This is a costly option for cash-constrained youth, which generally limits them to small plots and in turn requires diversification into off-farm activities to ensure an adequate livelihood. Land scarcity is hence changing the way in which young rural Africans acquire land, the cost of doing so, and hence the calculus of remaining in farming or shifting to other off-farm sources of employment. Participation in land and labour markets (which may entail relocation) is the main process by which young Africans respond to these challenges, and hence participation in these factors markets are rising rapidly. In Zambia, a relatively land abundant country, access to land for farming is one of the most important reasons cited by rural youth having migrated between 2000 and 2012 (Chamberlin and Ricker-Gilbert, 2016). Recent evidence underscores that migration in Africa is predominantly rural-to-rural, with the search for land being an important factor (Young, 2013; Garlick et al., 2016).

We also demonstrate the importance of disaggregating the "youth" category into more narrow age and gender segments, because we find that employment patterns follow distinct phases as a young person moves out of their parents' home, becomes independent, and slowly accumulates resources over time. Constrained access to land compels many rural youth to continue living with their parents to remain as unpaid workers on their parent's farms. Somewhat older youth in their mid-20's are more likely to have accumulated some savings and hence move away from their parent's home and either rent their own land or diversify into off-farm employment, which may or may not entail migration out of the area. Somewhat older youth (e.g., in their early thirties) have a higher probability of having accumulated some savings and therefore are more likely to migrate to urban areas where the cost of living is relatively expensive and requires greater savings, or to other rural areas where land markets make it possible to acquire sufficient land for farming and/or non-farm purposes.

Understanding the emerging dynamics of young people's access to land and youth participation in land and labour markets is integral to understanding the nature of economic transformation in Africa and to developing comprehensive strategies to address the employment challenges being faced by the region's youth.

2. Objectives

This report reviews evidence on how the evolving situation with respect to youth access to land is influencing employment opportunities, migration decisions and participation in land and labour markets. We also present fresh evidence on these topics for this specific report. The study's objectives are to:

- Synthesize evidence on land scarcity and changing land distribution patterns in Africa and their influence on youth access to land
- Examine how young people's engagement in farming, off-farm agrifood systems and non-farm employment changes over time, disaggregated by gender and five-year age categories
- Assess the role of land access on youth migration decisions and employment choices
- Assess the importance of land rental markets as a means for young people to gain access to land, the factors influencing their ability to utilize land rental markets, and the impacts on their welfare resulting from participation in land rental markets
- Consider the implications of our findings on policy actions promoting youth access to land and employment opportunities in light of other important economic process underway in the region

3. Data and analytical methods

The analyses in this paper rely primarily on data from multi-year and national population-based household surveys from multiple sources including the Living Standards Measurement Study with its Integrated Surveys of Agriculture (LSMS-ISA),[1] Labor Force Surveys and national agricultural census surveys. These surveys are implemented by the national statistical bureaus of African governments. Each of these data sources had multiple waves of nationally representative data that allows for comparison of relevant variables over time.

The analysis of youth employment structure over time was conducted for six sub-Saharan African countries, namely Ghana, Nigeria, Tanzania, Rwanda, Uganda and Zambia. Specific surveys used are Ghana's Living Standard Survey (2006 and 2013); Nigeria's Living Standard Survey (2004) and General Household Survey (2013); Rwanda's Integrated Household Living Survey (2006 and 2014); Tanzania National Panel Survey (2009 and 2015); Uganda's National Panel Survey (2005 and 2014); and Zambia's Labor Force Surveys (2005, 2012). Country selection was based on availability of comparable data over two or more periods separated by at least five years, and based on regional representation across SSA.

[1] LSMS-ISA surveys are implemented by national statistical offices with technical assistance from the World Bank Economic Research Group. Datasets and survey descriptions for the various countries can be found at http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTLSMS/0,,contentMDK:23617057~pagePK:64168445~piPK:64168309~theSitePK:3358997,00.html

The first line of analysis focuses on understanding the employment structure of the youth labour force. For each country, we examined the levels and changes in youth employment over time in three employment categories: (i) *farming,* including all activities related to crop and livestock production; (ii) *off-farm stages of agrifood systems* (AFS), including pre- and post-farm value-addition activities within agricultural value chains; and (iii) *non-farm sectors,* encompassing all other activities outside the AFS such as construction, finance, utilities etc. We explored youth employment trends both in terms of the total number of jobs as stated by survey respondents, and in terms of *full-time equivalents* (FTE), by weighting the jobs by the total number of hours worked in that job.[2] The FTE approach computes the share of individuals' work time over the 12-month survey year that can be allocated to various work activities. It, therefore, provides an estimate of the relative importance of the three sectors to young people's livelihoods.

This analysis reports on the working-age population (15-64 years) but pays particular attention to the youth population, defined as individuals between ages 15 and 34, following the definition of the African Union. However, unlike previous analyses, which consider youth as a homogenous group, the youth population is disaggregated by gender and five-year age categories (15-19, 20-24, 25-29, 30-34 years of age) and also reports results for the 35-45, 45-54- and 55-64-year reference groups. By disaggregating by age and gender in this way, we can begin to observe life-cycle effects for both men and women. Further, we can better understand the diversity of needs present in the heterogeneous youth population to provide an evidence base for tailored interventions to address youth challenges. It also allows us to see how youth behaviour is influenced post-departure from the parental home.

Second, we explored the extent to which observed employment patterns are being influenced by land access. Previous analyses typically relied on binary dependent variables that code youth employment activities as either farming or non-farm. The reality, however, suggests that many young people do not rely on farming or off-farm employment alone. Rather, they depend on a mix of wage labour, agricultural production and self-employment from informal non-farm microenterprises for their livelihood (The MasterCard Foundation, 2016). Youth engagement in livelihood activities should therefore be explored as a continuum instead of a binary switch from one activity to another. Our analysis breaks new ground by examining the effects of youth access to land on young people's level of engagement in farming as a continuous variable (full-time equivalents, or FTE). To do this, we specified and estimated a fractional probit model using the nationally representative data to examine the effect of access to land on the share of the time young people devote to farming. The model controls for individual characteristics (e.g. age, gender, education), household characteristics (e.g. age of household head) and community-level factors that are known correlates of young people's engagement in farming.

Third, drawing on recent analysis from Tanzania, Kenya and Zambia, we synthesized evidence on the relationship between land access and youth migration decisions.

Lastly, we reviewed evidence of the changing pathways by which young people gain access to land, paying particular attention to the rising importance of land rental markets. We also examined the factors influencing youth participation in rental markets. For this analysis, we calculated nationally representative statistics using data from the most recent rounds of the LSMS-ISA data for Ethiopia, Tanzania, Nigeria, Uganda, Niger and Burkina Faso, as well as the Zambian Rural Agricultural Livelihoods Survey.

[2] A full time equivalent of 40 hours a week, 4 weeks per month for a 12-month year period was assumed as one FTE. The FTE of any one job is thus computed as the actual number of hours worked as a share of this benchmark 1,920-hour work year.

4. Results

4.1 Dynamics in land ownership, distribution and access in Africa

Over the past decade, increasing land scarcity and rising land values has profoundly influenced farm structure, land distribution patterns and young peoples' ability to access land and earn a livelihood in agriculture. This section documents evidence on these dynamic changes, highlighting the shrinking median farm size in the region, the changing farm size distributions resulting from increased national and foreign investment in farmland, the relatively slow pace of growth among small-scale farms, changes in land scarcity and land prices, the rise of land purchase and sale markets, increasing inequality in land ownership, and the various consequences of these developments for the livelihoods of rural youth.

Changing farmland structure/ownership, distribution patterns, and shares of total farm output coming from small-scale vs. medium-scale, vs. large-scale sectors

Farm structure and farmland ownership patterns in SSA are changing. Although farms under 5 hectares still account for about 90 per cent of all farms in SSA, the number of farms between 5 and 100 hectares (hereafter "medium-scale farms") is rising rapidly (Table 1). An increasing portion of agricultural land and national agricultural output is controlled by medium-scale farms owned by an entrepreneurial, educated and relatively capitalized class of African investor farmers (Jayne et al., forthcoming). These investor farmers obtain land through negotiations with customary authorities (often involving monetary exchange) and through more transparent purchases of land in areas where land can legally be purchased (Sitko and Jayne, 2014; Jayne et al., 2016). Recent analysis indicates that medium-scale farms between 5 and 100 hectares control between 30 and 50 per cent of total farmland in Ghana, Kenya, Zambia and Malawi (Jayne et al., 2016). If recent trends continue, farms between 5-100 hectares will account for the majority of farm output and marketed output in many African countries within the next decade. The fastest rise in medium-scale African farmers is occurring in regions with substantial unutilized land. Areas with dense settlements and high land values (Rwanda, parts of Kenya and southern Ghana) are experiencing relatively slow growth in the share of area under medium-scale farms (Jayne et al., forthcoming).

Studies of medium-scale farmers in Kenya, Ghana and Zambia reveal that only about 5 per cent of them were previous smallholder farmers who had successfully graduated into medium-scale farming via farm expansion. About half of these farmers obtained their land later in life, financed by non-farm income. A much greater proportion of medium-scale farmers (60%) were relatively wealthy urban-based people who entered into farming recently after accumulating wealth in non-farm employment. The remaining 35 per cent of medium-scale farmers were influential rural-based people who may have been engaged in farming for many years even though their influence and wealth were derived from non-farming sources (Jayne et al., 2014). Rising concentration of landholdings, as defined by the Gini coefficient, has been documented in many African countries for which data is available (Jayne et al., forthcoming).

The impact of the evolving farm structure on employment remains unclear. While there is considerable speculation that the rise of investor farmers will exacerbate the challenges facing rural youth and convert them into landless informal wage workers, we feel it is premature to make such dire conclusions. Much depends on the rate of agricultural productivity growth, which because of its extensive forward and backward linkages with the rest of the economy, will influence the rate of employment growth in the off-farm sectors. Much of the economic transformation and employment shifts that the region has experienced in recent years is owed to rapid agricultural growth (Christiaensen and Martin, 2018; Yeboah and Jayne, 2018). SSA achieved 4.6 per cent inflation-

adjusted annual mean increases in agricultural growth between 2000 and 2016 (World Bank, 2017), roughly double that of the prior three decades. Because non-farm jobs provide higher returns to labour, on average, than jobs in farming (McMillan et al., 2014), a shift in the composition of the work force from farm to non-farm employment is likely to be associated with improved per capita incomes and other features of economic transformation. In other words, the greater costs that young Africans will incur in acquiring land for farming, while certainly problematic, may not depress rural livelihoods, as long as the economy is creating new off-farm jobs fast enough to absorb those who are exiting farming. This puts a huge priority on policy efforts to sustain the impressive agricultural growth rate that SSA has experienced since the year 2000.

An important question stemming then from the evidence of changing farm structures concerns the productivity differences between small-scale and medium-scale farms. Will the rise of medium-scale farms contribute to African countries' aggregate agricultural growth? Because medium-scale farms constitute the most rapidly growing segment of farms in some African countries, it is clear that they are contributing to agricultural production growth through area expansion. Evidence is emerging showing that medium-scale farms are substantially more productive than farms under 5 hectares (Muyanga & Jayne, 2019). The productivity advantage of relatively large farms stems at least partially from differences in technical choice related to mechanization, which substantially reduces labour input per hectare, and from input use intensity. But because medium-scale farms between 5 and 100 hectares are accounting for a rising share of total cultivated land in many countries, productivity differences between them may determine the pace at which new employment is created through the multiplier effects associated with the rate of agricultural productivity growth. Initial evidence for Tanzania by Chamberlin and Jayne (forthcoming) indicates that the share of district farmland accounted for by medium-scale farms is associated with significantly higher per capita incomes among the rural households residing in the district. Other research findings also point to spill over benefits accruing to small-scale farms in the proximity of medium- or large-scale farms (Sitko et al., 2018; Lay et al., 2018; van der Westhuisen et al., 2018).

Nevertheless, it will be necessary to keep a close eye on how rural youth acquire land as land scarcity intensifies in many parts of the region and as land values continue to rise. Especially if agricultural growth in the region slows for whatever reason, and the rate of job expansion in the off-farm economy slows in response, it will be particularly important to examine whether and how young rural-born Africans are able to acquire land for engagement in agriculture as land inheritance is phased out and land values continue to rise. In relatively densely settled areas experiencing economic stagnation and limited transformation, there is evidence that land constraints have indeed pushed rural people out of farming (Potts, 2006). One of the most effective ways to avoid this outcome would seemingly be to promote sustained agricultural productivity growth to encourage broader employment and income growth processes associated with economic transformation.

Declining farm sizes and the diversification of youth income-earning activities

The distribution of farm sizes is changing across SSA primarily due to rural population growth, the intergenerational subdivision of land, and the rise of African investor farmers. In some areas, median farm size is shrinking while the mean farm size is rising (Jayne et al., 2016). Among smallholder farms specifically, mean farm size in over 20 countries in SSA considered to be land-constrained have declined by about 30-50 per cent since the 1970s (Headey and Jayne, 2014). In Ethiopia, Kenya, Rwanda, Malawi, Mozambique and Zambia, at least 25 per cent of smallholder farms control less than half a hectare and are approaching landlessness (Jayne et al., 2010). Correlated with these trends is a rise in the numbers of rural informal wage workers (Mueller and Chan, 2015). Very small farm sizes constrain farmers' ability to produce surpluses and raise cash for reinvestment into more capital-intensive production processes. Jayne, Mather and Mghenyi (2010), using national data from six East and Southern African countries, revealed that about 40–60 per cent of smallholder farmers remain

either absolute buyers of staple foods or they buy more than they sell over the course of the year. Without huge increases in the value of output per unit land, the continued subdivision of small farms will constrain the profitability of agricultural self-employment and therefore discourage youth from choosing farming as their primary long-term occupation. The main factor that could potentially alter the current trend of youth exit from farming is public policies and investments that raise the productivity and profitability of smallholder agriculture. Even with such investments, however, the multiplier effects from agricultural growth to the rest of the economy will nevertheless accelerate the diversification of the labour force out of farming. As a result, we might anticipate under a positive agricultural growth scenario that a large percentage of rural youth choose to engage in farming as one of multiple income-earning activities, but in many cases not the primary one. In a stagnant agricultural growth scenario, we might anticipate weak multipliers and a slow growth in remunerative off-farm employment opportunities, forcing a greater proportion of rural youth to remain in farming, not by choice, but because of lack of other opportunities. In this scenario, however, constrained access to farmland at reasonable prices could become a flashpoint of youth unrest.

Land degradation impeding agricultural labour productivity and youth interest in farming

Since the 1960s, agricultural production growth in SSA has occurred primarily through area expansion (Evenson and Gollin, 2003). Yield growth contributed less than 25 per cent of SSA's total agricultural production growth between 1981 and 2015 (FAOSTAT, 2017), but rising population densities in many parts of Africa are making continued reliance on area expansion untenable for millions of African farmers. The land frontier has already been reached in many smallholder areas, causing farms to become subdivided, fragmented and increasingly small. Smallholders have responded to shrinking farm sizes by more continuously cropping their fields every year, mainly to their priority staple foods. Fallows have largely disappeared in densely populated areas, and for the overall SSA region, fallowed land as a proportion of total farmland has declined steadily from 40 per cent in 1960 to 15 per cent in 2011 (Fuglie and Rada, 2013). It will be harder to sustain production growth on existing smallholder farms through area expansion, putting more pressure on African farming systems to raise yields and the value of farm output per hectare and per labour unit.

The challenge of achieving sustainable yield growth in SSA in the face of rising land scarcity is further complicated by mounting evidence of yield-depressing soil degradation arising from unsustainable intensification in SSA's densely populated areas (Montpellier Panel, 2014; Tittonell and Giller, 2013; Barbier and Hochard, 2012; Drechsel et al., 2001; Stoorvogel and Smaling, 1990). A 2014 report by the Montpellier Panel indicates that about 65 per cent of arable land in SSA is already degraded, costing more than 180 million smallholder farmers about US$68 million of lost income annually (Montpellier Panel, 2014). The percentage of rural Africans residing on degrading land has risen from 18 per cent in 2000 to almost 26 per cent in 2010 (Sitko and Jayne, 2018).

Continuous cultivation of existing plots would not pose problems for sustainable intensification if farmers were able to maintain or improve soil quality over time through sufficient use of fertilizers, soil amendment practices and other land-augmenting investments. However, there is growing evidence of a significant relationship between population pressure, reduced fallow periods and land degradation, pointing to an unsustainable dynamic between population, agriculture and the natural resource base (Drechsel et al., 2001; Lal, 2011). Loss of soil organic matter and acidification pose special problems, both because they cannot be ameliorated by the application of conventional fertilizers and because they tend to depress the efficiency of inorganic fertilizer in contributing to crop output. Consequently, smallholder farmers cultivating depleted soils that are unresponsive to inorganic fertilizer are unable to benefit from yield gains offered by plant genetic improvements (Giller, Rowe, de Ridder, & van Keulen, 2006; Tittonell et al., 2007).

Given United Nations projections that rural SSA will contain 52 per cent more people in 2050 than it did in 2017, the challenge of helping millions of African smallholders to raise the productivity of their existing farmland in sustainable ways seems like an urgent priority. As most arable land is already under cultivation, future output growth must come from productivity gains on existing farmland, which will require African policymakers to fund and implement a more holistic approach to sustainable agricultural intensification and land management (Powlson et al., 2011). Because young people between 15-34 years of age account for slightly over half of the farming population in SSA (Yeboah and Jayne, 2018), efforts to address and introduce sustainable intensification and land management practices will be the foundation of an integrated agricultural productivity and youth livelihoods strategy for rural Africa.

Rising land prices and development of land markets in areas of favourable market access

Despite the widespread perception of land abundance in Africa, evidence shows a growing land scarcity in much of the region. About 91 per cent of Africa's remaining arable land is concentrated in nine countries (including the Democratic Republic of the Congo, Angola and Sudan), most of which are politically fragile states. The remaining 45 countries are either land constrained or approaching the full extent of their arable land area (Chamberlin, Jayne and Headey, 2014). Rising land scarcity coupled with increased interest in land from both foreign and local investors is fostering the development of land sales and rental markets in some parts of Africa (Holden, Otsuka, and Place, 2009).

However, because of risks associated with renting out land (especially when land tenure is insecure), emerging evidence suggests that the demand for rented land greatly exceeds the willingness of individuals to rent out their land, resulting in an unmet demand for rented land (Chamberlin and Ricker-Gilbert, 2016). Consequently, land prices and rental rates are rising rapidly, particularly in areas of high agro-ecological potential with favourable access to the market (Wineman and Jayne, 2018; Kopper, 2018). This broad trend is exemplified in Figure 1, which shows a remarkable rise in land prices over the past decade in Tanzania, Malawi and Ethiopia. In Tanzania, for instance, real land prices rose significantly between 2009 and 2013 by 5.67 per cent per year, driven largely by improved incentives for farming, urbanization and rising population density, and improved tenure security (Wineman and Jayne, 2018).

Rising land scarcity and values is also creating new stresses on the ability of customary tenure systems to protect small-scale farmers' land from encroachment or appropriation. Growing evidence suggest a weakening or breakdown of customary tenure systems, which are typically designed to hold land in reserve for current and future generations. Sitko and Chamberlin (2016) report that the share of Zambia's land under customary tenure has declined from 94 per cent at independence to at most 54 per cent in 2015. Malawi has experienced similar declines, from 87 per cent at independence to an estimated 60 per cent in 2016 (Anseeuw et al., 2016). To the extent that a willingness to pay mode of land acquisition becomes widespread, the prospects of current and future generations of rural youth, born in customary tenure areas to access land through inheritance, will diminish. This will compel many young people born in rural areas to migrate to seek work elsewhere.

Land markets may offer an important avenue for land-poor and labour-rich rural youth to access land (Jin and Jayne, 2013; Deininger et al., 2016; Chamberlin and Ricker-Gilbert, 2016). Evidence presented in more detail later (see Section 4.4) shows that young people are significantly more likely to utilize land rental markets to rent land than older people. Because renting land is relatively cheap compared to buying land, land rental markets are a rapidly growing option by which young Africans are acquiring land. However, because of insecure tenure arrangements, young people may not be able to rent land for more than a season or two and therefore may have limited incentives to make long-term productivity-enhancing investments on rented land (Yamano; Otsuka). This calls for consideration of

improved land tenure security arrangement to give owners an incentive to engage in multi-year lease arrangements.

Land purchase/sales markets are also growing rapidly, but most rural youth lack the financial resources to participate as buyers in these markets. A growing concern, therefore, is that land sales markets and the alienation of land from customary tenure systems (through title conversion) may tend to improve relatively wealthy investors' access to land at the expense of the rural youth. More evidence is required on this topic.

4.2 Land access and youth employment choices

In rural communities, land is widely recognized as an important factor of production, a form of security and collateral to access credit, and as a means to upgrade one's social status.

In recent years, a few studies have examined the role of land access on rural young people's livelihood choices (Bezu and Holden, 2014; Kosec et. al., 2017; Mdoe et al., forthcoming). Evidence from Ethiopia reveals that expected land inheritance was inversely associated with the likelihood of long-distance permanent migration and employment in non-farm sectors (Kosec et al., 2018). Similarly, Bezu and Holden (2014), Mdoe et al. (forthcoming) and Muyanga and Jayne (forthcoming) show that the availability of land through inheritance, as well as the productivity or fertility of that land, significantly increases the intention of youth to remain engaged in agriculture.

These analyses typically rely on binary dependent variables that code youth employment activities as either farming or non-farm. However, many young people do not rely on farming or off-farm employment alone. Rather, they depend on a mix of wage labour, agricultural production and self-employment from informal non-farm microenterprises for their livelihood (The MasterCard Foundation, 2016). Youth engagement in livelihood activities should therefore be explored as a continuum instead of a binary switch from one activity to another. From this understanding, we build on previous studies by examining the effect of access to land on the extent of engagement in farming, with particular emphasis of young people. First, we explored the evolving dynamics in the structure of employment among the youth population to understand the levels and changes in youth employment opportunities over time. The analysis disaggregates the youth population by gender and age in 5-year intervals. Second, we examined how land access is contributing to the observed employment patterns. Specifically, we analyzed the effects of access to land on young people's level of engagement in farming, controlling for individual (e.g. age, gender, education), household characteristics (number of siblings, landholdings) and community level factors (market access). Unlike previous studies, we employed a continuous dependent variable in the form of the share of an individual's total work time (full time equivalent, (FTE)) that is devoted to farming.

Structure of youth employment

Figure 2 presents the proportion of total FTE devoted to farming, off-farm agrifood system and non-farm sectors outside the agrifood system disaggregated by age cohort and gender for rural and urban populations using the latest available nationally representative data for six African countries. It is noteworthy that the employment share of farming in terms of FTEs is almost always lower than that based on total job numbers. In Ghana for instance, farming accounts for about 74 per cent of the total number of jobs in terms of counts for males in the youngest age cohort (15-19) but only 65 per cent of total number of FTE jobs in 2013. The relatively low share of farming in FTE terms reflects the seasonal nature of farming in these economies. Due to the dominance of rain-fed agriculture, most people do not work as farmers year-round. In fact, farming is estimated to take up about 500-1,000 hours per year, whereas most jobs in the off-farm sectors entail more than 2,000 hours per year (McCullough, 2015). Hence, in any given year, farming's employment declines when weighted by the

amount of time allocated to it during the year. Correspondingly, FTE-based employment shares in the off-farm sectors are relatively high. Nevertheless, the employment trends based on FTEs are remarkably similar to that based on total job numbers.

A salient observation from the figure is the high levels of engagement in farming among the youth population. In all countries, economically active young people in the youth age brackets (15-19 and 20-24) are associated with the highest levels of engagement in farming. In the aggregate, between 54 per cent of total work time among males in the 15-19 age cohort in Zambia and 83 per cent in Tanzania is devoted to farming. Likewise, farming's share of total FTE among females in 15-19 age cohort ranges from about 43 per cent in Ghana to about 75 per cent in Uganda. In rural areas, over 80 per cent of total labour time for this age cohort is devoted to farming in most countries (Figure 2a). Individuals in the lower age bracket of the youth population (15-19, 20-24) tend to be more dependent on their parents' decisions and preferences. Hence, the high levels of farming engagement among the youngest age cohort perhaps reflect their contribution to parents' agricultural activities. It could also be explained by farming's low entry barriers (particularly on family farms) and the lack of alternative employment options for this age cohort, who typically lack the required skills, experience and network to secure off-farm employment (McCullough, 2017; Filmer and Fox, 2014).

As young people leave home or school and integrate more fully in the labour force, they reduce their engagement in farming. This pattern is apparent in the declines in the share of total work time in farming and an increased engagement in both non-farm and off-farm agrifood system jobs as youth move into young adulthood (25-29 and 30-34 years). For both males and females, farming's share of total work time is lowest among individuals in the 25-29 and the 30-34 age brackets. Nevertheless, farming remains an important source of employment for both males and females across all age groups. From the latest available surveys, farming's employment share ranges from about 42 per cent (Ghana) to 51 per cent (Rwanda) of FTE jobs for men and from 31 per cent (Nigeria) to 72 per cent (Rwanda) for females. As expected, these shares are higher for rural populations, where between 53 per cent in total FTE employment in Nigeria and 76 per cent in Zambia are still in farming (Figure 2b). The non-farm sector outside the agrifood system accounts for the second largest share of total employment and is particularly important for males. In most countries, the non-farm sector has surpassed farming as the dominant employment sector for males between ages 25-45 years and is the largest source of employment for urban dwellers across all age categories (Figure 2b). Current shares of employment in the off-farm segment of the agrifood system are typically below that of farming and the non-farm sector, particularly for males across all age groups. In rural areas, the share of total FTE employment in the off-farm segment of the agrifood system is below 10 per cent in all the countries, except for Ghana and Nigeria (Figure 2a). For the urban population, the sector's share of total FTE jobs ranges from 14 per cent in Zambia to 26 per cent in Nigeria (Figure 2b). Farming will therefore remain an important source of employment for young people at least over the next decade.

There are some gender differences in employment patterns across the age groups. The off-farm sector within the agrifood system seems to be a more important source of jobs for females than males. In most countries, the share of female's worktime devoted to employment activities within the off-farm segment of the agrifood system is greater than that of males at all age levels. As young males mature in age, their engagement in farming reduces with a corresponding increase in the share of non-farm employment. Conversely, females appear to rely on employment activities in both off-farm segment of the agrifood system and non-farm employment at relatively equal rates even as they grow into adulthood. This observed pattern could be explained by the cultural norms that typically assign responsibilities for food preparation and handling to females.

Moreover, conventional wisdom indicates that women perform the bulk of agricultural activity in farming. This wisdom coupled with evidence of gender differences in agricultural productivity has generated interest in raising agricultural productivity among African women as pathways to achieving

agricultural growth objectives. The analysis provides mixed support for this conventional wisdom, identifying some heterogeneity across countries in the level of engagement in farming between males and females. Generally, for the countries in East and Southern Africa, females devote more of their FTE time to farming than men. This conclusion comes out more clearly when examining employment using the FTE approach, which is arguably more accurate than just primary employment or counts of jobs. In Tanzania, Rwanda, Uganda and Zambia, the share of total labour time in own farm production is higher among females than males across all age categories. Indeed, farming accounts for the largest share of total FTE employment among females in these countries at all age groups (Figure 2). This is, however, not the case for the countries in West Africa (Ghana and Nigeria) where female shares of total labour time in own farm production is lower than that of men at all age categories. These important regional differences suggest a need to resist generalizations about Africa as a whole and that nuanced country-specific policy approaches for improving youth livelihoods may be needed.

Land access and youth engagement in farming

To what extent is young people's access to land shaping their livelihood choices? Drawing on nationally representative panel data from Tanzania, we estimated a fractional probit model to examine the effects of access to land on the share of total work time people devote to farming activities. We used a control function approach to address potential endogeneity in the household landholding variable. First stage regression involved regressing household landholding on factors that are likely to influence household land sizes. These include the location of the land from infrastructural facilities such as roads, major market centres, population density and other geographical characteristics (e.g. soil type, climatic conditions) of the village where most of the land is located. The second stage model then controls for other individual, household and community covariates including age and educational attainment of the individual, age of household head, marital status of household head and geographical variables. The landholding size controlled by the household is used as a proxy for access to land. We included three educational attainment dummies for individuals having completed primary education, completed secondary education and completed tertiary education. The omitted reference category for education is individuals with less than primary education. We ran separate models for youth (15-24 years), young adults (25-34 years) and a combined model for both groups.

Table 2 present the estimated marginal effects of each variable on the share of total work time devoted to farming for the three groups. We highlight two main findings. First, access to land is determined to be an important factor influencing the share of time that young people devote to farming activities. Across the two age categories, we found a significant positive relationship between the total amount of land that households control and the share of a person's total work time in farming, after controlling for all other factors. The magnitude of the effect is generally higher among the youth population than the young adults. Indeed, a one hectare increase in household's landholdings was found to be significantly associated with about 20 per cent increase in the share of total time that youth devote to farming. This compares to a 13 and 16 per cent increase among young adults and the combined youth and young adult population respectively. Notably, the two age categories span the period when young people typically leave their parent's houses, start their own families, and decide on career paths and livelihood strategies. The finding that access to land significantly determines how young people allocate their time between farming and the off-farm activities is, therefore, unsurprising and consistent with the findings of previous studies (Kosec et. al., 2018; Bezu and Holden, 2014). The results also offer some insights into how land concentration may be influencing the work time devoted to farming. Generally, communities with increased concentration of land in the 5-10 hectare holdings were associated with an increased level of engagement in farming activities for young people.

Second, educational attainment was identified as an important determinant in an individual's level of engagement in farming. Increased educational attainment is significantly associated with lower shares of engagement in farming across all age categories. The magnitude of the effect of education also

increases as individuals acquire more education. For instance, the share of work time in farming among the youth population that have completed secondary and post-secondary education declines by over 100 per cent compared to those who have no significant formal education. Formal education is the principal medium through which foundational skills such as numeracy, cognitive and literacy skills required for formal employment are acquired. Increased educational attainment therefore enhances their prospects of securing off-farm employment opportunities. Furthermore, educational attainment also raises peoples' aspirations. In developing and agrarian societies where farming is associated with lower social status, young people are socialized to have career aspirations beyond farming, and education is often regarded as the pathway out of the farming. Consequently, even in areas where off-farm employment opportunities may be lacking, individuals that have received higher levels of formal education may find off-farm employment more attractive than engagement in farming activities. These dynamics possibly explain education's relationship with an individual's level of engagement in farming.

4.3 Land access and youth migration

This section reviews the rapidly growing literature on the causes and consequences of youth migration (e.g. Davis, et al., 2017; Beegle et al., 2011; Wineman & Jayne, 2018; Chamberlain, et al., forthcoming). Population pressure is reducing land availability to youths, and by extension, reducing their potential for long-term occupations in own farm production (Jayne et al., 2014; Muyanga and Jayne, 2014). While some studies argue that agricultural intensification may delay youth's decision to get out of farming (e.g. Ali and Deininger, 2015; Carletto, Savastano and Zezza, 2013; Sheahan and Barrett, 2014), other studies indicate that after population density exceeds a certain threshold, continued increases in density contribute to unsustainable forms of agricultural intensification (Muyanga & Jayne, 2014; Ricker-Gilbert et al., 2014; Josephson, et al., 2014). Agricultural intensification tends to rise with population density up to about 600 persons per square kilometre, beyond this threshold, rising population density is associated with sharp declines in agricultural intensification and productivity. Unsustainable agricultural intensification is likely to be a major factor influencing youth decisions against staying in agriculture.

To conceptualize youth migration, we build on the livelihoods diversification framework (Bezu and Holden, 2014). According to this framework, youth strive to maintain or advance their current welfare by expanding on their existing activities or by moving out of their current activities like farming into non-farm employment. There are two broad categories of factors associated with the movement from farm to non-farm employment, namely, *push* and *pull* factors.

Push factors are associated with poor performance of agriculture. This include factors such as shortage of cultivable land due to mounting population densities, degraded land associated with continuous farming without fallowing, unfavourable weather conditions, and low use of improved agricultural technologies. Persons with limited or no access to land are more predisposed to migration out of distress and so are individuals in low agricultural productivity areas. Secure access to quality land is fundamental for young Africans to engage in successful farming. The primary mechanism through which many young Africans access land is through inheritance. However, high population pressure in Africa and increased life expectancy, and land sub-divisions and degradation associated with these two factors is restricting land availability to youth through this channel. While waiting for land inheritance, young Africans may work on the family land for little or no remuneration. However, as they mature and start families, they may be induced to migrate in search of other livelihood options away from farming.

The pull factors emerge as a result of returns to labour and capital differences in farm and non-farm employment. The higher the earnings in the non-farm employment the more attractive the employment

in the non-farm sector. The pull migration to a great extent entails investment in education and requisite skills needed in the non-farm employment.

For the remaining part of this section, we synthesize findings from most recent studies on youth migration and especially how access to agricultural land influences young people's decisions to migrate in SSA.

Bezu and Holden (2014) examined the relationship between land access, measured as the ratio between farm size and children of the household head, and migration out of agriculture and non-farm employment in southern Ethiopia. Their results show a negative relationship between farm size and off-farm employment, but weaker evidence of a land effect on youth migration.

Another study from Ethiopia examined the effect of land inheritance on youth migration and employment decisions in rural Ethiopia using household fixed effects model on panel data from 2010 and 2014 (Kosec et al., 2016). The exogenous variation in the timing of land redistributions allowed them to overcome the potential endogeneity in the household decisions about how much land to bequeath to descendants. They found that expected land inheritances significantly lower the likelihood of youth to engage in long-distance permanent migration and permanent migration to urban areas. Land inheritance also increase youth's likelihood of employment in the agricultural sector. They also found that land inheritance significantly determines youth's decision to engage in rural-to-urban permanent migration and to seek non-agricultural sector employment in areas with less vibrant land markets and in remote areas.

In Tanzania, Mdoe et al. (forthcoming) categorized factors influencing youth's decision to migrate into three levels: (1) individual, (2) family and (3) community level characteristics. Youth is defined as individuals aged 15 to 30 years. At the individual level, probit model results indicate that the age and education attainment of the youth are important factors influencing their decision to migrate. Youth migration declines with age and increases with higher education level. For example, youths with post-secondary education attainment are 37 per cent more likely to migrate. Analysis by gender shows that males are less likely to migrate than female as age increases. This could be attributed to marriage and limited land access due to patrilineal systems of land inheritance common among many communities in rural Tanzania. Female youth with post-secondary education are 47 per cent more likely to migrate out of their rural homes.

In Kenya, Muyanga et al. (2014) used a control function approach in modeling the effect of land access on youth migration because of the perceived endogeneity of land variable. Two indicators of land access were used, namely, land owned or controlled by the youth, and land owned and controlled by the family. While most of the finding from this study were consistent with those from Tanzania, the results from Kenya showed that land access by the youth is more important than family land access. What influences youth's decision to migrate is the land that they control and not the overall family land. Also, in a recent analysis using panel data from Tanzania, Muyanga et al. (forthcoming) found the concentration of land in 5-10 hectare holdings to be associated with increased likelihood of migration among youth (15-24), young adults (25-34) and youth and young adults (combined).

At the household level, the study shows that youth are more likely to migrate out of rural areas if their parents' landholding size is small, and if the household head had many siblings. If the household land increases by one hectare, the probability of youth migration in that household reduces by about one per cent. The number of brothers and sisters of the household head is positively related to youth out-migration. For each additional brother or sister the household head has, youth migration in the household increases by about two per cent. Analysis by gender shows that the number of siblings to the household head only affects young male's migration and not female's. One possible explanation of this finding is that the number of siblings, and especially brothers, determined the amount of land

inheritance. Household heads with fewer siblings were more likely to inherit relatively more land from their parents compared to their counterparts from families with many children.

In Kenya, the number of active household members (aged 15 and 55) in the family was found to increase the probability of the youth migration. An increase in the number of active members by one person increases youth's probability of migration in that household by about 0.05. Youths from female headed households are more likely to migrate (Muyanga et al., forthcoming).

Mdoe et al. also found that livestock and tractor ownership have a significant positive influence on youth migration. The probability of youth to move out of their rural homes increases with the number of livestock units owned. With regard to tractor ownership, the results indicate that the probability of youth to migrate increases by 54 per cent if the family owns a tractor. This finding is in line with the labour substitution hypothesis that individuals living in a household that uses labour-saving technologies are most likely to migrate. Tractor use (mechanization) decreases manual labour, consequently freeing youths from agriculture.

At the community level, land and labour productivity, as measured by the village net value of crop output per hectare planted and per resident adult, respectively, are negatively related to the probability of youth out-migration in Tanzania and Kenya. For example, in Tanzania, the probability of youth migration decreases by about four and 14 per cent if land and labour productivity, respectively, increases by one million Tanzania Shillings (US$450) per hectare planted. Other community level variables found to influence youth migration in Tanzania are distance from the farm to a motorable road, annual precipitation and population density of the area where the household is located. Long distances to motorable roads, used as a measure of market access and remoteness, increase youth migration. Areas characterized by high population densities and those with low precipitation have lower youth migration rates. In Kenya, increased village wage rate significantly reduces youth's probability of migrating while increase in land rental rates increase it (Muyanga et al., forthcoming).

4.4 Youth participation in rural factor markets

Increasing life expectancies across the continent imply that many young people are waiting longer to inherit land. Moreover, a declining proportion of young people inherit land, and those who do tend to inherit smaller parcels than in prior generations and later in their lives. In short, there is mounting evidence that the modalities (and costs) of acquiring land are changing in much of Africa and that this is inducing important changes in youth behaviour in land and labour markets, with important implications for economic transformation (Jayne et al., 2014b; Jayne et al., forthcoming).

At the same time, other factors are contributing to increasing land access constraints: high and rising population densities, increasing scarcity of land, and higher land prices resulting from land acquisitions by national and foreign investors. The proportion of rural youth inheriting land is declining at least in some countries, the quantity of land inherited is declining, and youth are needing to wait longer before they inherit land because of substantially longer life expectancies in rural Africa (Jayne et al., 2014). As a consequence, land rental markets are becoming increasingly important avenues for starting out in farming by young people. In this section, we explore the various pathways through which young people gain access to land, paying particular attention to the importance of land rental markets, and the factors influencing their participation.

Table 3 shows recent statistics on rural land rental market participation in the region, drawing on nationally representative rural household survey data from seven countries. These data are largely in line with Deininger et al.'s (2017) study, although we use more recent data. The overall rate of rental market participation varies considerably across countries, with rates of renting in (defined at the household level) ranging between 5-50 per cent of all rural households. Participation on the landlord

side is much smaller, generally in the 1-5 per cent range, with the exception of Ethiopia, which has very high observed rates of renting out (~15%). This asymmetry is a regular feature of empirical studies (e.g. Deininger et al., 2017, Chamberlin and Ricker-Gilbert, 2016), and has been speculated to be attributable to under-representation of landlords in survey samples (possibly because they are less likely to be locally resident and thus show up in sampling frames), reluctant to admit renting out in customary tenure systems, or some combination thereof.

A striking feature of this table is the strong correspondence of rental participation with age of household head: younger heads are generally more likely to rent in land than older heads, although this trend is more pronounced in those countries with high rental market activity: Tanzania, Ethiopia and Uganda. Similarly, measures of rental intensity – i.e. the average share of land rented in by tenants, and the share of tenants who rent in 90 per cent or more of their farmland – are strongest for young household heads in those countries where rental activity is highest.

Because the groupings in Table 6 are coarse aggregations, we also calculate continuously varying measures of unconditional associations between rental market participation and age of household head. These are shown in Figure 3, for which panels a, b and c show bivariate relationships for Tanzania, Ethiopia and Uganda, respectively. The overall story that emerges from these figures is one of relatively pronounced age-dependent participation, where younger heads are more engaged in (and reliant on) rental markets for their own agricultural production. These bivariate graphs are less pronounced for Niger, Burkina Faso and Nigeria, which have generally lower overall rates of market activity. The takeaway is that while rental markets are still in the early stages of development in many parts of the continent, once they develop beyond incipient stages, they become an important avenue through which young households acquire land for farming.

Conceptually, we might be particularly interested in clarifying the role of land rental markets in facilitating entry into farming by households that are just starting out. In other words, we would like to know the role of land rental markets in facilitating the farm household formation process. Unfortunately, we do not observe this information explicitly in any of our datasets. However, for some of the LSMS-ISA datasets, individuals who appeared in sample households in the first wave, but who moved away at the time of subsequent rounds of data collection, were tracked to their new households, which were incorporated into the sample as “breakaway” households. While we do not know how systematic this tracking was, at least some (and possibly the majority) of these breakaway households are newly formed households. To investigate the role that rental markets might play for these households, we calculated the same measures of participation by head age group as well as breakaway status in Table 4, for Tanzania. We generally observed that rental market participation is more intense for these breakaway households, providing partial evidence of the role of rental markets as a facilitator of new household formation in land scarce rural areas.

Staying with the cases of Tanzania, Uganda, Niger and Nigeria, we model the determinants of renting in land, using the first three rounds of the LSMS-ISA data. Results, shown in Table 5, indicate that even after controlling for pre-rental land ownership, local population density, access to markets and other factors, the probability of renting land is significantly negatively related to the age of the household head

5. Conclusions and implications

SSA has the world’s youngest and fastest growing population. By 2050, the number of people living in the region is expected to double and the subcontinent’s share of the global population is projected to rise to about 23 per cent (from 12 per cent in 2015). Sub-Saharan Africa’s labour force is also expanding at a rate of 3 per cent per year and an additional 375 million young people are expected to reach working age by 2035. If they can be engaged in productive employment, this growing cohort of

young people will offer an important opportunity for economic transformation. Yet, employment creation in the formal economy has not kept pace. Even under the most favourable projections, only about a quarter of the people newly entering the labour force will find wage employment in the formal economy. Agriculture and the informal economy (most of which has important forward and backward linkages with agriculture) will need to absorb a large share of these new workers into remunerative work, otherwise the region will experience escalating economic, social and political challenges associated with youth unemployment.

At the same time, rapid population and income growth are expanding the demand for food and agricultural products in the region, opening up substantial opportunities for employment not only in agricultural production but also across agrifood systems. Africa's agricultural production systems, however, have not kept up; an increasing share of the food being consumed in Africa is supplied through imports. Between 2001 and 2014, the sub-continent's food import bill rose from US$6 billion to US$45 billion. Africa's rapid population and labour force growth combined with its import parity pricing conditions for many food products offer enormous potential for economic growth and employment creation in agrifood systems if competitive domestic agricultural production can be expanded.

Other factors are at play, however, that may slow the rate of employment creation, unless steps are taken proactively to address them. Climate change and rapid population growth portend increasingly acute water scarcity, outbreaks of new pests and diseases, and greater variability of temperatures and rainfall. The continent also faces growing land scarcity and degradation resulting from population pressures. Median farm sizes are shrinking to levels that generate little or no surplus production in many countries due to inter-generational subdivision of land and greater competition for unutilized arable land. Many smallholders are left with small plots that are degrading due to continuous cultivation without sufficient integrated soil fertility management. Population pressures are also driving up land prices in the region, making it more costly for young people to acquire land. To effectively harness the emerging opportunities for economic transformation and associated work opportunities, policymakers will need to anticipate the trends affecting African agriculture and proactively formulate and implement strategies to respond to them.

Over the past 15 years, African governments that have effectively promoted farm productivity growth (Ethiopia, Rwanda) have enjoyed faster poverty reduction, higher labour productivity in non-farm segments of the economy, and a more rapid diversification of the labour force from farming into the broader economy (Yeboah and Jayne, 2018). Since a large proportion of young Africans remain engaged in agricultural work, agriculture will continue to influence employment and livelihood opportunities both in agrifood systems and broader non-farm sectors. A comprehensive agricultural growth strategy that promotes competitive and efficient production and marketing systems may therefore be the foundation of an effective youth employment strategy for most African governments.

There is an important balance to be struck while transforming agriculture in the region. In the long term, a successful economic transformation in Africa is likely to shift low-productivity workers progressively out of agriculture and into higher-productivity jobs in the non-farm sector, as has been the case in most other regions of the world. Inclusive agricultural growth will support a stable and effective economic transition. Since a large proportion of the workforce in most African countries remain engaged in agriculture, agricultural development strategies that enable millions of smallholder households to participate in and benefit from these strategies will result in stronger multiplier and growth linkage effects that will expand job opportunities in the rest of the economy. Evidence from Asia shows that broad-based agricultural growth tends to generate stronger income and employment multiplier effects that pull labour out of agriculture into more attractive non-farm jobs, and do so more effectively than when agricultural growth is concentrated among a small number of large farms (Johnston and Kilby, 1975; Lipton, 2006). Agricultural productivity growth is therefore crucial not only to improve the livelihoods of people who remain fully or partially engaged in agriculture but also to

expand the pace of employment and income growth in the off-farm segments of the economy, including at various other stages in agrifood systems, and promote economic transformation.

It is in this context that we consider how growing land scarcity, rising land values and changing farmland ownership patterns are influencing young Africans' engagement in farming and their ability to contribute to sustainable agricultural productivity growth. Our report highlights six main findings:

First, a progressively smaller proportion of young Africans are inheriting land due to land scarcity (Jayne et al., 2014). An increasing proportion of young Africans are acquiring land for farming through rental markets and through relocation to another rural area.

Second, rural youth who do inherit land will need to wait longer to gain access to it because of significantly longer adult life spans. Not including South Africa, mean life spans in SSA have increased from 48 years in 1980 to 60 years in 2016 (World Bank, 2016) Buoyed by improvements in health systems and general wellbeing of the populace, life expectancy in a number of African countries has risen, with an estimated growth of about 20 to 42 per cent since the year 2000 (Johnson, 2016).

Third, land scarcity has driven rapid changes in land ownership and distribution patterns over the past decade and is shaping the employment and migration decisions of rural youth. Evidence from nationally representative data points to a shrinking median farm size in the region, changing farm size distribution resulting from increased national and foreign investment in farmland, the relatively slow pace of growth among small-scale farms, rising land prices and associated development of land purchase and sale markets, and increasing inequality in land ownership patterns. These dynamics are already weakening customary land tenure systems and diminishing the prospects of rural youth accessing land through inheritance. The effects of changing land ownership and distribution patterns on youth employment decisions are complex and general equilibrium effects may predominate. The rise of medium- and large-scale farms in the region may be exacerbating youth access to land in some cases and providing expanded job opportunities in other cases deriving from the agricultural growth multipliers and spill over benefits in other cases (Deininger and Xia, 2016; Lay et al., 2018; Chamberlin and Jayne, forthcoming). Further research in this area is needed to clearly understand how youth livelihoods are being affected by changes in farm size distributions.

Fourth, the share of individual labour time devoted to farming is declining over time across age categories and gender, signifying that continued economic transformation processes are underway in Africa. Nonetheless, farming still generally accounts for a significant share of individuals' labour time. Farming share of total labour time is particularly high among economically active young people aged between 15 and 19. Over half of the total labour time for males and females in the 15-19 age-bracket is devoted to farming activities. As young people progress into their 20s and 30s, the share of their work time in farming significantly declines in favour of off-farm employment opportunities. The probability of re-engaging in farm or increasing the share of one's labour time in farming, rises again in middle-age.

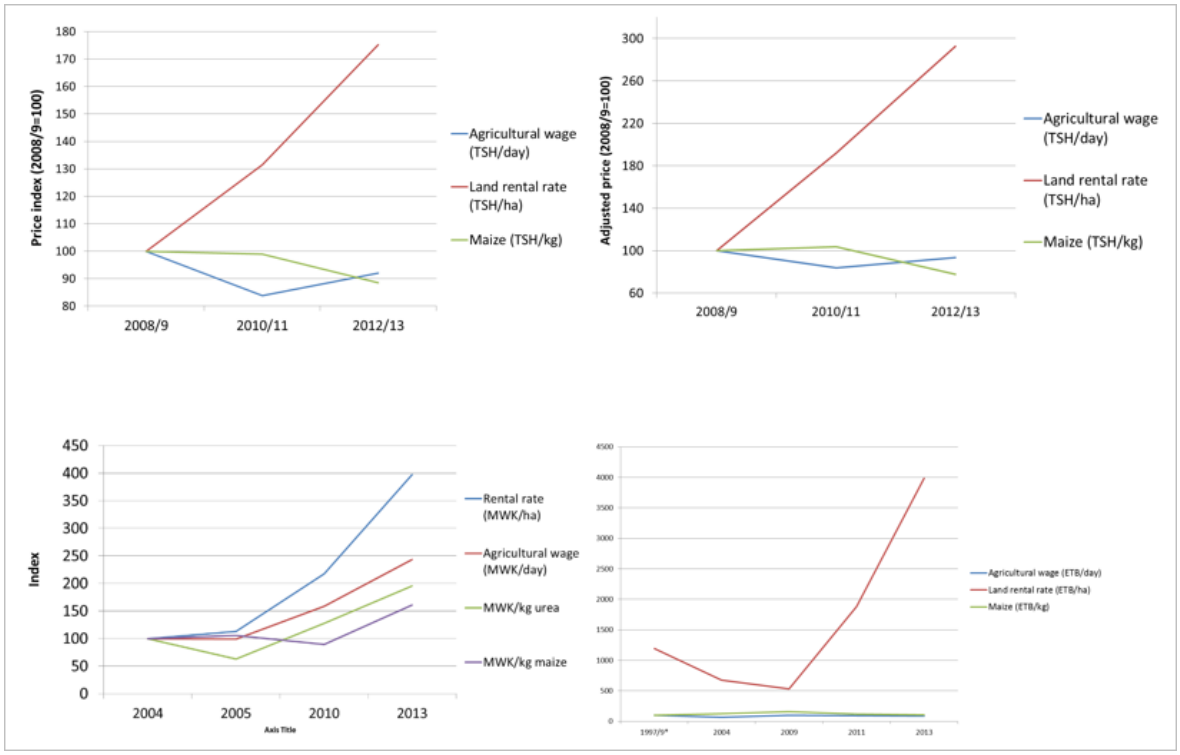
Fifth, access to land is an important determinant of the share of the labour time that young people devote to farming activities and their decision whether or not to migrate out of their home area. The analysis in this report also unearthed the importance of education in shaping young people's livelihood choices. Increased educational attainment was associated with a lower engagement in farming. The low educational levels of the labour force in farming is widely known to negatively affect the agricultural transformation process and the employment and income multiplier effects that results from it. As the future agrifood systems in the region and world are expected to be increasingly knowledge- and technology-intensive, investments to upgrade the educational level of the labour force will be critical for an accelerated economic transformation and job creation.

Sixth, we find a strong inverse relationship between participation in land rental markets and the age of household head: younger heads are generally more likely to rent in land than older heads, particularly in countries with relatively active rental markets. While land rental markets remain under-developed across Africa, participation in these markets is generally rising. In areas where they have developed beyond the incipient stages, they are becoming an important means for young households to acquire land for farming.

Overall, the analysis suggests policy actions that promote access to land and security of tenure will significantly shape young people's engagement in farming and their livelihood options. To be successful, such policies will need to recognize and anticipate the impacts of the evolving dynamics in land distribution and ownership trends and develop effective responses that will foster inclusive, competitive and productive agricultural growth. Policies to promote youth access to land and security of tenure are not necessarily intended to keep youth permanently engaged in farming but rather to stimulate dynamic agricultural productivity growth in ways that drive continued economic transformation and diversification.

Tables and figures

Figure 1. Land rental rates relative to other agricultural input and output prices

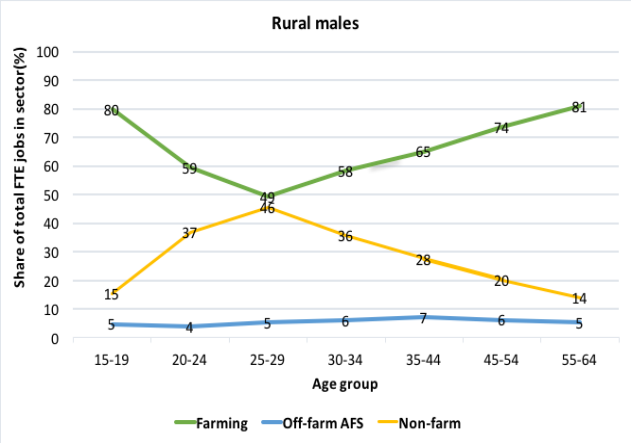


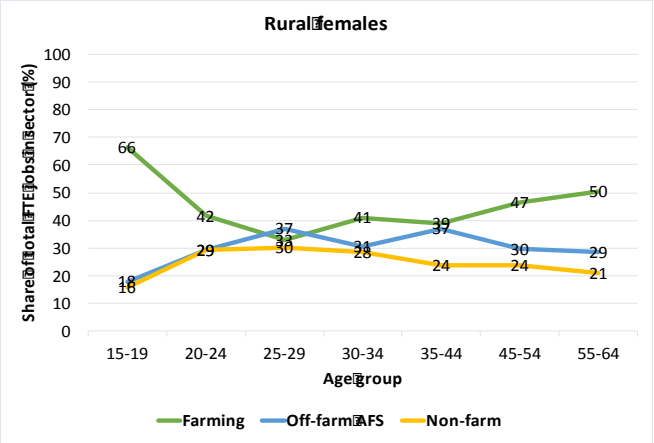
Notes: Upper-left quadrant is for regions of northern Tanzania; upper-right for regions of western Tanzania; lower-left quadrant show all districts in rural Malawi; lower-right quadrant is for all regions in southern Ethiopia.

Source: Wineman and Jayne (2017) using World Bank LSMS data sets

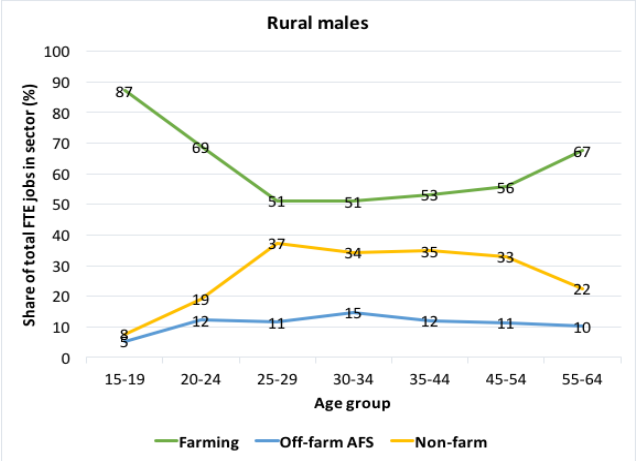
Figure 2a. Proportion of total full-time equivalent (FTE) jobs in employment sector by age group and gender in rural areas

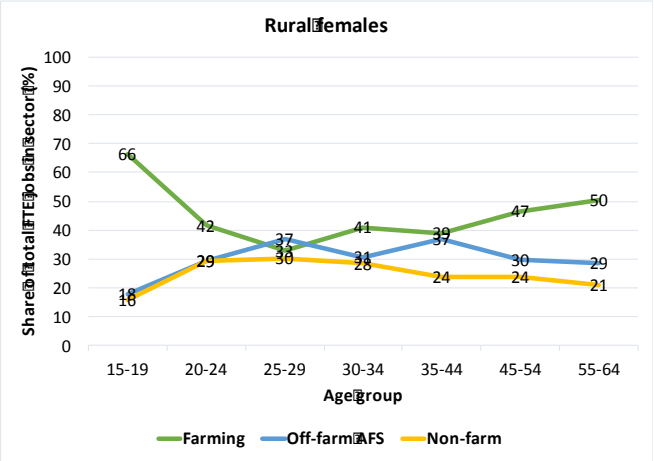
Ghana 2013



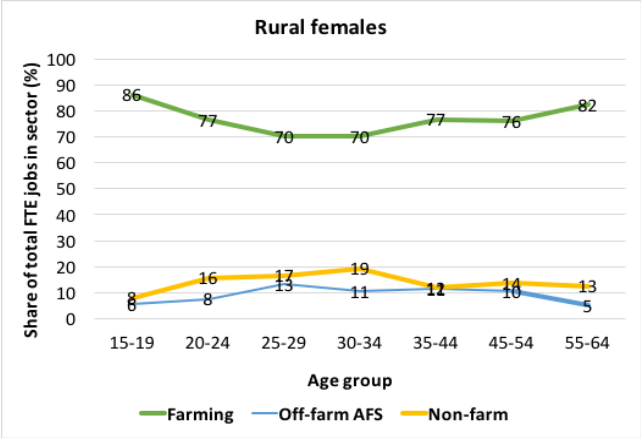


Nigeria 2013





Tanzania 2015



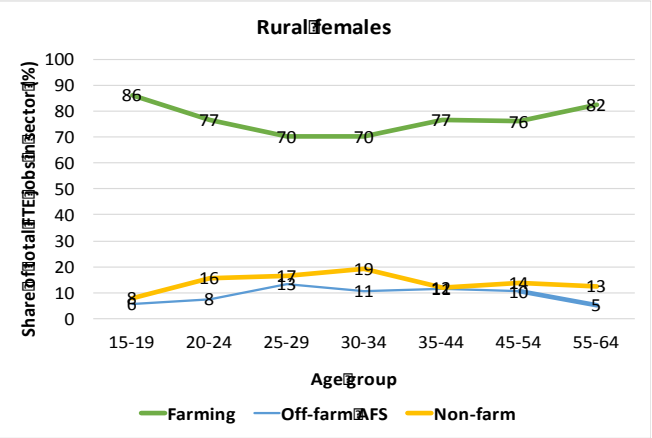
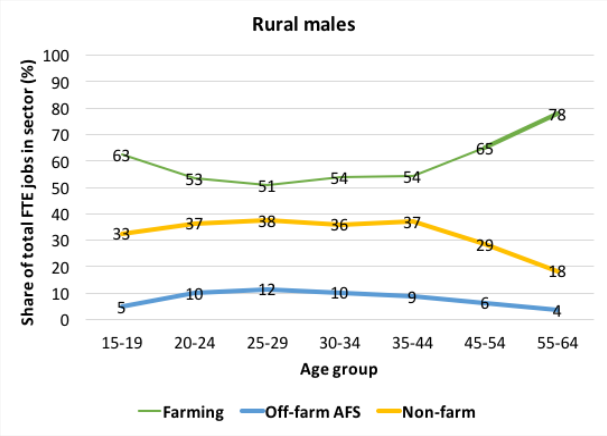
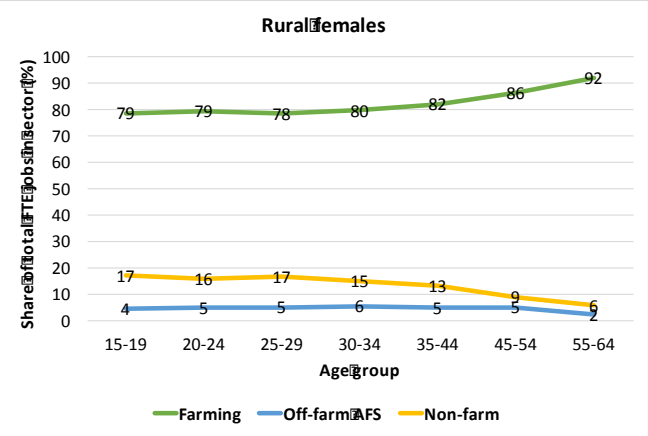


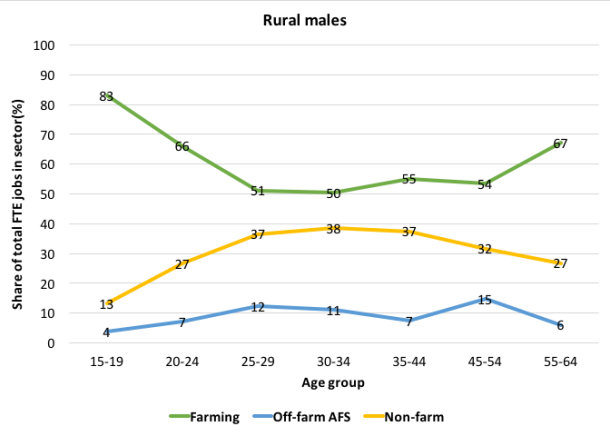
Figure 2a cont'd. Proportion of total full-time equivalent (FTE) jobs in employment sector by age group and gender in rural areas

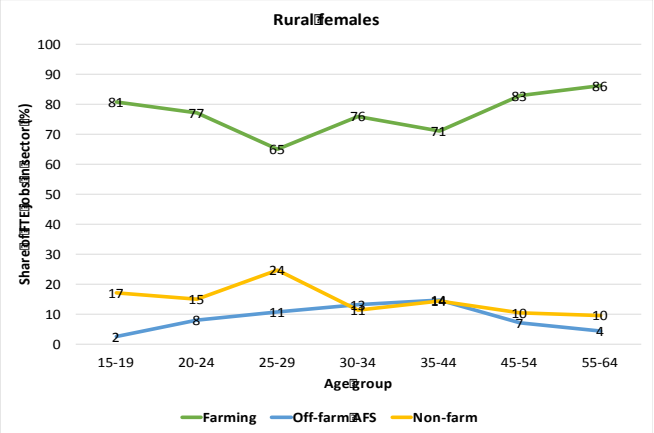
Rwanda 2014



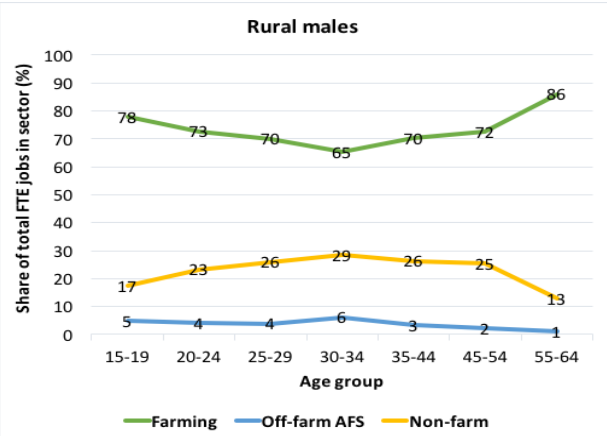


Uganda 2014





Zambia 2012



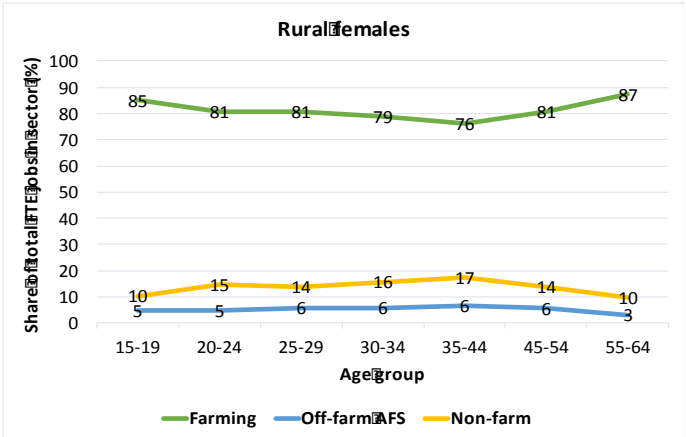
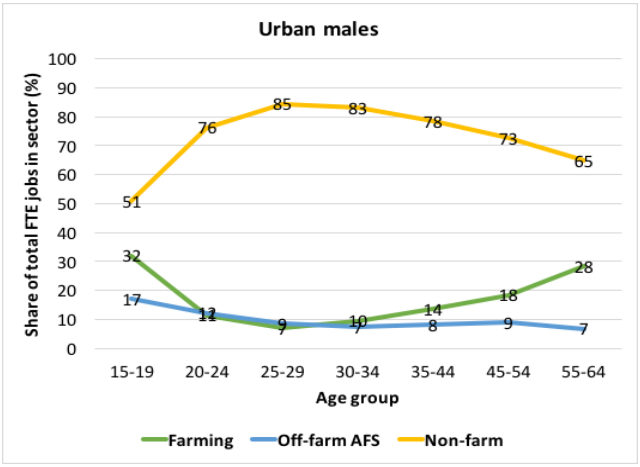
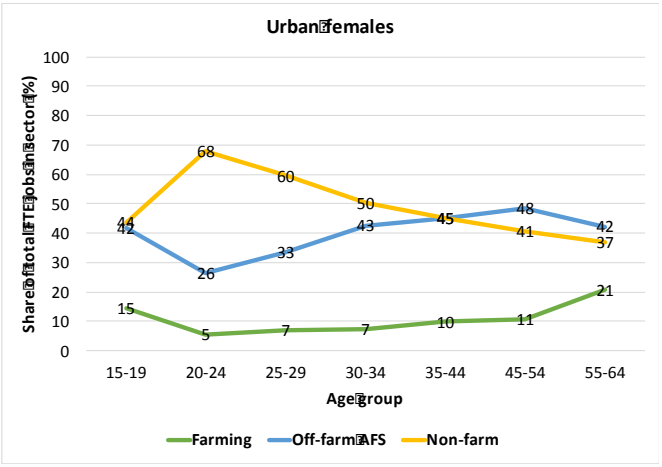


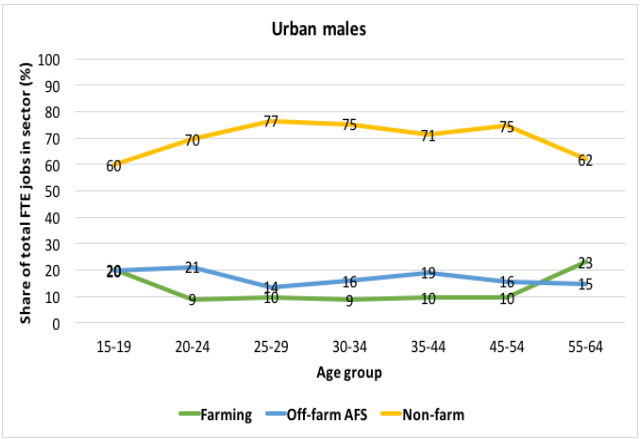
Figure 2b. Proportion of total full-time equivalent (FTE) jobs in employment sector by age group and gender in urban areas

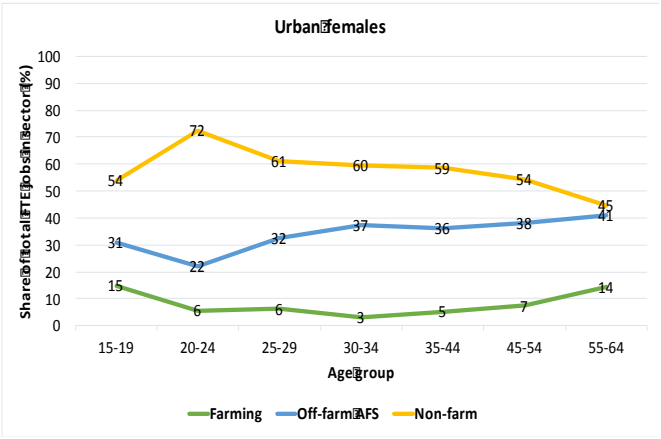
Ghana 2013



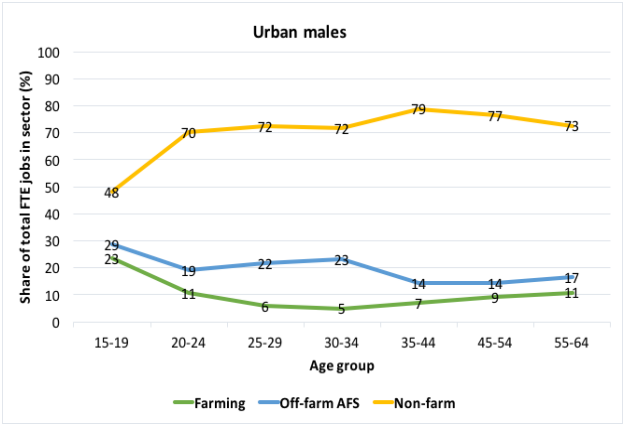


Nigeria 2013





Tanzania 2015



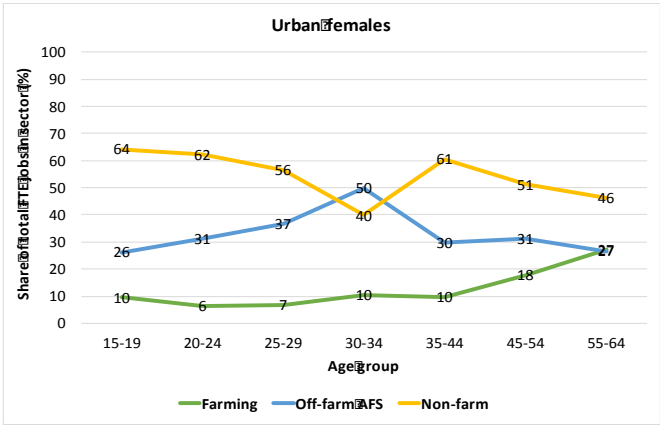
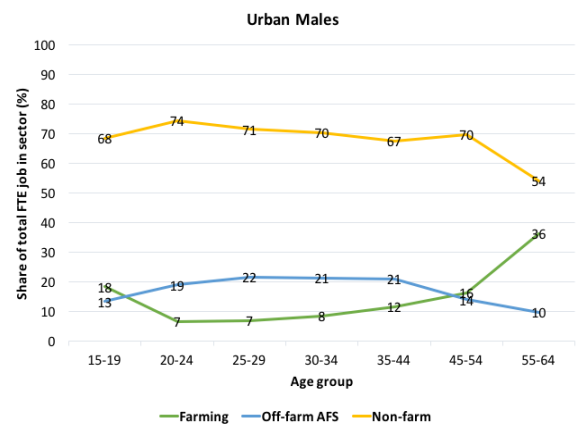
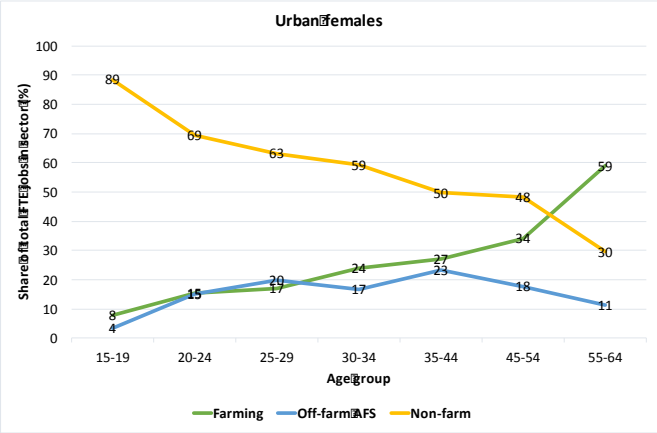


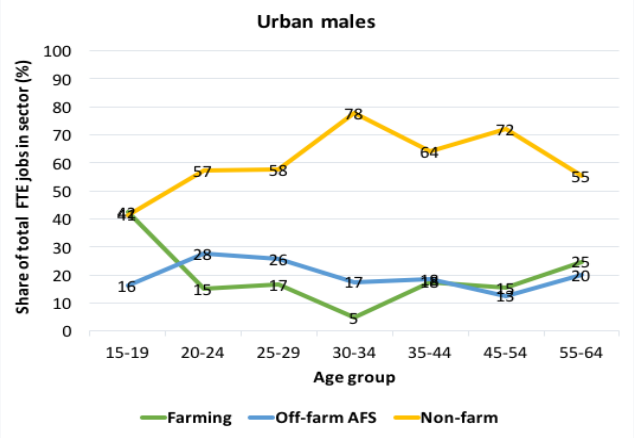
Figure 2b cont'd. Proportion of total full-time equivalent (FTE) jobs in employment sector by age group and gender in urban areas

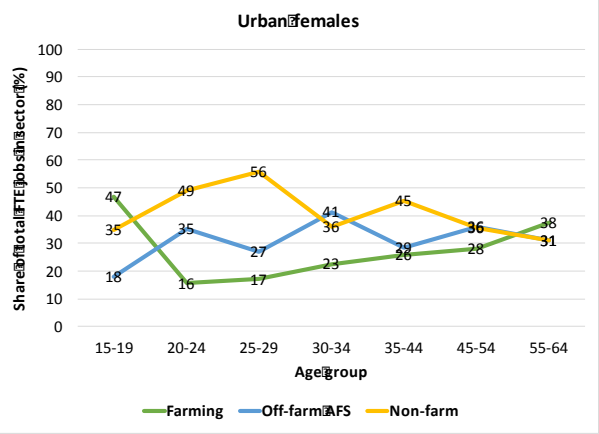
Rwanda 2014



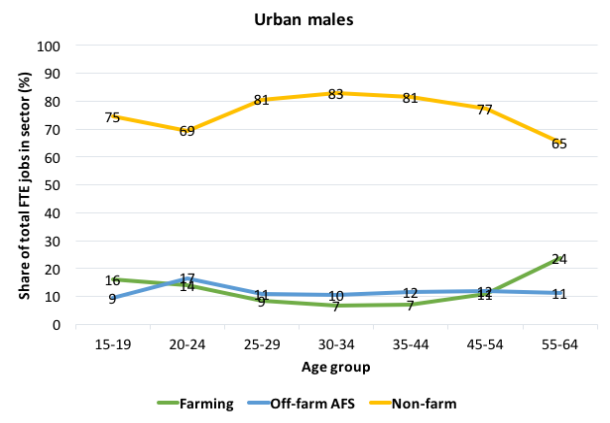


Uganda 2014





Zambia 2012



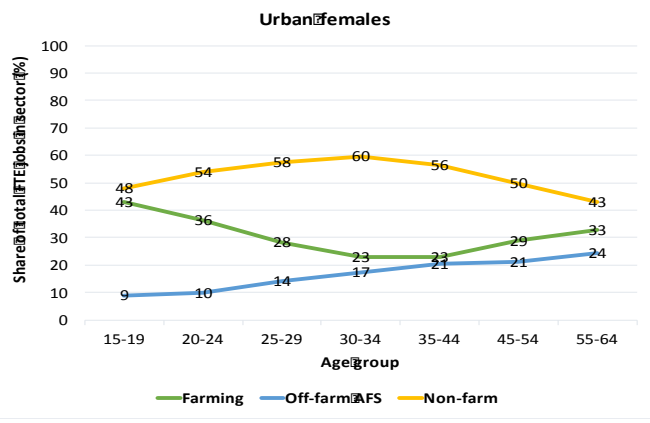
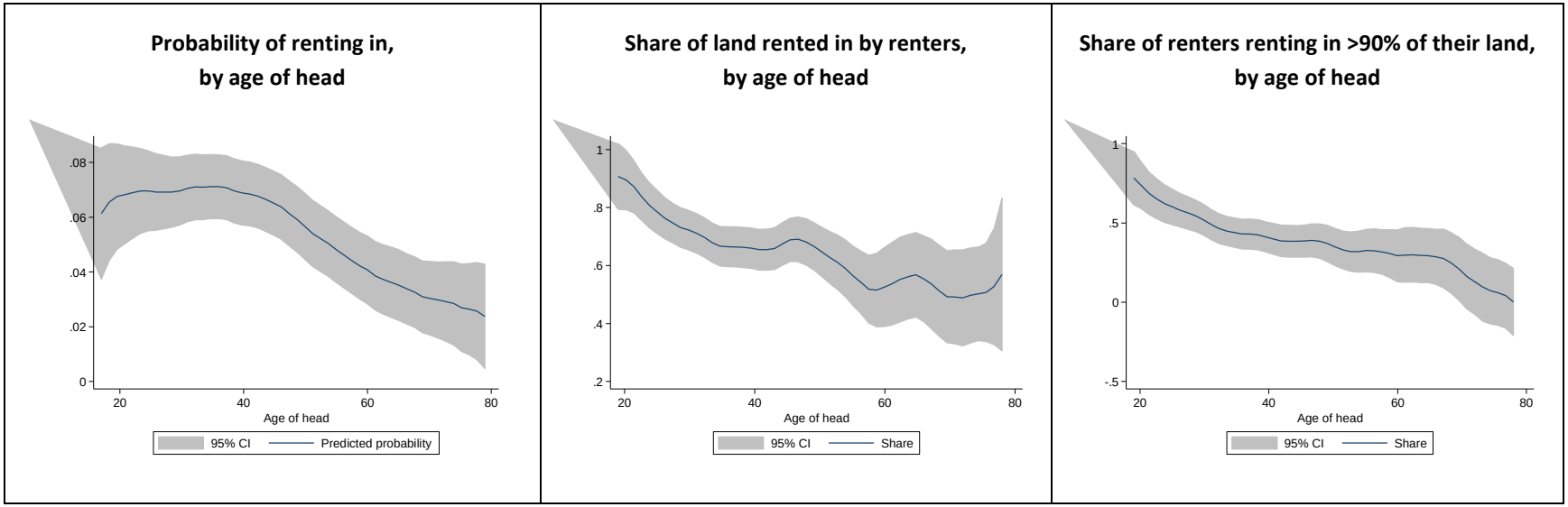
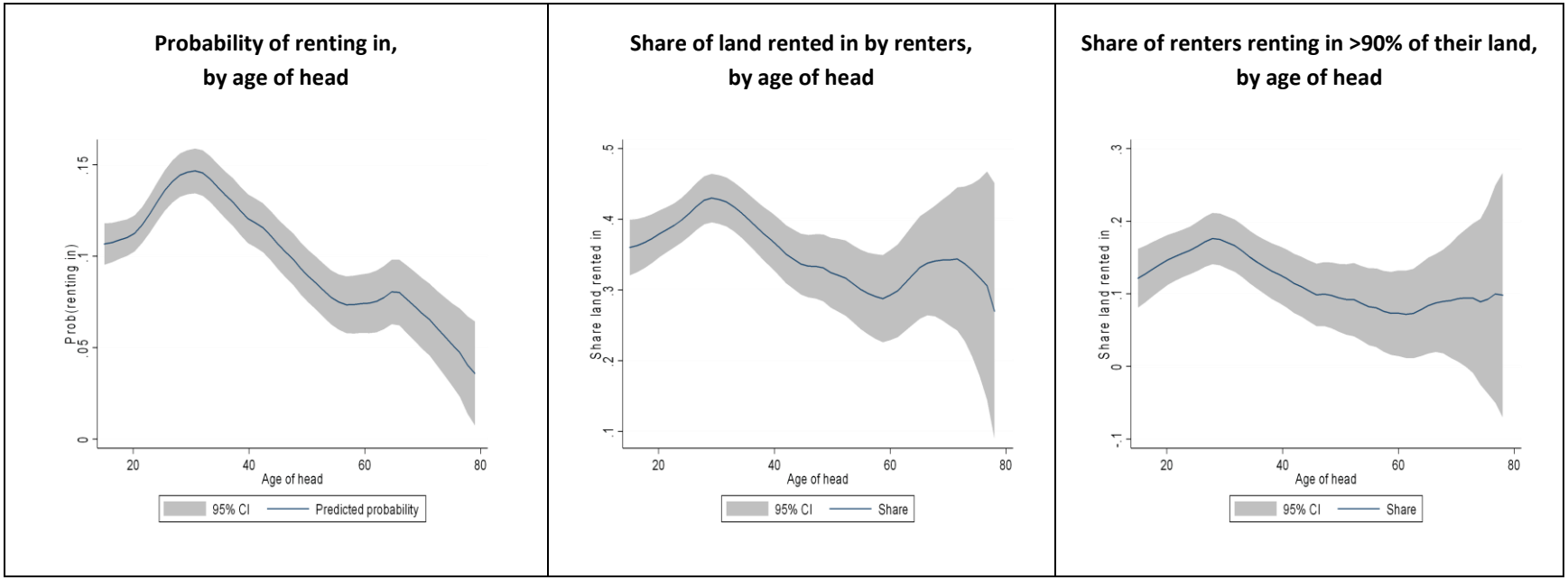


Figure 3a. Non-parametric relationships between rental market participation and age of household head (Tanzania)



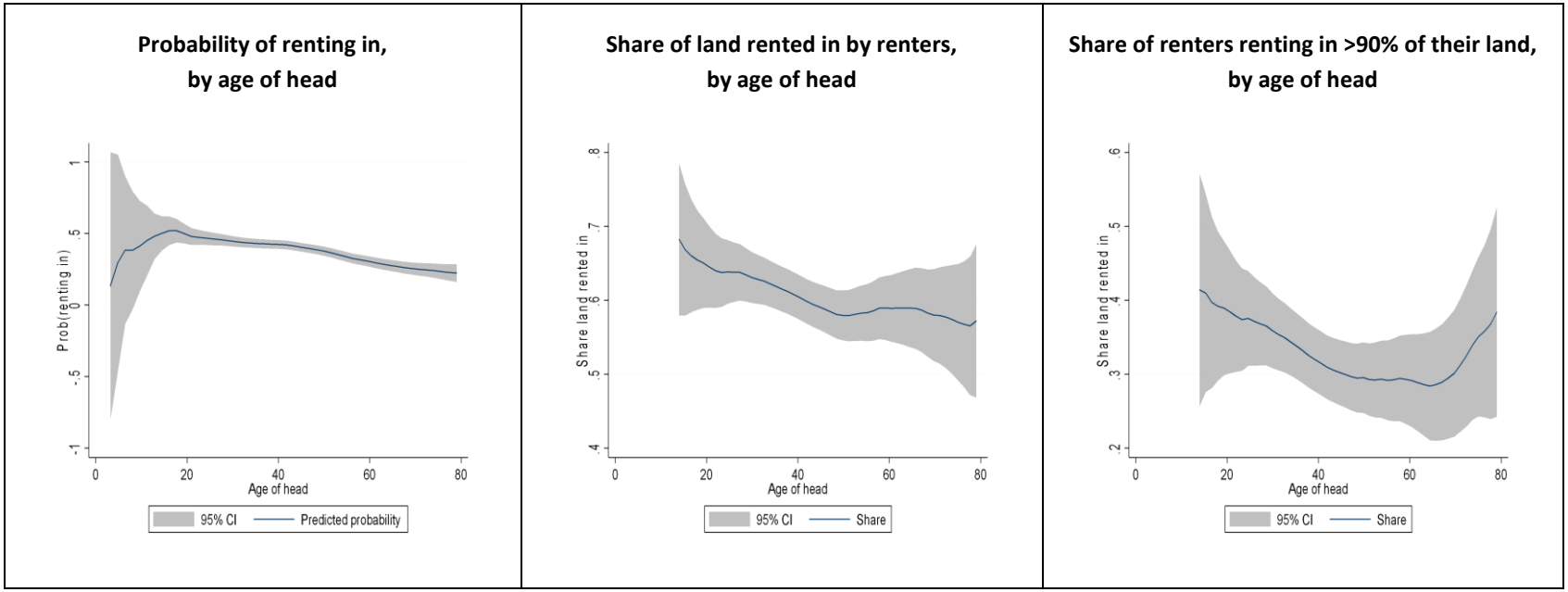
Data: Tanzania LSMS-ISA 2012-13

Figure 3b. Non-parametric relationships between rental market participation and age of household head (Ethiopia)



Data: Ethiopia LSMS-ISA 2015-16

Figure 3c. Non-parametric relationships between rental market participation and age of household head (Uganda)



Data: Uganda LSMS-ISA 2011-12

Table 1. Changes in farm structure in Ghana (1992–2012), Tanzania (2008–2012), Zambia (2008–2014) and Kenya (1994-2006) based on official national survey data

Farm size category (hectares)	Number of farms (% of total)		% growth in number of farms between initial and latest year	% of total operated land on farms between 0–100 ha	
Ghana	1992	2012		1992	2005
0–5	2,037,430 (92.1)	2,792,201 (84.5)	37.1	60.7	48.9
5–10	116,800 (5.3)	304,182 (9.2)	160.4	17.2	19.5
10–20	38,690 (1.7)	130,746 (4.0)	238.0	11.0	16.0
20–100	18,980 (0.9)	78,520 (2.4)	313.7	11.1	15.6
Total	2,211,900	3,305,649	49.5	100.0	100.0
Tanzania	2008	2012		2008	2012
0–5	5,454,961 (92.8)	6,151,035 (91.4)	12.8	62.4	56.3
5–10	300,511 (5.1)	406,947 (6.0)	35.4	15.9	18.0
10–20	77,668 (1.3)	109,960 (1.6)	41.6	7.9	9.7
20–100	45,700 (0.7)	64,588 (0.9)	41.3	13.8	16.0
Total	5,878,840	6,732,530	14.5	100.0	100.0
Zambia	2008	2014		2008	2014
0–5	984,976 (88.8)	1,142,041 (78.7)	15.9	54.1	38.8
5–10	87,719 (7.9)	211,862 (14.5)	141.5	19.6	25.6
10–20	29,197 (2.6)	74,959 (5.2)	156.7	13.3	18.1
20–100	7,471 (0.7)	22,584 (1.6)	202.3	13.0	17.5
Total	1,109,362	1,451,446	227.2	100	100
Kenya	1994	2006		1994	2006
0–5	2,217,706 (92.2)	2,972,031 (98.8)	34.0	61.5	72.0
5–10	93,871 (3.9)	17,451 (0.6)	-81.4	21.4	2.3
>10	92,498 (3.8)	19,493 (0.6)	-78.9***	17.1	22.7
Total	2,404,075	3,008,975	25.2	100.0	100.0

Note: Last two columns for Zambia are for land owned; Ghana, Kenya and Tanzania are for operated farm size.
Sources: Ghana Living Standards Surveys 1992/3 and 2005/2006. Tanzania National Panel Surveys, 2008 and 2012; Zambia Ministry of Agriculture Crop Forecast Surveys, 2008, 2014; Kenya Central Bureau of Statistics, *Welfare Monitoring Survey II, 1994: Basic Report* (Kenya: Central Bureau of Statistics, Office of the Vice-President and Ministry of Planning and National Development, 1996); Kenya National Bureau of Statistics, *Kenya Integrated Household Budget Survey 2005–2006* (Nairobi, Kenya: Kenya National Bureau of Statistics, Ministry of Planning and National Development, 2006)

Table 2. Fractional probit estimates of the effect of landholdings on young people's level of engagement in farming

	Youth (15-24 years)			Young Adults (25-34 years)			Combined (15-34 years)		
	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
MEMBER LEVEL:									
Age of the member (years)	0.2053	0.0199	0.00	-0.0024	0.0166	0.89	0.0835	0.0068	0.00
Gender of the member (1=male)	-0.0152	0.1071	0.89	-0.2043	0.0966	0.03	-0.1646	0.0697	0.02
Member's education attainment (base: no education)									
primary education completed	-0.8966	0.1528	0.00	-0.2778	0.1213	0.02	-0.5825	0.0955	0.00
secondary education completed	-2.7340	0.1913	0.00	-1.2428	0.1877	0.00	-2.0832	0.1288	0.00
post secondary education completed	-39.8565	0.3173	0.00	-14.4852	0.3575	0.00	-74.5801	0.2311	0.00
HOUSEHOLD LEVEL:									
head of hh age	-0.0136	0.0039	0.00	-0.0028	0.0039	0.46	-0.0095	0.0026	0.00
head of hh sex (1=male)	0.2293	0.1931	0.24	-0.2399	0.1954	0.22	-0.0241	0.1286	0.85
Marital status (base: monogamous)									
polygamous	-0.2445	0.1632	0.13	-0.0711	0.1474	0.63	-0.1556	0.1041	0.14
single	0.2583	0.2046	0.21	-0.4344	0.2206	0.05	-0.0540	0.1435	0.71
other	0.3806	0.1752	0.03	-0.0507	0.1357	0.71	0.1165	0.1087	0.28
Landholding (ha)	0.2099	0.0495	0.00	0.1342	0.0329	0.00	0.1594	0.0309	0.00
# livestock '000	-0.0046	0.0019	0.01	-0.0025	0.0025	0.33	-0.0043	0.0014	0.00
own plough (1=yes)	0.1266	0.1707	0.46	0.1699	0.1950	0.38	0.2013	0.1240	0.11
COMMUNITY LEVEL:									
% of land between 5 & 10 ha	0.0273	0.0083	0.00	0.0254	0.0079	0.00	0.0240	0.0056	0.00
% of land over 10 ha	0.0000	0.0043	0.99	0.0028	0.0036	0.44	0.0021	0.0027	0.44
Residuals from first stage regression	-0.1797	0.0726	0.01	0.0439	0.0377	0.25	-0.0204	0.0365	0.58
Constant	-3.8413	0.5130	0.00	0.7168	0.5755	0.21	-1.4963	0.2700	0.00
Dep variable: Proportion of total worktime (FTE) in farm									

Table 3. Rental market participation by age of head

	head's age	Tanzania	Zambia	Ethiopia	Nigeria	Uganda	Niger	Burkina Faso
Estimated population (1000s)	<=24	221	22	426	218	212	33	29
	25-34	1,108	288	3,433	358	942	533	203
	35-44	1,367	406	4,242	5,831	1,046	629	245
	45+	3,072	763	8,466	13,899	1,878	1,234	560
Average farm size (ha)	<=24	1.1	1.8	1.4	1.4	0.7	3.4	2.7
	25-34	1.9	3.3	1.5	1.3	1.1	3.4	3.2
	35-44	2.4	4.5	2.6	1.3	1.4	4.4	4.3
	45+	3.1	4.6	1.9	1.2	1.6	6.5	4.5
Landlord % of sample	<=24	3.0%	0.5%	8.5%	0%	0.0%	0.0%	0.0%
	25-34	1.0%	0.9%	9.4%	0%	0.6%	3.8%	0.0%
	35-44	2.0%	0.9%	14.3%	0.1%	2.7%	3.5%	0.0%
	45+	2.0%	1.4%	20.7%	0.6%	1.9%	2.0%	0.0%
Tenant % of sample	<=24	14%	3%	13%	4%	25%	0%	<1%
	25-34	11%	4%	34%	7%	30%	9%	2%
	35-44	11%	5%	33%	9%	21%	7%	3%
	45+	6%	3%	18%	8%	15%	4%	2%
Mean % of land rented in (tenants only)	<=24	93%	100%	48%	100%	62%	-	100%
	25-34	71%	56%	47%	88%	58%	50%	72%
	35-44	63%	64%	39%	80%	58%	61%	75%
	45+	58%	62%	29%	80%	52%	58%	77%
% of tenants renting ≥90% of their land‡	<=24	78%	100%	7%	100%	33%	-	100%
	25-34	49%	26%	14%	100%	30%	28%	52%
	35-44	35%	45%	9%	100%	25%	38%	57%
	45+	27%	36%	6%	100%	22%	36%	53%

Sources: Data for Tanzania are from the 2012-13 LSMS-ISA. Data for Ethiopia are from the 2015-16 LSMS-ISA. Data for Nigeria are from the 2015-16 LSMS-ISA. Data for Uganda are from the 2011-12 LSMS-ISA. Data for Niger are from the 2014-15 LSMS-ISA. Data for Burkina Faso are from the 2014-15 LSMS-ISA. Zambia data are from the 2015 Rural Agricultural Livelihoods Survey.

Table 4. Rental participation indicators for original and breakaway households in Tanzania

	head's age	original	break-away	diff	signif.
Sample size	<=24	37	92	NA	
	25-34	356	159	NA	
	35-44	520	108	NA	
	45+	1,249	254	NA	
Estimated population (1000s)	<=24	81	139	NA	
	25-34	871	236	NA	
	35-44	1,222	144	NA	
	45+	2,746	327	NA	
Average farm size (ha)	<=24	1.5	0.9	-0.6	0.062
	25-34	2.0	1.6	-0.4	0.163
	35-44	2.4	2.2	-0.2	0.578
	45+	3.0	4.1	1.0	0.061
Landlord % of sample	<=24	6.0%	1.0%	-5.0%	0.269
	25-34	1.0%	1.0%	0.0%	0.635
	35-44	2.0%	1.0%	-1.0%	0.628
	45+	2.0%	1.0%	-1.0%	0.303
Tenant % of sample	<=24	10%	16%	6%	0.403
	25-34	9%	19%	10%	0.019
	35-44	10%	19%	9%	0.060
	45+	5%	10%	5%	0.079
Mean % of land rented in (tenants only)	<=24	95%	92%	-3%	0.628
	25-34	64%	85%	21%	0.012
	35-44	61%	74%	13%	0.192
	45+	52%	82%	30%	0.000
% of tenants renting ≥90% of their land‡	<=24	59%	86%	27%	0.395
	25-34	34%	77%	43%	0.001
	35-44	31%	51%	20%	0.172
	45+	18%	66%	48%	0.000

Note: Data for Tanzania are from the 2012-13 LSMS-ISA. Original households refer to households that appeared in earlier waves. Breakaway households are those which entered the sample when a member of a household sampled in a previous wave left that household and were tracked by survey enumerators.

Table 5. Determinants of renting-in land (average partial effects from Probit model)

Dependent variable: *=1 if household rents-in land*	Tanzania	Uganda	Niger	Nigeria
age of head	-0.00166	-0.0026	-0.0017	-0.001
	(0.000)***	(0.0007)***	(0.0007)**	(0.000)**
pre-rental land (ha)	-0.0528	-0.1430	-0.0160	-0.052
	(0.000)***	(0.0338)***	(0.0066)**	(0.019)***
household size	0.000614	0.0111	0.0035	0.0037
	(0.864)	(0.041)***	(0.0021)	(0.003)
max. educ. attainment	0.00110	0.0036	-0.0009	-0.0004
	(0.579)	(0.0030)	(0.0027)	(0.001)
female head = 1	7.61e-05	-0.0029	-0.0524	0.1644
	(0.998)	(0.0268)	(0.0283)*	(0.019)
number of plots	0.0859	0.0077	0.0081	0.0031
	(0.000)***	(0.0061)	(0.0029)***	(0.002)*
IHS(assets)	0.00726			
	(0.001)***			
log (income per capita)		0.0122	0.0142	0.0056
		(0.0129)	(0.0064)**	(0.065)
has ox plough = 1	0.0179	0.0390	0.0449	
	(0.274)	(0.0477)	(0.0285)	
has tractor = 1	0.00749	0.1806		
	(0.739)	(0.2389)		
rural = 1	0.00917			-0.095
	(0.697)			(0.033)***
km to road	-0.000161	-0.0005	0.0010	0.0022
	(0.904)	(0.0015)	(0.0007)	(0.001)
km to market	-0.000655	-0.0015	-0.0004	0.0004
	(0.257)	(0.0009)	(0.0003)	(0.000)*
elevation	4.58e-05	0.0001	-0.0003	-0.000
	(0.424)	(0.0001)	(0.0001)**	(0.000)
slope	-0.00475	-0.0004		-0.003
	(0.150)	(0.0019)		(0.004)
Log(population density)	-0.00178			0.0018
	(0.507)			(0.007)
Log(distance to nighttime lights)		-0.0091	0.0022	
		(0.0054)*	(0.0035)	
bimodal rainfall = 1	-0.0954			
	(0.240)			
mean annual rainfall	0.000131	0.0001	-0.0005***	0.000
	(0.383)	(0.0001)	(0.0002)	(0.000)***
N	8360	1887	1723	2208

Notes: Tanzania model uses 2008/9, 2010/11 and 2012/13 waves of the Tanzanian LSMS-ISA. For Tanzania, Mundlak-Chamberlain time-averages of time-varying regressors and year dummies are included, but coefficients are not reported. Uganda model uses the 2011/12 wave of the Uganda LSMS-ISA data. Niger model uses the 2014 wave of the Niger LSMS-ISA datasets. P-values are cluster robust, with significance levels denoted as follows: * = p<0.10, ** = p<0.05, *** = p<0.01.

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Appendix Tables

Table A1. Proportion of labour force in farming, off-farm agrifood systems, and non-farm activities over time by age and gender, Ghana

				Farming		Off-farm within AFS		Non-farm outside AFS	
Age category	Gender	Survey year	Total # of jobs in millions	% of jobs	% of FTE jobs	% of jobs	% of FTE jobs	% of jobs	% of FTE jobs
15-19	Male	2006	0.4	82.3	77.4	3.8	4.3	13.9	18.3
		2013	0.8	74.4	65.3	9.5	8.6	16.1	26.1
	Female	2006	0.4	61.4	51.6	16.9	17.8	21.7	30.6
		2013	0.8	56.4	43.0	24.3	28.0	19.4	29.0
20-24	Male	2006	0.5	54.1	42.3	5.0	6.5	40.9	51.2
		2013	0.8	48.0	36.8	8.3	7.8	43.7	55.5
	Female	2006	0.6	43.4	33.9	19.7	19.2	36.8	46.9
		2013	0.9	38.5	28.1	20.8	21.7	40.7	50.2
25-29	Male	2006	0.7	48.0	37.9	6.9	7.5	45.2	54.6
		2013	0.9	32.9	25.4	7.0	7.1	60.1	67.5
	Female	2006	0.8	43.9	34.7	19.7	20.6	36.4	44.7
		2013	1.0	32.4	24.4	26.0	29.1	41.6	46.5
30-34	Male	2006	0.6	48.9	40.6	5.1	6.1	46.0	53.3
		2013	0.8	35.6	28.5	6.5	6.9	57.8	64.6
	Female	2006	0.7	44.3	36.5	24.4	24.2	31.3	39.3
		2013	0.9	35.3	28.0	31.3	35.7	33.4	36.3
35-44	Male	2006	1.2	54.3	45.3	6.5	7.1	39.3	47.7
		2013	1.5	42.7	35.9	7.9	7.7	49.4	56.4
	Female	2006	1.3	45.5	37.1	26.2	28.4	28.3	34.5
		2013	1.8	39.0	32.4	33.4	36.6	27.5	31.0
45-54	Male	2006	0.9	58.2	50.4	4.9	5.4	36.8	44.3
		2013	1.0	50.4	43.7	7.0	7.7	42.6	48.6
	Female	2006	1.0	52.4	45.2	25.1	28.1	22.5	26.7
		2013	1.2	41.2	34.2	34.4	38.6	24.4	27.2
55-64	Male	2006	0.8	69.5	62.0	4.5	4.6	26.0	33.4
		2013	1.0	64.4	58.1	5.9	5.9	29.7	36.0
	Female	2006	0.7	64.4	55.8	17.8	21.1	17.8	23.1
		2013	1.1	54.1	44.4	25.8	31.5	20.1	24.2

Table A2. Proportion of labour force in farming, off-farm agrifood systems, and non-farm activities over time by age and gender, Nigeria

Age category	Gender	Survey year	Total # of jobs in millions	Farming		Off-farm within AFS		Non-farm outside AFS	
				% of jobs	% of FTE jobs	% of jobs	% of FTE jobs	% of jobs	% of FTE jobs
15-19	Male	2004	0.8	37.9	32.9	1.8	1.9	60.3	65.2
		2013	3.3	83.3	74.0	5.4	8.1	11.4	18.0
	Female	2004	0.5	32.7	30.1	1.6	3.2	65.7	66.7
		2013	1.7	60.7	53.2	18.7	21.3	20.6	25.6
20-24	Male	2004	1.1	31.5	25.3	2.5	4.2	66.0	70.5
		2013	3.3	59.3	48.5	12.8	15.3	27.9	36.2
	Female	2004	1.2	22.9	17.9	4.9	7.3	72.2	74.8
		2013	2.6	35.7	29.1	25.7	26.7	38.6	44.1
25-29	Male	2004	2.0	25.8	22.7	2.7	3.4	71.5	73.9
		2013	3.3	43.1	33.0	11.2	12.4	45.6	54.5
	Female	2004	1.9	21.1	17.4	7.9	8.1	71.1	74.5
		2013	4.2	26.7	21.9	34.7	35.1	38.7	43.0
30-34	Male	2004	2.3	25.0	20.9	3.1	2.7	71.9	76.5
		2013	3.8	39.2	30.9	13.1	15.3	47.7	53.8
	Female	2004	2.0	19.0	16.4	5.6	8.5	75.5	75.1
		2013	4.4	29.0	23.9	31.9	33.6	39.1	42.5
35-44	Male	2004	5.7	26.0	21.3	3.4	3.9	70.6	74.8
		2013	9.2	43.1	34.5	13.4	15.1	43.5	50.4
	Female	2004	4.0	21.1	16.9	6.1	6.7	72.8	76.5
		2013	8.7	30.4	25.0	35.4	36.7	34.2	38.3
45-54	Male	2004	4.9	27.2	22.8	3.1	3.5	69.7	73.7
		2013	8.1	45.3	36.8	11.2	13.2	43.4	50.0
	Female	2004	3.1	24.6	20.8	4.8	5.5	70.7	73.7
		2013	6.4	34.5	28.3	31.0	33.6	34.6	38.1
55-64	Male	2004	5.2	31.7	29.0	2.9	2.5	65.4	68.5
		2013	9.5	58.7	51.9	10.5	11.8	30.8	36.3
	Female	2004	2.8	23.8	20.8	4.4	4.4	71.9	74.8
		2013	6.8	42.6	35.5	29.9	33.7	27.6	30.9

Table A3. Proportion of labour force in farming, off-farm agrifood systems, and non-farm activities over time by age and gender, Tanzania

Age category	Gender	Survey year	Total # of jobs in millions	Farming		Off-farm within AFS		Non-farm outside AFS	
				% of jobs	% of FTE jobs	% of jobs	% of FTE jobs	% of jobs	% of FTE jobs
15-19	Male	2009	0.9	82.7	78.0	2.2	2.0	15.1	20.0
		2015	1.8	84.3	82.5	4.1	4.5	11.6	13.1
	Female	2009	0.8	83.6	73.2	4.5	4.6	12.0	22.2
		2015	1.6	76.8	65.9	9.8	11.2	13.3	22.9
20-24	Male	2009	1.1	70.1	60.9	2.9	5.1	27.0	33.9
		2015	1.4	58.4	49.3	8.8	9.8	32.7	40.9
	Female	2009	1.4	78.4	72.3	5.1	7.4	16.5	20.3
		2015	1.7	67.2	52.1	11.5	15.9	21.2	32.0
25-29	Male	2009	1.4	61.6	51.1	1.8	3.3	36.6	45.5
		2015	1.4	44.6	29.4	10.5	14.2	44.9	56.3
	Female	2009	1.4	69.9	60.9	7.1	8.4	23.0	30.7
		2015	1.5	59.2	44.6	14.4	22.8	26.4	32.6
30-34	Male	2009	1.3	56.5	45.1	4.7	6.3	38.7	48.6
		2015	1.2	39.5	28.7	13.6	17.0	46.9	54.2
	Female	2009	1.2	68.2	60.8	9.4	11.1	22.4	28.1
		2015	1.3	60.3	45.3	17.9	26.9	21.8	27.8
35-44	Male	2009	2.0	61.9	52.0	3.7	4.8	34.3	43.1
		2015	2.3	43.6	34.8	15.2	13.5	41.2	51.8
	Female	2009	2.1	74.0	66.6	8.1	10.5	17.9	23.0
		2015	2.2	62.3	50.6	16.2	18.5	21.4	30.9
45-54	Male	2009	1.4	68.7	60.2	1.6	1.8	29.7	38.0
		2015	1.3	55.0	44.0	8.9	9.5	36.1	46.5
	Female	2009	1.3	78.3	72.6	5.4	7.2	16.3	20.2
		2015	1.5	65.1	57.9	16.8	16.8	18.2	25.3
55-64	Male	2009	1.5	77.9	70.0	2.0	2.4	20.1	27.6
		2015	1.3	67.5	54.9	8.4	8.3	24.0	36.7
	Female	2009	1.5	84.1	75.8	4.4	6.3	11.5	17.9
		2015	1.4	78.6	67.8	8.5	10.8	12.9	21.4

Table A4. Proportion of labour force in farming, off-farm agrifood systems, and non-farm activities over time by age and gender, Rwanda

Age category	Gender	Survey year	Total # of jobs in millions	Farming		Off-farm within AFS		Non-farm outside AFS	
				% of jobs	% of FTE jobs	% of jobs	% of FTE jobs	% of jobs	% of FTE jobs
15-19	Male	2006	0.4	76.9	70.2	5.0	4.6	18.1	25.3
		2014	0.5	61.3	56.2	6.3	6.1	32.4	37.7
	Female	2006	0.4	80.6	68.7	4.8	3.0	14.6	28.3
		2014	0.5	71.0	60.8	5.4	4.2	23.7	34.9
20-24	Male	2006	0.6	67.4	52.6	6.6	8.7	26.0	38.6
		2014	0.8	53.7	42.9	8.5	12.0	37.8	45.1
	Female	2006	0.6	80.4	73.4	7.1	7.2	12.5	19.4
		2014	0.7	70.7	65.9	6.4	7.1	22.9	27.0
25-29	Male	2006	0.5	61.3	47.0	7.8	11.2	30.9	41.8
		2014	0.8	51.3	38.6	9.5	14.4	39.2	47.0
	Female	2006	0.5	79.9	72.6	7.4	9.6	12.7	17.7
		2014	0.7	70.8	66.1	6.6	8.1	22.6	25.9
30-34	Male	2006	0.3	64.5	49.1	9.3	11.3	26.2	39.6
		2014	0.7	53.0	43.2	9.5	12.9	37.5	44.0
	Female	2006	0.4	79.5	74.4	8.0	8.2	12.4	17.3
		2014	0.7	73.0	69.9	7.5	7.5	19.5	22.6
35-44	Male	2006	0.5	65.0	50.8	7.1	8.9	27.9	40.3
		2014	0.9	54.7	43.8	8.6	11.8	36.7	44.4
	Female	2006	0.6	83.0	80.0	7.5	7.8	9.5	12.2
		2014	0.9	74.0	72.3	7.4	8.1	18.6	19.6
45-54	Male	2006	0.4	71.4	62.5	6.0	7.2	22.6	30.3
		2014	0.6	63.4	56.7	6.4	7.7	30.2	35.6
	Female	2006	0.4	86.5	84.8	6.0	5.6	7.5	9.6
		2014	0.6	78.1	79.4	6.1	6.7	15.7	13.9
55-64	Male	2006	0.3	81.0	72.8	3.8	5.6	15.2	21.6
		2014	0.5	73.7	73.0	4.4	4.4	21.9	22.6
	Female	2006	0.3	91.0	91.2	3.3	3.6	5.7	5.2
		2014	0.6	86.4	88.7	3.9	3.2	9.7	8.1

Table A5. Proportion of labour force in farming, off-farm agrifood systems, and non-farm activities over time by age and gender, Uganda

Age category	Gender	Survey year	Total # of jobs in millions	Farming		Off-farm within AFS		Non-farm outside AFS	
				% of jobs	% of FTE jobs	% of jobs	% of FTE jobs	% of jobs	% of FTE jobs
15-19	Male	2006	0.9	86.6	72.5	2.9	7.5	10.5	20.0
		2014	1.6	82.1	75.7	3.2	6.0	14.8	18.3
	Female	2006	1.0	90.2	76.2	3.7	8.2	6.1	15.6
		2014	1.4	83.1	75.2	4.3	4.9	12.6	19.9
20-24	Male	2006	0.8	65.7	49.7	8.8	15.5	25.5	34.8
		2014	1.3	65.4	50.3	7.7	13.5	26.9	36.2
	Female	2006	0.9	79.5	67.2	8.0	13.2	12.6	19.7
		2014	1.4	70.1	57.4	11.3	16.8	18.5	25.8
25-29	Male	2006	0.8	55.5	41.6	10.6	16.0	34.0	42.4
		2014	1.2	52.4	38.4	11.3	17.2	36.3	44.3
	Female	2006	0.9	71.9	56.4	11.8	17.1	16.4	26.4
		2014	1.2	63.4	49.4	12.6	15.9	24.0	34.6
30-34	Male	2006	0.7	51.0	38.7	7.7	10.9	41.3	50.4
		2014	1.0	49.3	35.0	11.2	13.3	39.6	51.7
	Female	2006	0.6	71.0	59.5	11.1	17.0	17.9	23.5
		2014	1.1	69.4	58.7	16.2	22.1	14.4	19.2
35-44	Male	2006	1.1	58.2	45.2	9.3	12.2	32.5	42.6
		2014	2.2	59.1	44.8	7.7	10.4	33.2	44.8
	Female	2006	1.0	78.9	65.9	9.9	16.7	11.2	17.4
		2014	2.1	67.5	58.3	15.1	18.5	17.5	23.2
45-54	Male	2006	0.6	61.3	48.5	7.2	12.2	31.5	39.2
		2014	1.2	54.7	41.8	11.0	14.1	34.4	44.1
	Female	2006	0.6	82.4	70.7	7.5	11.4	10.2	17.9
		2014	1.3	69.8	64.9	13.8	16.5	16.4	18.6
55-64	Male	2006	0.6	78.3	63.4	4.8	9.0	16.9	27.5
		2014	1.2	67.6	56.3	6.3	9.6	26.1	34.1
	Female	2006	0.6	94.5	89.8	3.2	4.8	2.3	5.4
		2014	1.2	80.1	75.5	7.4	10.2	12.5	14.3

Table A6. Proportion of labour force in farming, off-farm agrifood systems, and non-farm activities over time by age and gender, Zambia

Age category	Gender	Survey year	Total # of jobs in millions	Farming		Off-farm within AFS		Non-farm outside AFS	
				% of jobs	% of FTE jobs	% of jobs	% of FTE jobs	% of jobs	% of FTE jobs
15-19	Male	2005	0.4	89.0	83.8	1.5	1.5	9.5	14.8
		2012	0.2	70.6	54.1	3.8	6.6	25.6	39.3
	Female	2005	0.4	90.2	85.2	1.3	1.4	8.5	13.4
		2012	0.3	79.8	70.7	3.6	6.1	16.6	23.2
20-24	Male	2005	0.4	75.7	63.0	3.6	6.5	20.7	30.5
		2012	0.4	59.7	44.0	6.5	10.2	33.8	45.8
	Female	2005	0.4	82.9	74.7	3.1	5.3	14.0	20.0
		2012	0.5	72.6	61.5	4.5	7.0	22.9	31.5
25-29	Male	2005	0.4	57.2	42.3	3.9	5.8	38.9	51.9
		2012	0.4	48.5	36.7	5.9	7.7	45.6	55.6
	Female	2005	0.4	72.0	59.4	3.8	5.1	24.2	35.4
		2012	0.5	64.1	52.4	6.6	10.2	29.3	37.4
30-34	Male	2005	0.3	57.8	42.3	3.5	5.3	38.7	52.4
		2012	0.4	42.1	31.4	7.3	8.6	50.6	60.0
	Female	2005	0.3	74.1	60.9	3.7	6.3	22.2	32.8
		2012	0.4	61.0	48.9	8.6	12.0	30.4	39.2
35-44	Male	2005	0.4	58.4	44.9	3.3	4.9	38.4	50.2
		2012	0.6	47.4	36.2	5.8	7.8	46.8	56.0
	Female	2005	0.4	74.7	63.9	4.5	6.3	20.8	29.8
		2012	0.5	62.8	49.9	9.6	13.4	27.6	36.7
45-54	Male	2005	0.3	66.4	55.7	2.3	3.6	31.3	40.7
		2012	0.3	53.7	42.4	5.0	6.9	41.3	50.7
	Female	2005	0.3	82.3	71.6	1.5	2.4	16.2	26.1
		2012	0.3	68.5	56.5	8.8	12.9	22.7	30.6
55-64	Male	2005	0.3	81.3	72.3	2.0	3.2	16.7	24.5
		2012	0.3	73.1	65.3	2.8	4.5	24.1	30.2
	Female	2005	0.3	93.2	87.5	1.3	2.5	5.5	10.0
		2012	0.3	80.4	68.6	6.3	10.4	13.3	21.0

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