The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

The Future of Smallholder Farming in Malawi

Milu Muyanga, Zephania Nyirenda, Yanjanani Lifeyo

& William J. Burke

MwAPATA Institute
Working Paper No. 20/03

August 2020

P.O. Box 30883 Capital City, Lilongwe Malawi
Chilanga Drive, Off Blantyre Street, Area 10/44

Muyanga (m.muyanga@mwapata.mw) is the Research Director of the MwAPATA Institute and an Assistant Professor in the Department of Agricultural, Food and Resource Economics at Michigan State University. Nyirenda and Lifeyo are Research Assistants at MwAPATA Institute. Burke is a consultant for Michigan State University and an advisor to the MwAPATA Institute.

© MwAPATA Institute, 2020

The Future of Smallholder Farming in Malawi

Milu Muyanga, Zephania Nyirenda, Yanjanani Lifeyo & William J. Burke

Executive Summary

This paper seeks to understand the nature of the smallholder agriculture in Malawi, outline the key challenges facing agricultural growth, and identify strategies for moving Malawi forward. Findings from this study indicate that, given the current status of smallholder farming in Malawi, the outlook is quite bleak. Farm sizes are already quite small, with 76 percent of the population of farmers operating farms below one hectare. About 30 percent of the farmers are already virtually landless and struggling to sustain a family on less than half a hectare of land. The population continues to grow while the scope for expanding the amount of land under cultivation seems very near or already at the frontier of its potential. Agricultural productivity is low, despite the high intensity of fertilizer use in the country compared to many other SSA countries. This problem is attributable to degraded soils as a result of continuous cultivation without fallowing. It seems the soils are degraded to a point that crop's response to inorganic fertilizers is impaired by the low soil organic carbon content. About 42 percent of Malawians are trapped in areas where sustainable intensification may not feasible with the existing on-shelf agricultural production technologies.

The country is experiencing a rapid rise in the number of young people. About two thirds of Malawi's population is under 24 years of age, and 45 percent is under 15 years. Absorbing this group into employment is a major challenge at present because of slow economic growth. The non-agricultural wage jobs are unlikely to provide employment for a large share of these youths. This means a great majority of the youths will depend on farming and agricultural related informal sector jobs for their livelihoods. Agriculture is the leading employer accounting for over 70 percent of total employment in Malawi. The share of employment from the industrial sector has stagnated at about 8 percent. Employment in the services sector is growing and stands at 20 percent. It seems the country is fast evolving into a non-producing and vending economy. The study findings also show that the country

is not urbanizing fast enough to stabilize available farmland. Urbanization has the potential to provide numerous opportunities for local farmers and employment for rural populations that is being squeezed out of farming as a result of land related constraints.

The results also show that a large proportion of children in the school going age are out of school and a very small proportion is transitioning to secondary schools. This implies that even smaller proportion is transitioning to post-secondary institution of higher learning and potentially being equipped with skillsets that required in the emerging knowledge economy. The majority of those people being edged out of farming will likely be taking the few industrial and service jobs that do not require formal education. The main challenge associated with these types of jobs is that earnings tend to be usually low. They are basically "poverty jobs" characterized by insufficient social protection and thus increased vulnerability to poverty.

That said, by any realistic assessment, agriculture will need to be the engine of growth. For one, barring certain oil-rich countries, no economy in history has successfully transitioned from being poor and agricultural to non-poor and industrial without first increasing agricultural productivity. Most importantly, there are not enough jobs outside of agriculture available to absorb the huge proportion of the population that is underemployed in agriculture or being edged out due to increasing land constraints. A majority in this group are the youth and young adults. Therefore, agricultural productivity is the realistic growth engine. In the classic model of structural transformation, increases in agricultural productivity lead to surplus production, which simultaneously leads to more disposable income for productive farmers (and their employees), spurring demand for goods and services goods and services generated off the farm, while freeing up labor to supply non-farm goods and services. A major lesson to be drawn from the Asian structural transformation experience is that, for any growth to substantially reduce poverty, it must be broad-based such that a large proportion of the population is able to participate in the process. Growth starting from any other sector of the economy is unlikely to be inclusive and likely to exclude the poor, a group that constitutes large proportion the country's population.

History suggests that attempts to artificially stimulate one (supply of or demand for non-farm goods and services) without the other are costly and ill-fated. The country needn't look any further than its own stalled attempts at import substitution industrialization for an historical example. The critiques of World Bank and IMF structural adjustment programs notwithstanding, the fact remains that import substitution led to heavy burdens on national coffers and debilitating explicit and implicit taxation. Both supply of and demand for non-farm goods are necessary, but neither is likely without agricultural productivity growth. As bleak as Malawi's situation appears currently, and even though the obstacles in its way are formidable, there is just no evidence to support notions that broad-based economic growth will follow anything except agricultural growth.

Fortunately, there is also no evidence to suggest that Malawi's fate is already determined, and there is ample evidence on ways to avoid the grim Malthusian trap that a 'business as usual' strategy may lead the country into. The fact that current agricultural productivity is so low seems dismal, and it is, but it also represents Malawi's greatest source of potential. The country has large yield gap in virtually all crops. Evidence exists showing that the greatest return on investment for agricultural productivity growth come from: (1) research and development, (2) education (especially farmer extension), and (3) infrastructure (especially roads and electricity). Shoring up land rights and tenure laws incentivize long-term investments in soil health could also enable sustainable intensification on Malawi's relatively limited and ultimately finite land resources. Secure land rights also enable mutually beneficial transfer of land towards the most productive uses could increase national land productivity. However, there is a need to strike a balance between efficiency gains and fairness in land allocation especially in country where a large proportion of the population is likely to become landless and non-farm jobs are growing slowly.

The country will also need to deal with some of the already known challenges, such as an unpredictable policy environment featuring frequent ad hoc decision-making that threatens agricultural commercialization; a lack of coordination between government policy and public and private investment decisions; and a limited voice for private sector and civil society in the policy-making processes. Providing a commercially friendly (open, fair and predictable) policy environment and avoiding the temptation of reactionary and/or politically expedient rules-of-the-day allows for ruminative commercialization in agriculture and other sectors. Ad hoc trade rules lead to a large informal sector that is difficult to regulate.

A huge potential to revitalize smallholder farming exists amid the challenges and new megatrends that are threating smallholder farming in Malawi. Several other countries in SSA have overcome similar challenges. It is possible for Malawi to thrive as well, but not without deliberate and informed efforts to guide the process. We call on policy makers to take an honest stock of whether the past efforts have been sufficiently successful and, if not, seek ways to make improvements. It is imprudent to take sides and retreat to corners in a fruitless debate over whether past efforts were “good” or “bad”. Such discussions seem to inevitably devolve unproductively into a disagreement on benchmarks, unable to proceed past the fact that outcomes can be simultaneously “better” and “worse” than they could have been. Most importantly, that debate doesn’t need to be resolved in order to recognize the need and the potential to do better. Malawi’s fate is not sealed, but it depends wholly on the willingness of policy makers and policy researchers to learn and to evolve.

1. Introduction

Smallholder farmers operating less than 5 hectares constitute the bulk of agricultural producers in Malawi. Most of them are poor and food insecure (World Bank, 2018). A smallholder-led growth strategy has been touted as solution for reducing poverty in the sub-Saharan Africa (SSA) region (Mellor, 1995). Growth starting among smallholders is likely to have far higher growth 'linkages' than growth in any other sector. A major lesson for the region from the experience of smallholder-led growth in Asia is that agricultural growth must be inclusive – a large percentage of the rural smallholder population is able to participate in the process – if it is to reduce poverty. The Asian green revolution was a small farm phenomenon: over 80 percent of farms in India, Bangladesh, Indonesia, China, Japan and Viet Nam were less than two hectares (Johnston and Kilby, 1975; Mellor, 1995). The Asian green revolution was broad-based thus contributing greatly to rural poverty reduction. Smallholders tend to spend their incomes on locally produced goods and services, therefore stimulating the rural non-farm economy and creating additional jobs. A fundamental element of the structural transformation process is smallholder commercialization – a transition from subsistence to market-oriented patterns of production and input use. Smallholder commercialization can include a cycle in which farmers intensify use of productivity-enhancing technologies, achieve greater output per unit of land and labor expended, produce greater surpluses, expand their participation in markets, and ultimately raise their incomes and living standards.

The evidence from Asia notwithstanding, recent trends cast doubt on the viability of the smallholder-led agricultural transformation strategy not only in Malawi but in SSA in general. The smallholder farming in Malawi is bedeviled by a myriad of problems ranging from low productivity, dependence on rain-fed production systems with only one growing season and limited use of irrigation, and low return opportunities within agriculture. Many agricultural value chains have huge unmet potential.

In addition to these known challenges, the country must deal with emerging *megatrends* shaping the region's economic, political, and social landscapes. These include mounting population densities; and *youth bulge* that offers unprecedented economic opportunity if this group is fully employed in productive activities or a threat to social cohesion and political stability if the group remains largely unemployed. Arable land frontiers are closing with increasing populations resulting in tiny farm sizes and increased constraints in access to agricultural land especially in the Central and Southern Regions. Much of Malawi farming is sliding into greater vulnerability each day with increasing weather variability associated climate change. The neo liberal policies of 1980-90s opened doors to a more uncertain market environment. This led to some smallholder production re-adjustment away from high yielding and high input intensive crops to crops that require few purchased inputs and offering either quick or more regular, year-round returns (Bryceson and Jamal, 1997).

These problems are compounded by inadequate infrastructure, unpredictable policy environment featuring frequent *ad hoc* decision-making threatening agricultural commercialization; lack of coordination between government policy, and public and private investment decisions; and limited voice for private sector and civil society in the policy-making processes.

This paper examines if there is potential to revitalize smallholder farming amid the pre-existing challenges and the new megatrends that are threating smallholder farming in Malawi. The specific objectives of the paper are to: (1) understand what the smallholder agriculture sector looks like now; (2) outline the key challenges facing agricultural growth; and (3) identify strategies for moving Malawi forward.

While the challenges facing the country may seem daunting, it is important to emphasize at the onset that the problems are not insurmountable. Several countries in SSA, Rwanda and Ethiopia for example, have overcome similar challenges. It is possible for Malawi to thrive as well, but not without deliberate and informed efforts to guide the process. While the mega trends may be largely exogenous, their outcomes effects are not inevitable. The outcome will depend on today's policy actions (or inactions). There are huge potential gains that can be reaped from agricultural transformation, chief among them the obvious humanitarian gains that can be made by improving the livelihoods of Malawians. There is also strong political will to achieve them. The country has demonstrated its grit and willingness to attempt large and meaningful reforms, short of this, there is real potential for political and social turmoil if meaningful change and growth are not achieved.

2. Data Sources

The paper draws from numerous sources of data sources. First, the *2018 Malawi Housing and Population Census Data.* This is national households and housing census data collected by NSO in 2018. Second, *Food and Agriculture Organization of the United Nations Statistical Database* (FAOSTAT). Disaggregated information on population growth and projections, densities, and structure was drawn from these two sources.

Third, World Bank *Integrated Household Surveys (IHPS)* panel data. The IHPS are three waves of nationally representative panel data collected by the National Statistical Office of Malawi (NSO). This panel is a part of the World Bank Living Standards Measurement Studies (LSMS). The surveys were conducted 2010, 2013, and 2016.

Fourth, MwAPATA Institute's *Malawi Rural Agricultural Livelihood Survey (MRALS) 2019.* This is the Agricultural Transformation Initiative (ATI) baseline data. The data is representative of farm households at the eight (8) selected districts level. The survey covered two districts in the Northern Region (Rumphi and Mzimba), four in the Central Region (Lilongwe Rural, Dowa, Kasungu, and Michinji), and two in the Southern Region (Neno and Blantyre Rural). During the household listing stage, a short instrument was administered to all households owning farms – large or small - within a sampled EAs. This captured information on farm size, as well as the main residence (rural/urban) and main occupation (farm/non-farm) of the farm owner. This information was captured irrespective of farm scale or the owner's place of residence. In cases where the farm owner was an urban dweller and thus not available at the time of listing, the information was obtained from close neighbors and/or local leaders. A longer version of the instrument that elicited information on household demographics, farm production, and marketing was administered to sampled households only during the second phase of the survey.

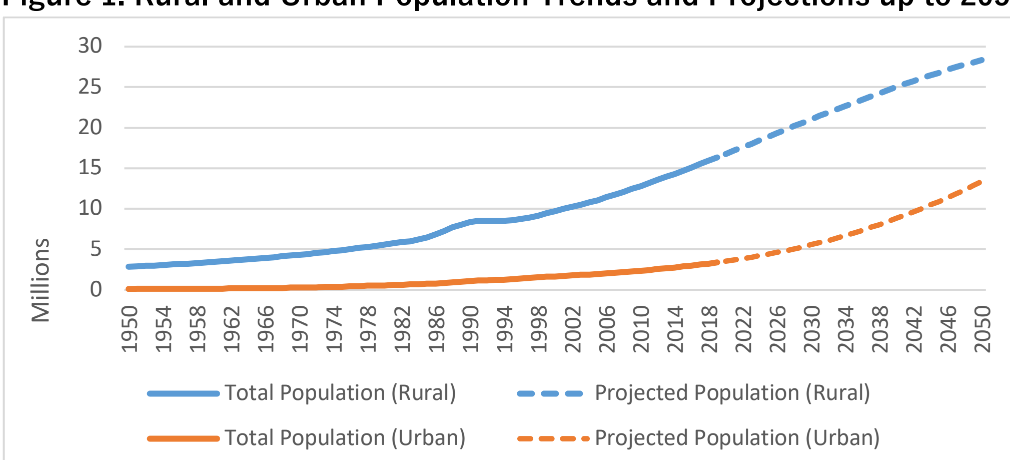
3. Main Challenges facing Agricultural Growth in Malawi

Malawi faces many challenges. Some are related to the intersection of demography and geography – rising population, low urbanization and shrinking farm sizes. Others relate to how farmland is used – the limits of Malawi's brand of intensification and the (lack of) resilience to weather shocks. Policies themselves can be counter-productive – for example, policy uncertainty can put a damper on investments, tenuous land rights limit incentives to make long term investments and hinder the development of land markets (which would allow for land to be transferred to the most efficient users), while inadequate infrastructure drives up the costs of doing business. As a result, there are limited opportunities for Malawians either within our outside of agriculture. For the remainder of this section, we will systemically examine each of these issues in detail.

3.1. Mounting Population Growth and Densities

Population densities in sub-Saharan Africa, and Malawi in particular, are much higher than they were some two decades ago. While population growth has slowed down or plateaued on other continents, it has been on the upward trajectory in sub-Saharan Africa, Malawi included (Figure 1). The UN predicts that Malawian population will grow from 19.1 million in 2020, to 25.8 million by 2030, 34.1 million by 2040, and 44.1 million by 2050 (United Nation, 2019). Increasing population density is causing a number of problems in the country. There has been a gradual decline in mean farm sizes. A substantial fraction of Malawi's rural population now lives in relatively densely populated areas where land scarcity is becoming a binding constraint to agricultural production and productivity. Shrinking farm sizes are leading to unsustainable agricultural intensification as soils become degraded. As already mentioned in the introduction, increasing population growth is leading to increased proportion of people below the age 25 years (youth bulge). Next, we discuss in more details these population related challenges.

Figure 1. Rural and Urban Population Trends and Projections up to 2050



Source: World Development Indicators (2020)

Diminishing farmland sizes and unsustainable forms of agricultural intensification

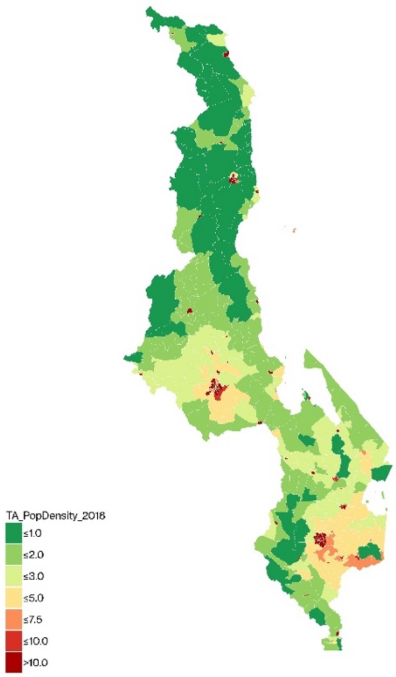
For many years raising land productivity, or agricultural *intensification,* has been touted as a possible strategy for increasing agricultural production in areas of shrinking farm sizes (Mellor, 2014). As farms get smaller, farmers intensify their use of productivity-enhancing technologies and achieve greater output per unit of land and labor expended. However, there is mounting evidence that at very high levels of rural population density, the well accepted positive relationship between population density and land productivity breaks down (Muyanga and Jayne, 2014; Ricker-Gilbert et al., 2014; Josephson, et al., 2014). Agricultural intensification is found to rise with population density up to about 500 persons/km^2; beyond this threshold, rising population density is associated with sharp declines in output per unit of land. These unsustainable agricultural productivity trends are being attributed to factors such as land fragmentation, continuous cultivation without fallowing leading to deterioration in soil quality.

For example, Willy et al. (2018) find presence of a 'silent' form of soil degradation as a result of dwindling soil organic carbon and critical soil micronutrients as well as increased soil acidity due to continued use of inorganic fertilizers on tiny pieces of land.

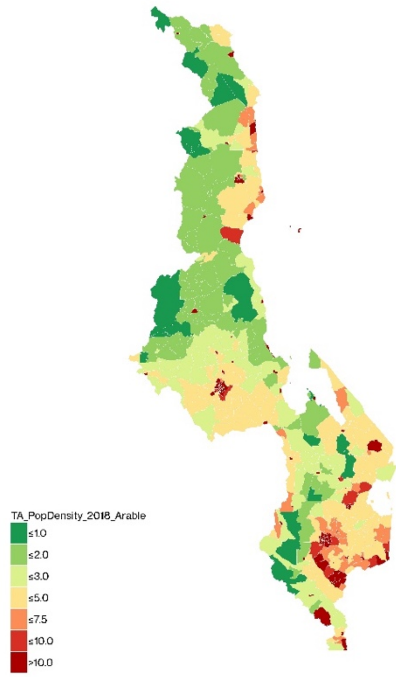
Next, we would like to get an indication of the proportion of the Malawian population that is residing in areas exceeding the 500 persons/km^2 population density threshold. Assuming an average household size of 5 persons (Government of Malawi, 2018), the 500 persons/km^2 translates to 5 people per ha of land. This roughly means unsustainable agricultural intensification kicks in when population densities exceed one household per hectare. In Figure 2(a) shows rural population densities in Malawi using the 2018 Malawi Population and Housing Census data at Traditional Authority (TA) level. Population density is defined as the number of persons in the TA divided by the TA's total land area (km^2). In Figure 2(b) population densities are computed using the TA's total *arable land* as the denominator. Arable land is loosely defined as the total land less the amount of land unavailable and unsuitable for farming (land under forests, water bodies, roads, and buildings, etc.). In Figures 2(c) and (d) we replicated the same graphs, but this time using projected population densities for 2048. To project population counts for the year 2048, we used 2018 Malawi Population and Housing Census data at district level from 2008 to 2018

Figure 2. Rural population densities (persons per km²) – actual and projected

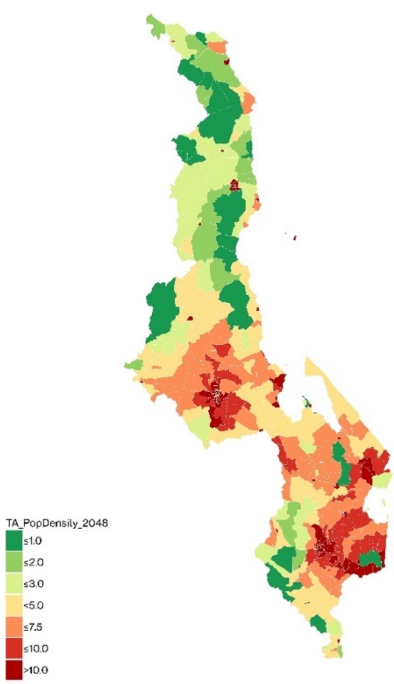
a. Population densities (2018)



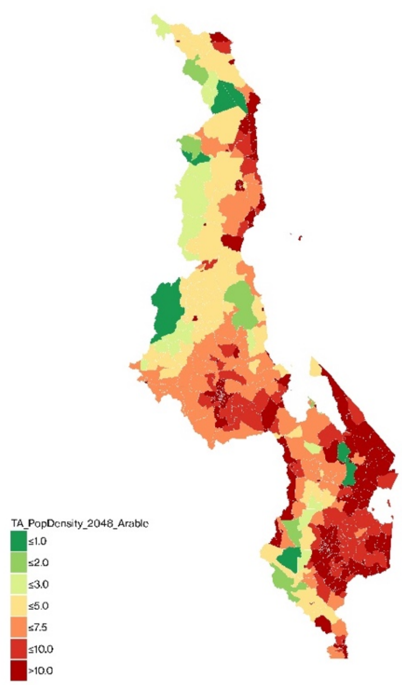
b. Population densities in (2018-using arable land)



c. Projected population densities (2048)



d. Projected population densities (2048 - using arable land)



Note: Maps produced by ORG PERMANENT MODERNITY using 2018 Malawi Population and Housing Census Data.

Table 1. Percent of the Population That Would Need to Exit Traditional Authority to Maintain One Hectare of Land per Household

	2018	2028	2038	2048
Southern Region	5.3%	10.4%	16.6%	22.5%
Central Region	0.7%	17.0%	27.4%	35.8%
Northern Region	0.3%	5.7%	6.2%	6.2%
Overall	6.3%	13.4%	25.0%	38.8%

Source: 2018 Malawi Population and Housing Census and projections by the authors.

to calculate growth rates for the past decade. Then we used these growth rates to project populations up to year 2028 at the TA level holding all the other factors constant.

The results show that about 12 percent of the land in rural Malawi has already reached the 5 persons/ha population density threshold and about 42 percent of the population is trapped in areas where sustainable intensification is not feasible (Figure 2a). When population density is defined as the number of people per ha of arable land, the percentage of land that reached the population density threshold increases to 34 percent with 63 percent of the rural population residing in such places (Figure 2b). It is projected that over 90 percent of the population will be residing in TAs with population densities exceeding the 5 persons per hectare threshold in 2048. The total area under such will be about 58 percent of the total land (Figure 2c) and about 87 percent of the total arable land (Figure 2d).

If we continue with the assumption that each household needs at least a hectare (5 persons/ha) of arable land to engage in farming in a sustainable way, we would like to find out the proportion of the population that needs to move out of farming to maintain the hectare per household in the TAs that have already hit the population density threshold. Results presented in Table 1 show that about 6.3 percent of the population in the TAs that have already reached the population density threshold must move out of farming in their TAs of residence. Most of these TAs are in the Southern Region of the country. Only about 0.7, and 0.3 percent of the population needs to exit farming in their respective TAs in the Central and Northern Regions, respectively. For this group to engage in sustainable farming, it must either lease or buy land in more land abundant TAs. Else, the group may have to quit farming altogether and engage in off-farm or non-farm activities in the rural or urban areas.

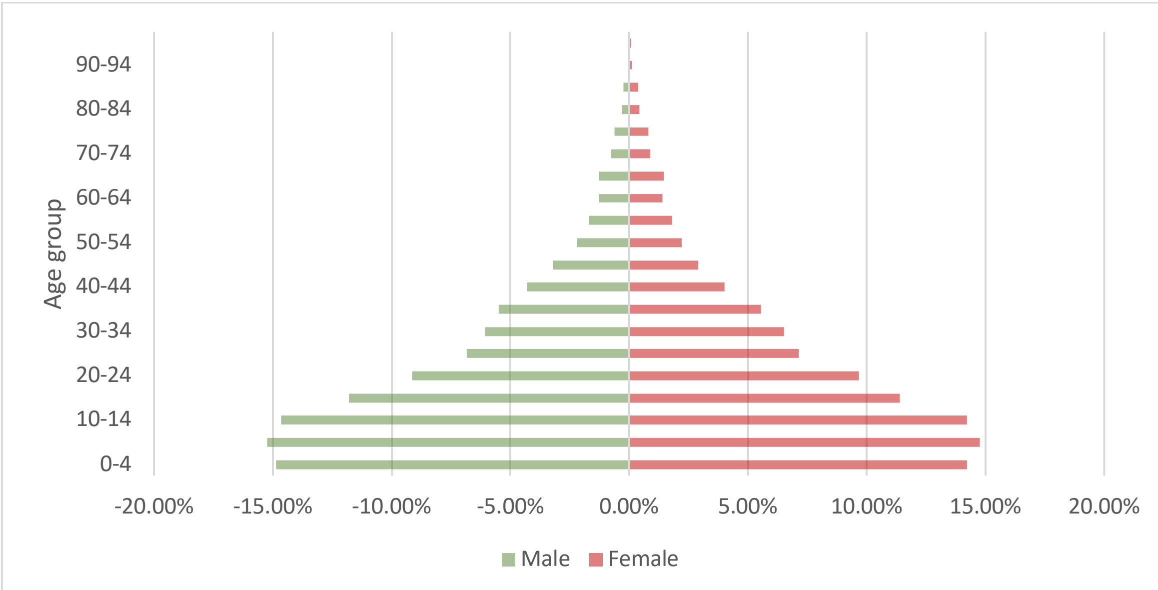
Again, assuming a constant rural population growth rates, no migration out of the TAs, no changes in existing on-shelf agricultural production technologies, and that arable land remains fixed, Table 1 shows the projected percentages of population that will need to move out of farming in their TAs to maintain the hectare per household threshold in 2028, 2038 and 2048. The proportion of population unable to access land in their respective TAs will increase in the coming years reaching almost 40 percent in 2048. A greater proportion of this group will be able to access land in land abundant TAs either within or outside their regions. However, by 2038, about 10 percent of the rural population will need to move completely out of farming to either off-farm or non-farm jobs to maintain the one hectare per household landholding threshold in the country.

It is important to note the following from the foregoing analysis: First, the estimations and projections are conservative and are likely to change if we relax some of these assumptions. For example, increased population growth rates will increase the proportion of population that needs to migrate to land abundant areas or get out of farming. Second, soil degradation as a result of increased pressure on land and nutrients mining is likely to reduce the land carrying capacity. Conversely, new innovations in productivity enhancing technologies are likely to increase the land carrying capacity, thereby delaying the unsustainable forms of agricultural intensification. Third, the hectare per household threshold shows the lower limit of population density beyond which unsustainable forms of agricultural intensification are expected kick in. The threshold doesn't mean the one-hectare farm sizes are profitable, and likely to generate a surplus to spur the smallholder-led agricultural transformation process. Agricultural transformation requires farms that can generate a surplus, expand their participation in markets, and eventually generate increased money flows and spending in rural areas. Fourth, we are assuming land markets operate efficiently and can transfer land from those who have excess to those who are being crowded out in densely populated areas. To the contrary, evidence exist showing that land market operations are thin in Malawi and in most occasions are succeeded in facilitating land to more productive farmers (Chamberlin and Ricker-Gilbert, 2019) and not necessarily to the landless or near landless.

Rapid rise in the number of young people

Another problem associated with high population growth that presents a critical development challenge in Malawi is the youth bulge. Malawi, just like other countries in SSA, is experiencing a rapid rise in the number of young people. According to the 2018 Malawi

Figure 3. Malawi population age pyramid in 2018



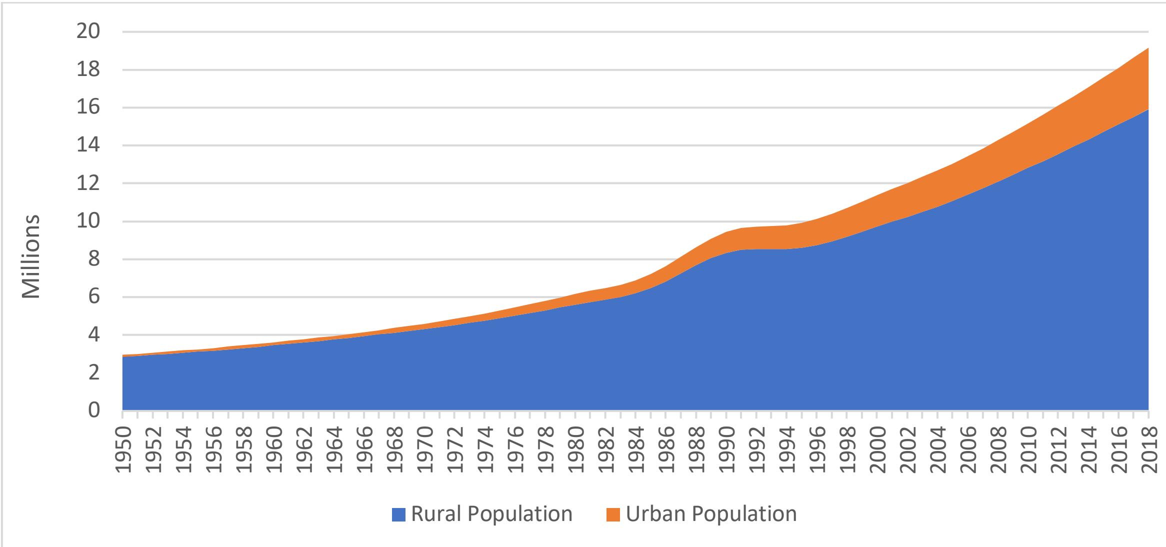
Source: 2018 Malawi Population and Housing Census. Note: The horizontal reference line highlights that the majority of Malawians (74%) are below 25 years of age.

Population and Housing Census data, about two thirds of Malawi's population is under 24 years of age, and 45 percent is under 15 years (Figure 3). Soon, these youths will be graduating into adulthood and will need employment to feed their families. As Fox and Sohnesen (2012) observe, even under the most optimistic projections of non-farm employment growth, the non-agricultural wage jobs are unlikely to provide employment for a large share of the youths in SSA, Malawi included.

During the post-independence period in SSA, non-farm employment took place mostly in the public sector (Fox and Sohnesen, 2012). However, this is no longer the case with the introduction of the neo liberal policies of 1980-90s. The private sector in this region is still small and has been unable to absorb the rapidly growing labor force in the rural areas (Fox and Sohnesen, 2012). This means a great majority of the youths in SSA population, Malawi included, will depend on farming and agricultural related informal sector jobs for their livelihoods.

The urgency and importance of addressing the youth bulge cannot be overemphasized. The youth bulge could evolve into either a demographic dividend or disaster. If this group could be fully employed in productive activities, the level of average income per capita could increase. However, if the group remains unemployed the youth bulge could quickly become

Figure 4. Rural and Urban Populations in Malawi



Source: FAOSTAT (2020)

a demographic disaster. Unemployed youths and young adults have been associated with violence and political instability in sub-Saharan Africa (United Nations, 2019).

Urbanization is low and happening slowly

As mentioned in the background section, urbanization has the potential to provide numerous opportunities for local farmers and employment for rural populations that is being squeezed out of farming as a result of land related constraints. While declining farm sizes reflects the diminishing land frontier in Malawi, it also reflects the failure of the country to urbanize fast enough to stabilize available farmland. The proportion of urban population remain low and growing slowly (Figure 4). According to the 2018 Malawi Population and Housing Census data, the percentage of urban population was recorded at 14, 15, and 16 percent in 1998, 2008, and 2018, respectively.

A key lesson to be drawn from the Asian countries' agricultural transformation and the associated rural poverty reduction was the mass reduction in the number of people engaged in agriculture and a massive increase in the urban population (Collier and Dercon, 2009). If currently there is any economic growth taking place in the urban areas, such growth is unlikely to be broad based and inclusive given the slow pace of rural-urban transitions.

3.2. Policy Environment is Uncertain thus Unconducive to Investment in Agriculture

The policy environment of an economy is a key determinant of the economy's overall performance. In the agriculture sector, policy determines whether farmers can engage in production and marketing, especially with regard to the export of certain crops and livestock products. The Government of Malawi has been heavily involved in these markets. Some of the relevant legislation includes the Agriculture General Purposes Act, the Special Crops Act and the Control of Goods Act. Most of these policies were put in place soon after the country's independence in early 1960s and reflected the political spirit of self-determination. While some of issues motivating the policies (such as land rights and access) are still relevant. Some elements of these older policies, however, cannot cope with the realities of a relatively liberalized economy and are not supportive to private sector investments and agricultural commercialization. This has resulted in unpredictability and occasional inconsistencies in policy intervention.

Unpredictability and inconsistency in policy action has led to a very uncertain environment that stifles the operations of private sector players (Comstock et al., 2018). For example, while the objective of ADMARC operations in grain markets is to stabilize farm produce prices, ADMARC's buying price has, at times, been far below the official government set minimum prices. The discretionary policy around export and import bans of agricultural produce is also very unpredictable. For example, the government banned export of maize in 2016[1] when farmers had just harvested, and prices were low. The ban was lifted after poorer farmers (who could not afford to store their produce) had already sold to vendors. Similarly, the government banned exports of soya in November of 2017 only to lift it after less than a month in December. These actions can be very disruptive, especially when bans are implemented long after production decisions and investments are made.

With regard to the Farm Input Subsidies Programme (FISP), evidence indicates commercial farmers in Malawi do not engage in maize production because the FISP distorts the maize markets (Edelman et al., 2016). These farmers argue that maize is not commercially profitable because there is no guaranteed market through ADMARC and/or NFRA. Further, maize grown commercially cannot compete with maize produced with

[1] See the Nation Newspaper of July 14, 2016.

subsidized inputs. Jayne and Rashid, (2013) and Ricker-Gilbert et al., (2011) show that FISP fertilizer also displaces commercial fertilizer sales. Furthermore, it is claimed that awarding of FISP fertilizer supply contracts benefits the politically connected persons thus affecting private sector investments on fertilizer.

These examples demonstrate significant policy constraints that can disincentivize commercialization. Reformulating these policies could considerably aid the creation of a more enabling environment for private sector investments in agriculture.

3.3. Government Investment in Infrastructure is Inadequate

The Malawi Growth and Development Strategy III recognizes transportation and energy sectors among the six key priority areas outlined to spur sustainable social and economic growth from 2017 to 2022. However, the transportation and energy sectors face several challenges that contribute to high costs of doing the agricultural business in the country. Malawi is among the countries that have made a least investment in rural transportation systems in sub-Saharan Africa (Japan International Cooperation Agency, 2020a). As a result, the country's rural areas are characterized by poor road conditions. About 74 percent of the total road network is unpaved and dilapidated (World Bank, 2019). While the road sector receives almost 1.4 percent of the total GDP from the national budget annually, most of these funds go to construction, maintenance and rehabilitation of roads in urban and peri-urban areas, while rural roads remain unpaved and unmaintained (World Bank, 2019). Close to 38 percent of the villages in Malawi are not accessible by motorized vehicles in the rainy seasons and only 26 percent of the total population lives within 2 kilometers of an all-weather road (Foster and Shkaratan, 2011; Goldberg, et al., 2011). These factors contribute to limited access to markets and increased cost of transportation of farm produce between farms and markets.

The cost of energy has a bearing on investment in agricultural produce value addition. Malawi has a diverse energy mix with about 85 percent of total energy coming from biomass, 3.5 percent petroleum and 2.3 percent from electricity (Sustainable Energy for All, 2020). The energy sector in the country is unable to meet the ever-growing energy demands. Power supply has fallen short of growing demand stimulated by urbanization and population growth. The total country's electrical capacity is around 351MW hours per day. As a result, less than half of the urban households and only four (4) percent of rural households have access to electricity (JICA, 2020).

About 95 percent of Malawi's electricity is generated by hydropower. This becomes a problem when water levels decline due to droughts. Power blackouts of 2-4 hours and load shedding are very common during dry seasons in urban centers. These problems are now compounded by the weather variability and reduced precipitation as a result of climate change. Furthermore, environmental degradation causes siltation of rivers and reduced water levels at hydropower power stations. Aging and poor maintenance of hydropower plants has also limited production of electricity in the country. For example, Nkula Falls hydropower plant, which provides more than 50 percent of Malawi's total electricity supply, encounters 20 to 25 percent loss of the total generated electricity in some years (Sabet, et al., 2014).

Even though the government liberalized the energy sector to allow Independent Power Producers (IPPs) to take part in power generation, very few IPPs produce or supply electricity. This has been attributed to policies that are not conducive for private sector investors. The main challenge is low base tariffs offered by the single buyer Electricity Supply Corporation of Malawi Limited (colloquially called ESCOM), which most IPPs find unprofitable. To meet the growing demand in electricity, the state Electricity Generation Company (EGENCO) supplements with relatively expensive diesel-powered generators to provide electricity during peak hours.

3.4. Agriculture is not Resilient to Weather Shocks

As noted previously, farming in Malawi is dominated by rain-fed agriculture with limited irrigation. It is becoming increasingly apparent that climatic variability adversely affects rain-fed agricultural production systems. Climate change is causing a continued rise in global hunger, with both droughts and flooding negatively impacting food production. For example, the effects of the El Niño droughts in 2015-2016, and the Cyclones Idai and Kenneth in 2019 resulted in about 41.2 million people being exposed to food insecurity in SADC member states (SADC, 2019). Evidence is emerging showing that cereal production in Southern Africa is declining and the number of people in need of food assistance as a result of weather-related shocks is on the increase (FAOSTAT)[2].

Studies show the majority of households in Southern Africa, Malawi included, have not built their own resilience to climate shocks because of poverty and land constraints associated with high population growth (Galarza and Ximena, 2019). As a result, dependence on food aid has become a norm, limiting the levels of donor aid flowing to agricultural development (Mangani et al., 2020). The frequent food insecurity has pushed farmers to devote more farmland and time to maize production at the expense of high value crops (Sesmero et al., 2018). The situation is exacerbated in Malawi by shrinking farm sizes. Consequently, many farmers may become trapped in a vicious climate-induced poverty trap if community resilience and the vulnerability of agriculture to climate related shocks is not addressed.

3.5. Household Farmland and Landholding Sizes are Shrinking

In this section, we examine the household farm and landholding sizes in Malawi using the IHS/LSMS panel households. We categorize the households by their farm sizes, defined as the area operated which is sum of area under crop and pasture, though notably area under pasture constitutes less than one percent of the total operated area. Landholding is defined as the land owned by the household. This includes the area operated (under crop and pasture), land under fallow, rented and borrowed out land, and land owned by the household that is not under any use. Results show that household farm and landholding sizes in Malawi are not only small but shrinking. Farm sizes declined more than six percent between 2010 and 2016, from an average of 0.78 to 0.73 hectares. Similarly, average landholding sizes declined by nine percent from 0.77 to 0.70 hectares over the same period.

In Table 2 we present the distribution of farm households across various land categories in Malawi. The results show that smallholders (farmers operating less than 5 hectares) constitute virtually all farm households in the country, increasing from 98.9% to 99.5% from 2010 to 2016. Medium-scale farmers constitute less than one percent of the total farm

[2] Sources: FAOSTAT, FAO Special reports, World Bank data, SADC Reports.

Table 2. Distribution of farm households across farm size categories

Farm size category	2010		2013		2016		% growth between 2010 and 2016
	Number of farm households	%	Number of farm households	%	Number of farm households	%	
0- 0.5ha	753,167	28.89	762,881	24.04	889,303	30.98	18.08
0.5-1ha	790,130	30.31	850,164	26.79	950,924	33.12	20.35
1-2ha	728,628	27.95	968,613	30.52	757,216	26.37	3.92
2-5ha	306,469	11.75	529,398	16.68	260,081	9.06	-15.14
5-10ha	25,629	0.98	57,976	1.83	10,282	0.36	-59.88
>10ha	3,168	0.12	4,739	0.15	3,167	0.11	136.55
Total	**2,607,190**	**100**	**3,173,770**	**100**	**2,870,974**	**100**	**10.12**

Source: Integrated Household Panel Surveys (IHPS) 2010, 2013, & 2016

households and their numbers have been shrinking. The most worrying trend is the rapid growth in the number of the *near-landless* farm households; defined as farm households operating less than 0.5 hectares. The group constitutes about 30% of the farm families in 2016 and their numbers grew by 18 percent between 2010 and 2016.

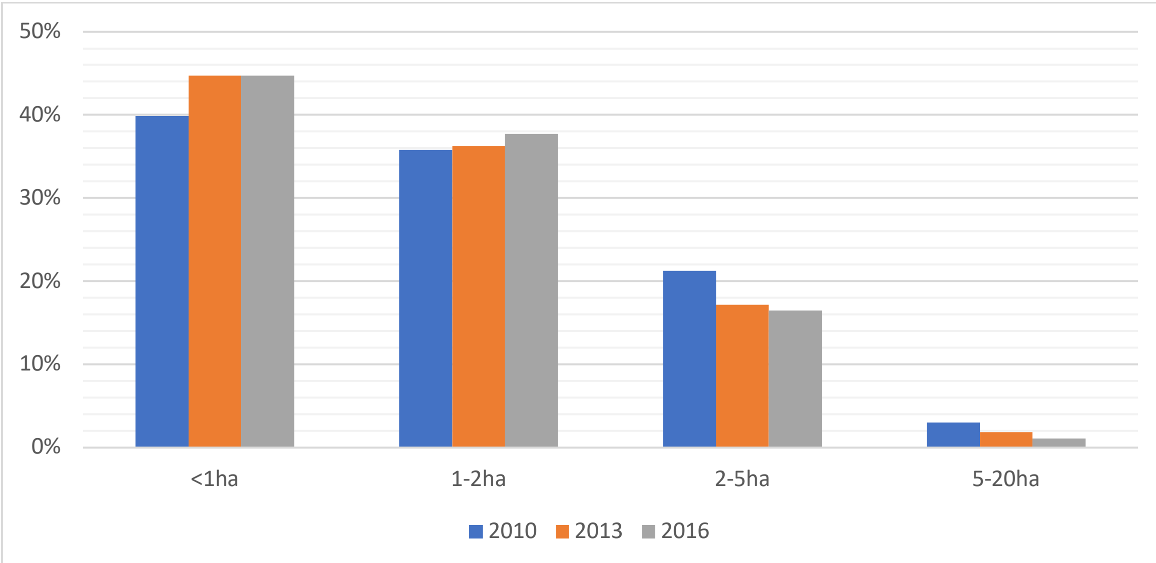
The Southern Region has the highest proportion of farmers operating less than one hectare followed by the Central Region (Table 3); 53% of all farmers with less than one ha in 2010 were in the Central Region, and although the Region's share of this group of farms had decreased slightly (to 51%) by 2016, it is still the home to most of Malawi's smallest farms. Out of the 30 percent near landless farmers observed in Table 2, 57 and 37 percent of them were in Southern and Central Regions, respectively. The results also show that the proportion of farms operating less than one hectare has grown by 54 percent over the panel period. The growth in this category of farms varied across the regions with the more densely populated regions, Central and Southern, experiencing significant growths over the panel

Table 3. Distribution of farm households across farm size categories in the regions

Farm size group	Distribution by Regions								
	2010			2013			2016		
	Northern	Central	Southern	Northern	Central	Southern	Northern	Central	Southern
<1 ha	11%	36%	53%	12%	36%	52%	10%	40%	51%
1 – 2 ha	24%	47%	29%	12%	50%	39%	12%	49%	39%
2 – 5 ha	11%	55%	34%	8%	55%	37%	14%	57%	29%
> 5 ha	0%	53%	47%	0%	75%	25%	0%	97%	3%

Source: Integrated Household Surveys (IHS) 2010, 2013, & 2016. Note: Rows within years sum to 100%. For example, 97% of the farms larger than 5 ha in 2016 were in the Central Region.

Figure 5. Farmland distribution across farm sizes



Source: Integrated Household Panel Surveys (IHPS) 2010, 2013, & 2016

period. The number of below one-hectare farms grew by 68 and 47 percent in the Central and Southern regions, respectively, compared to 36 percent in the Northern Region.

Next, we examine the distribution of land across farm categories. Evidently, almost all the farmland in Malawi is concentrated in smallholder holdings (Figure 5). Medium-scale farms take a small share of the farmland and this share has been declining. Farmland under smallholders operating below 2 hectares has grew between 2010 and 2016. During the same period, the share of farmland under farms 2 hectares and above declined. It is important to note that while the 'near landless' farm household constitute about 30 percent of the farm households in the country, their share of farmland in 2016 was only 20 percent.

Three very important observations emerge from this analysis. First, there is a huge proportion of farm families in Southern and Central Regions of Malawi that is already near landlessness; operating less than 0.5 hectares. The near landless households may progress into landlessness if their farms are subdivided into smaller units. Second, farming in Malawi is dominated by households operating less than two hectares. This group represent 96 percent of the farm households and control 86 percent of the farmland in the country. Third, the proportion of households operating two hectares and above is not only small but shrinking. The group represents less than five percent of farmers and controls about 14 percent the total operated land. Medium-scale farms, defined as farms between 5 to 50 hectares, represent less than one percent of farm households and control about two percent of the total farmland.

Even though nationally representative surveys that adopt population-based sampling are found to undercount medium-scale farms in some other countries, the proportion of medium-scale farms in Malawi was confirmed using the MRALS households listing data. The MRALS 2019 found that the proportion of medium-scale farm households in the eight (8) surveyed districts was about one percent and the proportion of farmland under their control was six percent, four percentage point above the figure that was reported by IHS/LSMS 2016.

3.6. Low Return Opportunities Within Agriculture

For several reasons, the returns to agricultural investments made by many farmers are quite low. This may be due to the productivity of inputs used, especially fertilizer, and the crop portfolios that farmers adopt, including the rate of mono-cropping. These factors, coupled with the fact that Malawian farms tend to be fairly small, contribute to an overall low rate of commercialization.

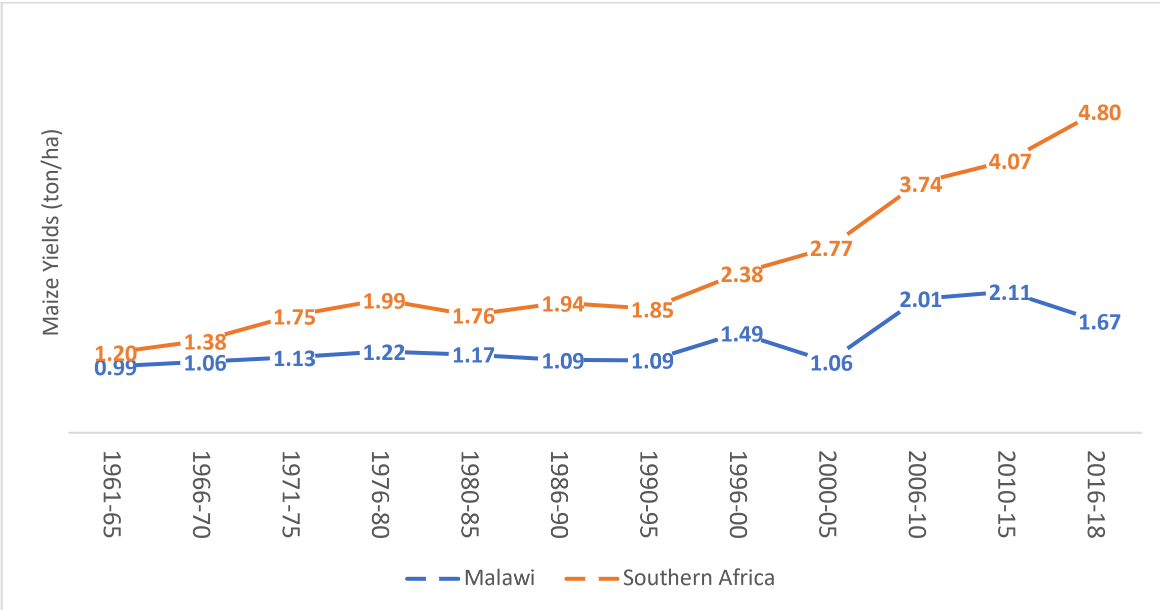
Productivity is low

Fostering higher agricultural productivity remains key in increasing rural farm incomes in SSA. Most SSA countries, Malawi included, have large yield gaps in in almost all crops (Tittonell and Giller, 2013). For example, while maize yields in Southern Africa region have quadrupled since 1960-65 period[3] (Figure 6) reaching about 5 metric tons per hectare in 2016-18, maize yields have remained low and grown marginally from about one metric ton per hectare in 1960-65 period to about two tons per hectare in 2016-18 period.

In Figure 7 we show the crop productivity, defined as gross value of crop output per hectare operated, in Malawi computed from the IHS/LSMS data. The results show that crop productivity is not only low but also declined over the IHS/LSMS panel period. Crop

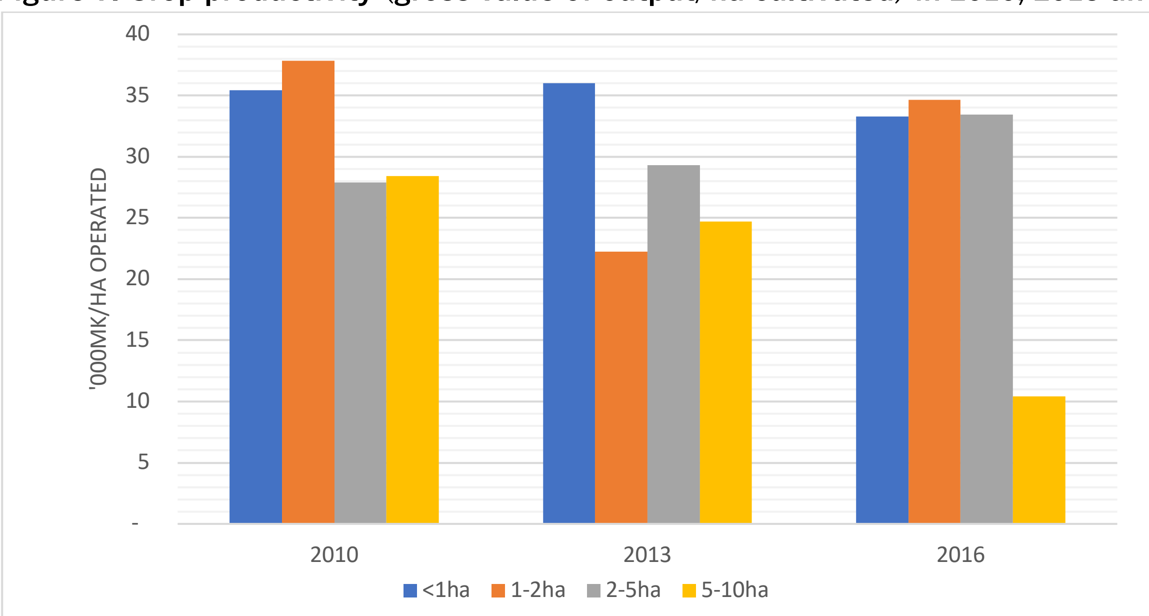
[3] Notably, Southern African yield gains are largely driven by improvements in South Africa. This is nevertheless suggestive of a sizable difference between observed and obtainable yields in Malawi.

Figure 6. Maize yields in Malawi and Southern Africa



Source: FAOSTAT (2020).

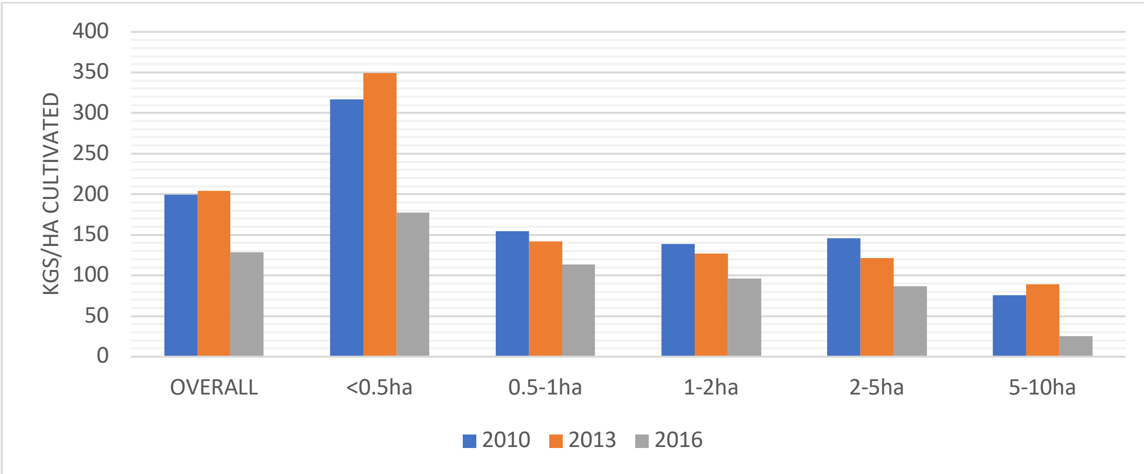
Figure 7. Crop productivity (gross value of output/ha cultivated) in 2010, 2013 and 2016



Source: Integrated Household Panel Surveys (IHPS) 2016

productivity averaged MK33.68 thousand (translates to about US$45) per hectare over the panel period. Generally, productivity seems to be inversely related to the farm size (Figure 7) with smaller farms exhibiting relatively higher productivity levels.

Figure 8. Mean fertilizer application rates by farm sizes



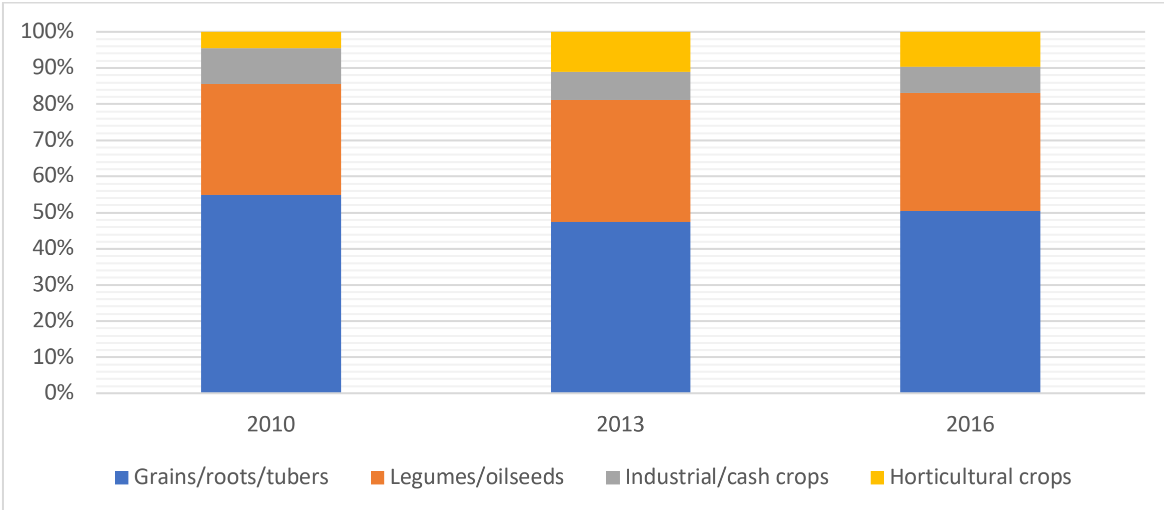
Source: Integrated Household Panel Surveys (IHPS) 2010, 2013, & 2016

Fertilizer use intensity

Using IHS/LSMS data, we analyze fertilizer use intensities in the country over the panel period. Fertilizer use intensity is defined as the total kilogram of all inorganic fertilizer per hectare of land operated. The results show that over 80 percent of Malawian farmers apply fertilizer on their farms. Fertilizer application rates declined by 35 percent from about 200kg per hectare in 2010 to 130kg in 2016 (Figure 8). Mean fertilizer application rates are inversely related to farm sizes with smaller plots having relatively higher application rates. Fertilizer applications rates also dropped over the panel period across all farms categories.

It is important to mention that the 130-200 kg/ha fertilizer application rates are in the same range has those reported in some other SSA countries. For example, the average applications rate is 303kg/ha (152kg basal and 151kg topdressing) in Zambia (IAPRI, 2019) and between 128kg/ha and 310kg/ha in Nigeria (Liverpool-Tasie et al., 2017; Sheahan and Barrett, 2017). While high fertilizer application rates are important, it should be noted that crops response to inorganic fertilizers is dependand on the soil organic carbon content (Drechsel et al., 2001; Marenya and Barrett, 2009; Tittonell and Giller, 2012; Sheahan et al., 2013). Degraded soils are irresponsive to inorganic fertilization. Consequently, as farm sizes continue to shrink with the accompanying soils degradation, the country must brace for impaired crop response to inorganic fertilizers if nothing is done to boost soil organic carbon content.

Figure 9. Farmland distribution across crop categories



Source: Integrated Household Panel Surveys (IHPS) 2010, 2013, & 2016

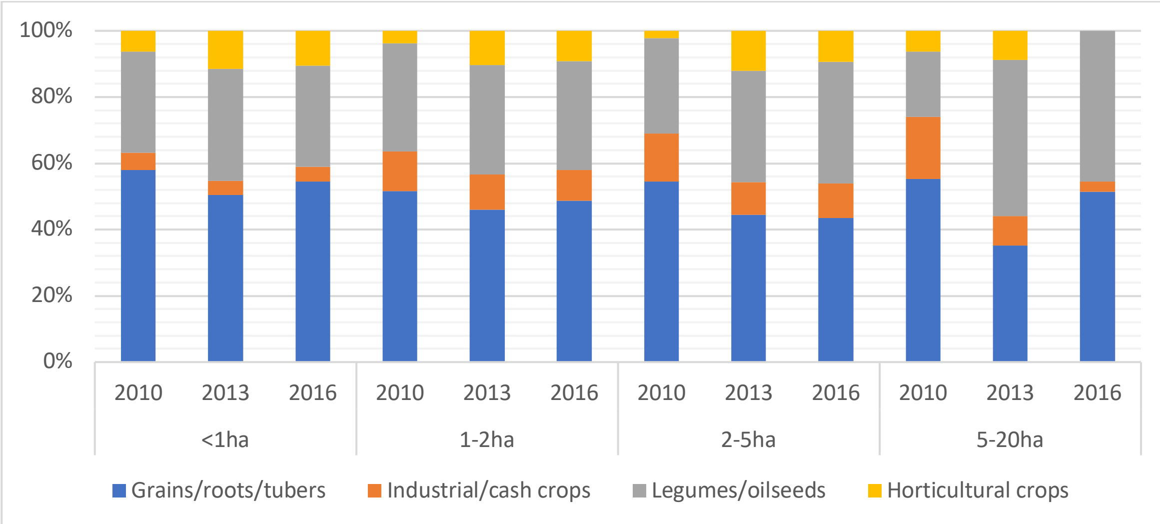
How efficiently are farmers allocating their land to various crop?

In order to get some insights on how efficiently farmers are allocating their farmland to various crops, we examine farmland distribution across crops and value of crop production and sales across farms. We classify crops into the following broad categories: 1) grains, roots and tubers (maize, rice, sorghum, millet, wheat, cassava, sweet potato, and Irish potato); 2) industrial crops (tobacco and cotton); 3) legumes and oils seeds (groundnuts, beans, soya beans, ground beans, etc.); and 4) horticultural crops (fresh fruits and vegetables).

Figure 9 shows operated farmland distribution across crop types. The results show that grains, roots and tubers take about half of households' farmland in Malawi, though their share has declined slightly between 2010 and 2016. Legumes and oil seeds occupy the second largest share of farmland, taking about 30 percent of the national area under crop in 2010 and slightly increasing to 2016. The remaining cropland is distributed between industrial and horticultural crops, each covering about 5-10% of Malawi's area in a given year.

Figure 10 shows how farmland is distributed across crop types within farm categories. Grains, roots, and tubers occupy about 50 percent of the family area under crops across all farm types. However, their share seems to be somehow shrinking over the panel period. Legumes and oil seed crops take about 30 percent. While their share of area cultivated has

Figure 10. Farmland distribution across crop types by farm sizes



Source: Integrated Household Panel Surveys (IHPS) 2010, 2013, & 2016

been relatively stable in 0-1, and 1-2-hectare farms over the panel period, it has significantly increased in 2-5- and 5-10-hectare farms. Cash/industrial and horticultural crop each occupy less than 10 percent of area cultivated.

Next, we examine the gross value of crop production by crop categories across farm types. Figure 11a shows that, despite the slight decline in the share of farmland allocation, the share of grains, tubers and roots in the total gross value of crop production increased between 2010 and 2016. It rose from 34 in 2010 to 55 percent in 2016. The share of legumes and oil seeds significantly shrunk from 59 to 24 percent over the same period. The share of industrial crop increased from six percent to about 20 percent.

Farms below one hectare produce 40-55 percent of the value of national crop output, depending on the year (Figure 11b). Eighty (80) percent is produced on farms that are 2 hectares or smaller. Farms in the 2-5 hectares contribute about 16 percent of the total national value of crop output. Those in the 5-10-hectare range contribute less than 5 percent and their share shrunk over the panel period. Perhaps this reflects the already noted falling share of farmland under 5-10-hectare farms that stood at less than one percent in 2016.

What is the contribution of each farm type to the total crop output in each crop category? The results presented in Figure 11c show that farms below one hectare are contributing the bulk of the national production of grains, tubers, and roots. Their share, however, dropped

Figure 11a. Distribution of gross value of crop production by crop types

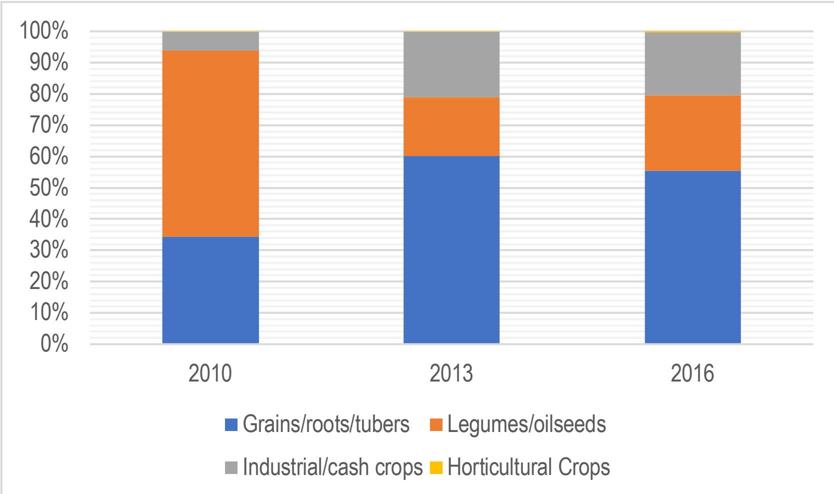


Figure 11b. Distribution of gross value of crop production by farm sizes

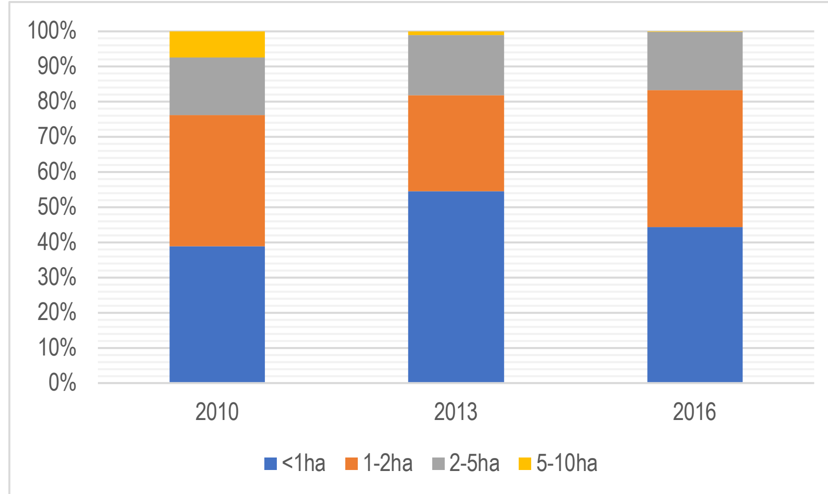


Figure 11c. Distribution of gross value of crop production by crop types and farm sizes

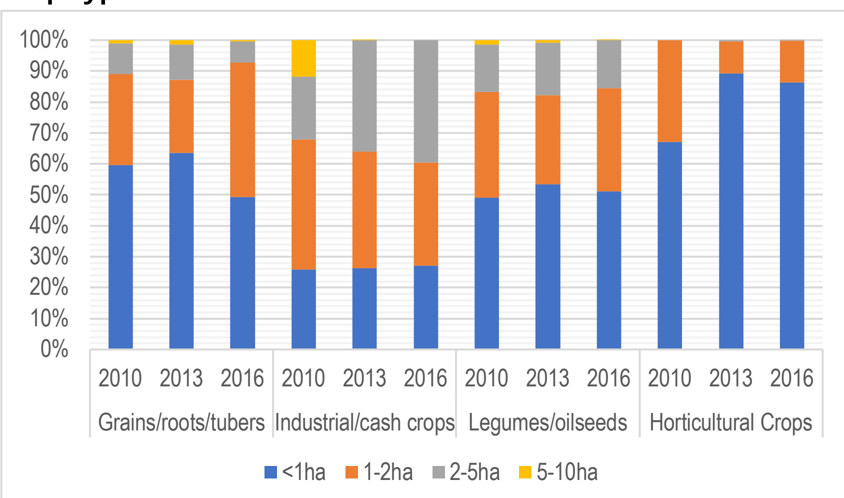
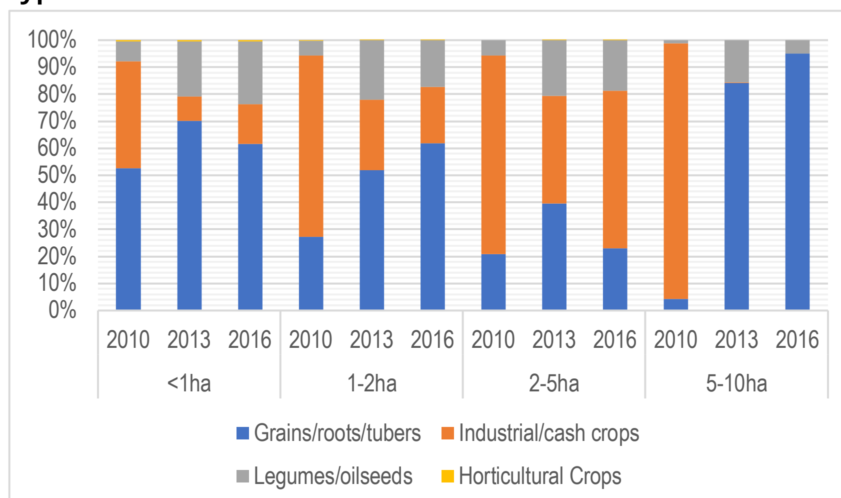


Figure 11d. Distribution of gross value of crop output by crop types within farm sizes



Source: Integrated Household Panel Surveys (IHPS) 2010, 2013, & 2016 from 60 to about 50 percent between 2010 and 2016. The same category of farms also leads in the production of legumes/oil and horticultural crops and their shares has been on the increase. Farms 2-5 hectares lead in the production of industrial crops followed by those in the 1-2 hectares category. As expectant, over 80 percent of horticultural crops is produced by farms below one hectare.

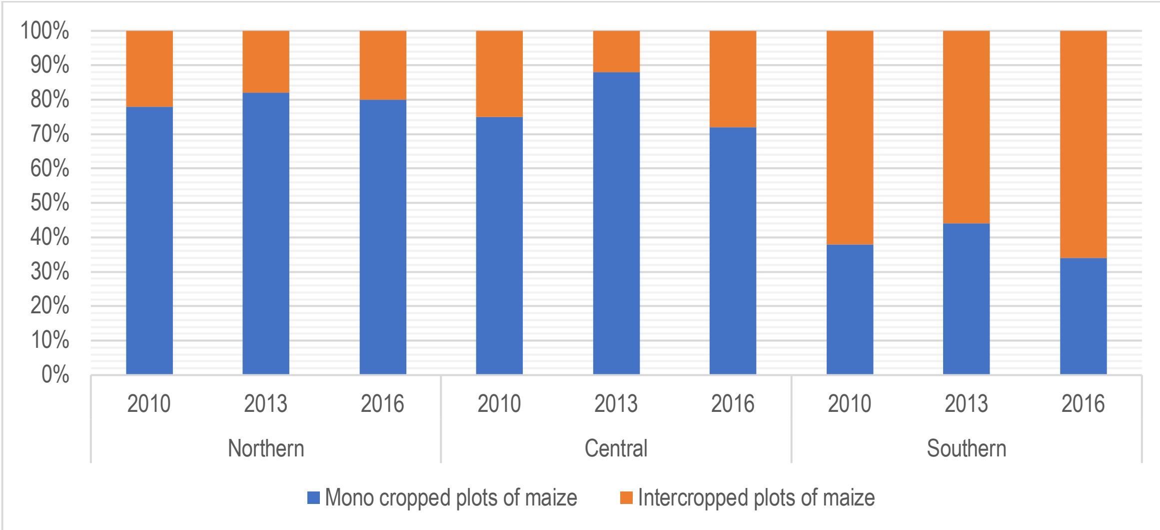
In Figure 11d we now examine the distribution of gross value of crop output by crop types within farms. Grains/roots/tubers dominate crop production in almost all farms in 2016. Their share in the total crop output within 0-1-hectare farms has increased from 53 percent in 2010 reaching 62 percent in 2016. The share of grains/roots/tubers in 1-2-hectare farms has increased tremendously from 27 to 62 percent over the panel period. Similarly, this crop category's share has also significant risen in the 5-10-hectare farms. However, as already noted, these farms represent less than one percent of total farms in the country.

It appears the share of cash/industrial crops to total household crop output is falling considerably across all farm types. It dropped from 39 to 15 percent in 0-1-hectare farms, 67 to 21 percent in 1-2-hectare farms, 74 to 58 percent in 2-5-hectare farms, and from 95 percent to zero in 5-10-hectare farms. Legumes and oil seeds share has been growing even though it remains less than 20 percent. Horticultural crops share is negligible across all farm categories. It is important to note that while the share of industrial crops in the national crop production has been increasing as seen in Figure 10a, production of these crop in farms below 2 hectares has been declining. Perhaps it is becoming riskier growing industrial crops, dominantly by tobacco, in small farms.

Maize mono-cropping vs. inter-cropping

Intercropping – growing more than one crop on a plot – has been promoted as another way for farmers to extract more value per unit of land. Farmers are encouraged to intercrop nitrogen mining crops, like maize and other cereals, with nitrogen fixing crops, like legumes. This has been adopted to varying degrees with some geographic correlation. In particular, about 60 percent of maize plots in the Southern Region are inter-cropped compared to the majority (70-80%) of plots in Northern and Central Regions that are mono cropped (Figure 12). These trends are fairly consistent over time. Perhaps the predominance of intercrops in the Southern Region could be explained by the agricultural land constraints prevailing in that

Figure 12. Maize cropping system by regions



Source: Integrated Household Panel Surveys (IHPS) 2010, 2013, & 2016

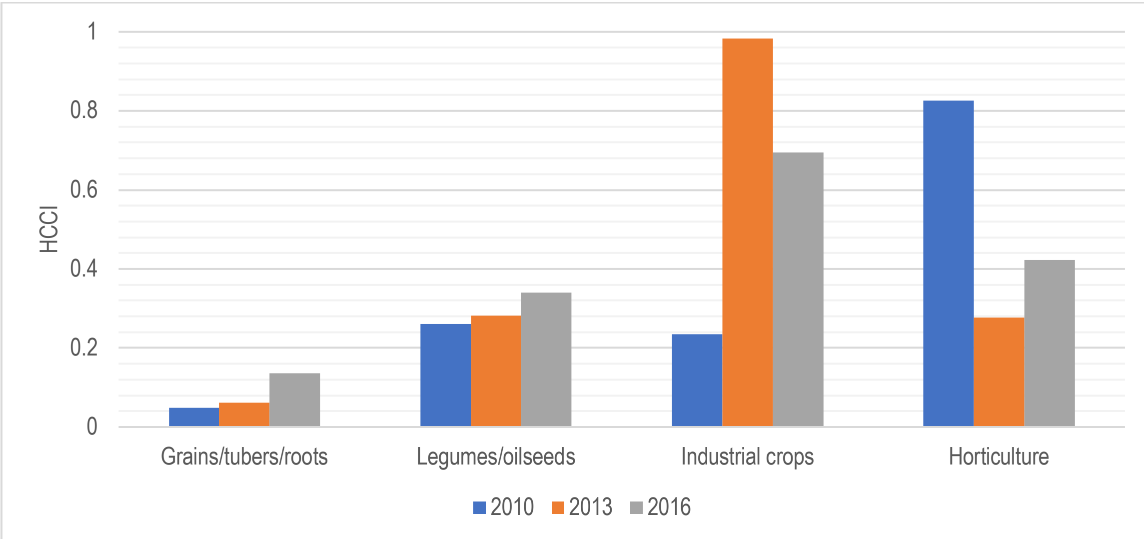
region. Farm households facing closing land frontiers may choose to intercrop to increases their farms productivity and income.

Commercialization is low

In this section, we examine the extent to which farms are participating in crop produce sales market. First, we examine the levels of households' commercialization. The degree of commercialization is measured using a Household Crop Commercialization Index (HCCI) defined as the proportion of total crop output that is sold. Figure 13 shows that in general households sell a greater proportion of industrial/cash crops, horticultural crops, and legumes/oil seeds. The proportion of industrial/cash crops that is sold increased significantly from 0.23 in 2010 to 0.69 in 2016 while that of legumes/oil seeds increased from 0.26 to 0.34 over the same period. The proportion of horticultural crops that is sold dropped from 0.83 to 0.42 between 2010 and 2016.

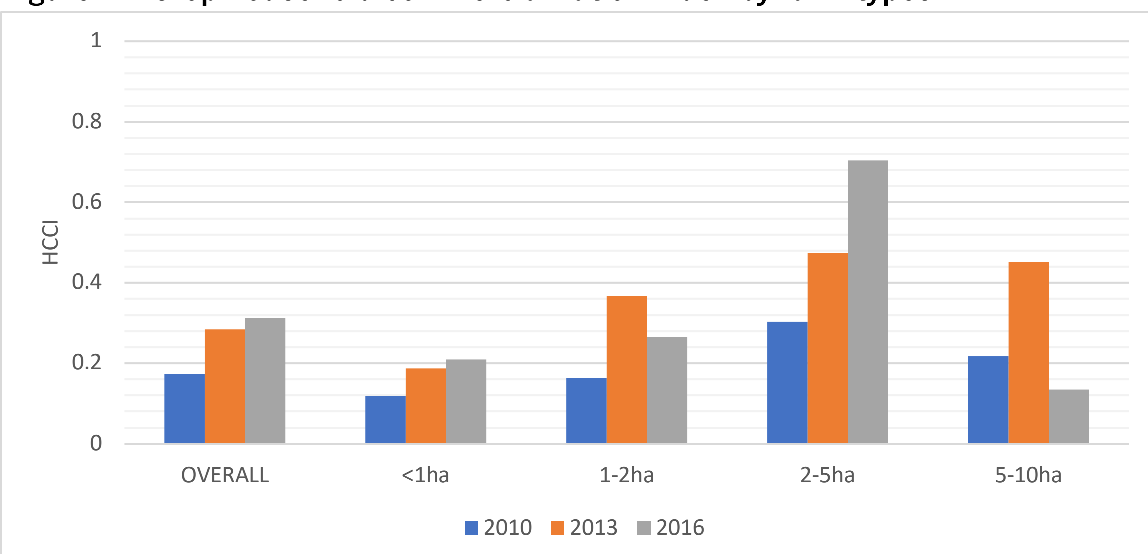
In Figure 14 we examine the levels of crop commercialization by farm types. While the proportion of farm produce that is sold has increased in all farms below 5 hectares, it is only relatively large farms (2-5-hectare) farms that appear to be highly commercialized. The 2-5-hectare farms are selling 70 percent of their farm produce. Farms below 2 hectares sell less than 30 percent of their farm produce.

Figure 13. Crop household commercialization index by crop types



Source: Integrated Household Panel Surveys (IHPS) 2010, 2013, & 2016

Figure 14. Crop household commercialization index by farm types



Source: Integrated Household Panel Surveys (IHPS) 2010, 2013, & 2016

Next, we go into to detail to establish the composition of the national agricultural marketed surplus composition and the contributions of the farm types to the same. As shown in Figure 15a, legumes and oil seeds crops contribute the most to the national crop marketed surplus. However, the legumes and oil seeds crops share has substantially declined from 80 to 55 percent between 2010 and 2016. Conversely, the contribution of other crop types to the total marketed surplus has been growing over the same period. The contribution of grains, tubers and roots crops increased from 10 to 23 percent while that of horticultural crops increased from 9 to 21 percent. It is important to note that crops that are designated as cash/industrial crops contribute less than one percent to the national marketed surplus.

Which farms types contribute the highest share of the total marketed surplus? It appears each of farms in the range 0-1, 1-2, and 2-5 hectares categories contributed on average about one third of total crop marketed surplus over the panel period (Figure 15b). The 2-5 hectares farms' share in the total marketed surplus has been on the increasing topping 39 percent in 2016. Farms in the range 5-10 contribute less than 10 percent and their share has been shrinking.

In Figure 15c, we examine how the national crop marketed surplus by crop types is distributed across farm types. The bulk of national marketed surplus of grains/tubers/roots crops is produced by below 2-hectare farms accounting for over 80 percent of the total marketed surplus. However, we also observe that the displacement of 0-1-hectare farms by 1-2-hectare farms in the share of grains/tubers/roots marketed surplus with the 1-2-hecatres farms now contributing a larger share while that of 0-1-hectare farms is shrinking.

Farms in the range 2-5 hectares share to the total marketed surplus of legumes and oil seeds has doubled reaching 60 percent in 2016. The share of farms 0-1- and 1-2-hectare categories in the total marketed surplus of legumes and oil seeds has been falling reaching 18 and 22 percent in 2016, respectively.

Surprisingly, farms below one hectare contribute bulk (62% in 2016) of industrial crops marketed surplus. The rest is contributed by the 1-2-hectare. The contribution of over 2 hectares farms to the total industrial crops marketed surplus is negligible. As expected, smaller farms (below 2 hectares) contribute the bulk of the horticultural crops marketed surplus. We also note that while 1-2-hectrare farms share of the horticultural crops total marketed surplus has been declining over time, that of farms below one hectare has been rising.

For market interventions aimed supporting smallholder farmers, it would be important to know which crop categories households derive most of their crop incomes from and if this varies across farm categories. It seems farms below one-hectare farms were drawing two thirds of farm incomes from legumes/oilseeds and horticultural crops in 2016 (Figure 15d).

Figure 15a. National crop marketed surplus by crop categories

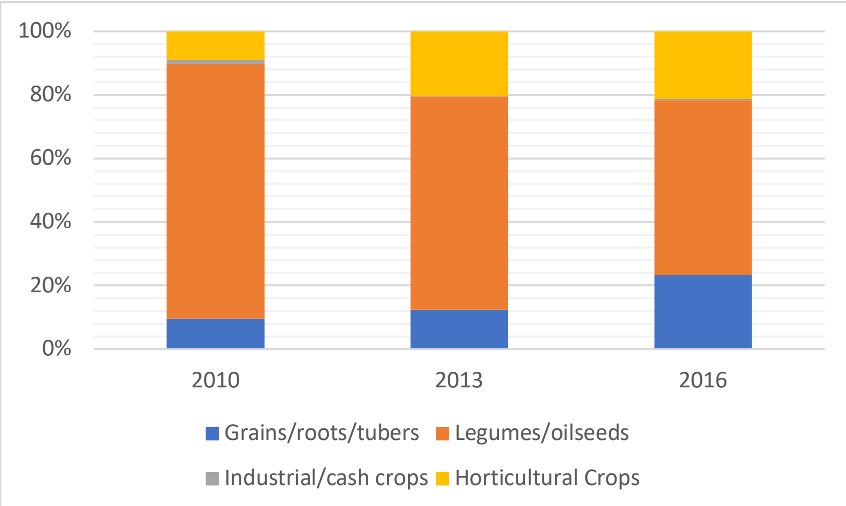


Figure 15b. National crop marketed surplus by farm sizes

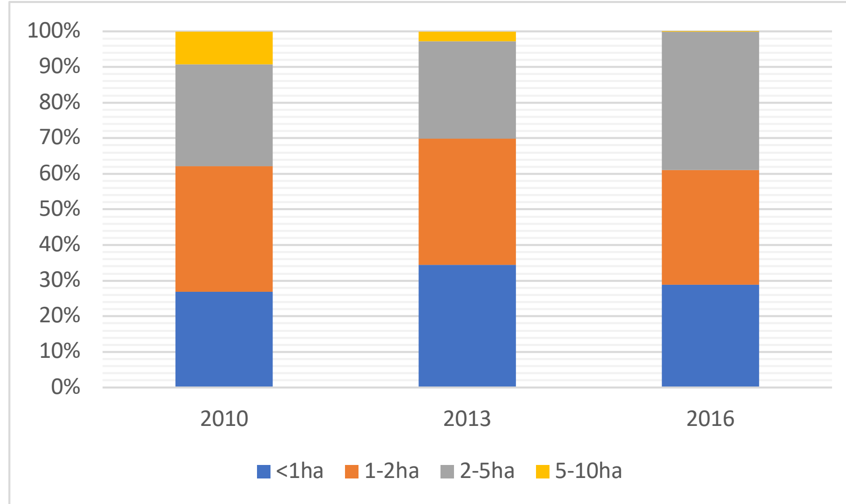


Figure 15c. Share of total crop marketed surplus by farm sizes

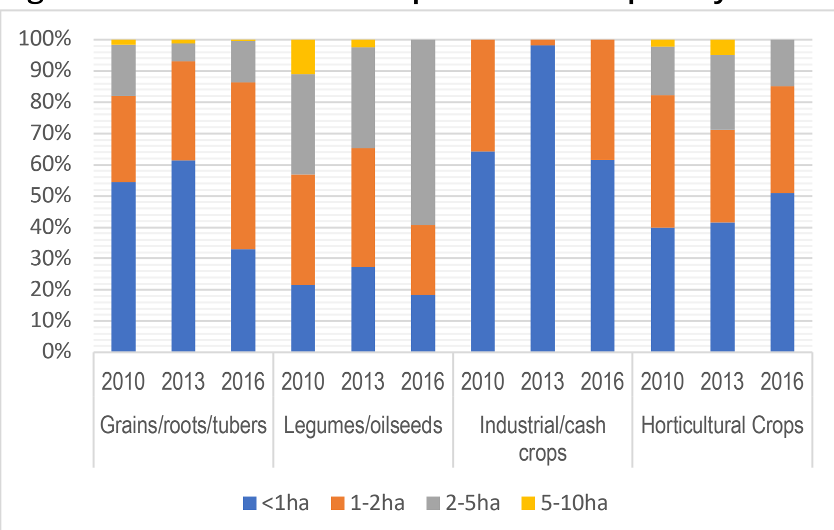
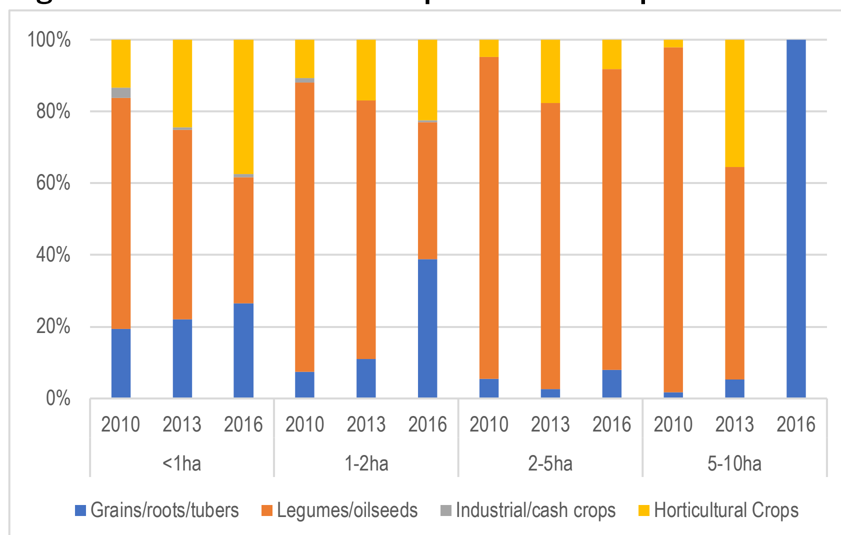


Figure 15d. Share of total crop marketed surplus within farms



Source: Integrated Household Panel Surveys (IHPS) 2010, 2013, & 2016

The other third came from grains, tubers, and roots. It is important to note that the contribution of legumes and oil seed crops to the incomes of below one-hectare farms has fallen by half from 64 percent in 2010 to 35 percent in 2016. Conversely, the shares of horticultural crops and grains/tubers/roots has been on the upward trend over the same period. The contribution of industrial crops to the incomes of the below one-hectare farms is negligible.

Similar dynamics have also been witnessed in the 1-2-hectare farms over the panel period. The share of legumes and oil seeds crops dropped from 81 percent in 2010 to 38 percent in 2016. The shares of grains/tubers/roots and horticultural crops have increased over the same period reaching 39 and 23 percent, respectively, in 2016. The contribution of industrial crops to the incomes of the 1-2 -hectare farms is also negligible.

Legumes and oil seeds have consistently contributed over 80 of the total crop incomes in the 2-5-hactare farms. Grains/tubers/roots and horticultural crops each contributed about 8 percent of 2-5 -hectares farm crop income in 2016. Very remarkable dynamics occurred in 5-10-hectres farms. While the contribution of legumes and oil seeds in the crop income of these farms plunged drastically from 96 percent in 2010 to zero in 2016, that of grains, roots, and tubers crops rose from 2 to 100 percent over the same period.

Have most farms become, "too small" to generate meaningful production surpluses?

Have most farms in Malawi become, "too small" to generate meaningful production surpluses to kickstart the much-awaited inclusive agricultural growth in Malawi? To answer this question, it is important to reflect on the key highlights emerging from this section. Farming in Malawi is dominated by smallholders operating less than two hectares with limited scope for expansion given the closing land frontiers. The very small farms (<1 ha) take about 45 percent of the total farmland in the country and generate a roughly proportionate amount of the gross value of crop production. However, they contribute about 30 percent of the total crop sales. While this group constitute the largest proportion of farmers in Malawi, largest portion of their farm produce goes to household consumption.

A similar finding is observed when we look at the 1-2-hectare farms. About 40 percent of the total farmland, generate a proportionate amount of the gross value of crop production, and contribute about 30 percent of the total crop sales. While the 2-5-hectrare farms take 16 percent of the total farmland, they generate a proportionate gross value of crop production but contribute about 40 percent of the total crop marketed surplus in the country. This is largely due to their relatively heightened focus on legumes and oilseeds (not tobacco and cotton, as one might expect), which have consistently provided 75 percent or more of their crop income.

Grains, tubers and roots occupy about half of the farmland in the country, contribute roughly more than proportionate amount of the gross value of crop production, but their share of their total crop marketed surplus is about 20 percent. These are the staple crops are basically grown for home consumption. Legumes and oil seed crops are now the new "cash crops" in country. These crops occupy about 30 percent of the total farmland, contribute about 25 percent of the total gross value of crop output, but contribute 55 percent of the total crop marketed surplus. The real cash crops (industrial crops) take about 10 percent of the total farmland, contribute about 20 percent of the total crop gross value, and are contributing only about one percent to total household's crop income. Horticultural crops occupy about 10 percent of total farmland and contribute about 20 percent to household crop income. The salient point is that focusing very intently on cash crops and horticultural crops could be missing the mark for options to raise the value productivity of farmland for those with the land endowments sufficient to focus on income generation.

Unlike in other SSA countries that have witnessed emerging medium-scale farms, this class of farms is almost nonexistent in Malawi. Evidence is emerging showing that the number medium-scale farms is growing rapidly and these farms account for a rising share of total farmland in selected SSA counties (Jayne et al., 2019). Medium-scale farms are a source of dynamism, technical change, and commercialization in these countries. The growth in medium-scale farms is associated with land institutions and policies that encourage investment in land acquisitions by urban-based professionals and influential rural people. A sizeable proportion of medium-scale farmers began their farming careers as smallholders. These are profitable smallholders able to generate surpluses, accumulate more farmland and graduate into more commercialized medium-scale farming. However, studies show that small-scale farms that have the potential to grow organically into more commercialized farming systems are not the typical smallholders operating below one-hectare farms the type that dominate farming in Malawi (Muyanga et al., 2019). The smallholders that were able to graduate into medium-scale farming operate a minimum of 2 hectares of land.

The importance of medium-scale farms as a source of dynamism and technical change is not a new concept in Malawi. As early as in 1970, the Malawi Government introduced the *Achikumbes* program (Mkandawire, 1982). The *Achikumbes* program focused on farmers who operated more than two hectares. These farmers practiced intensive farming achieving higher yields compared to those obtaining in typical smallholder units. As Mkandawire (1982) explains, the aim of the program was to:

> … "concentrate efforts on those farmers who have in the past responded well to extension advice and had adopted modern farming practices and who in themselves would act as catalysts. Such farmers were active participants in farmers' clubs and attended seminars and courses to learn new or improved technologies and techniques. The Achikumbes participated in the markets, generated capital required for farm investments and for hiring labor and were also able to secure loans."

Even though at the surface the *Achikumbes* program looked like a novel idea, the *Achikumbes* didn't serve as a 'catalyst' to the growth of the vast smallholders. Mkandawire (1982) explains why.

> "While the government encourage the growth of medium-scale farming it also "vigorously" encourage large scale estate farming. These farms were also guaranteed an almost infinite supply of cheap labor from the smallholders. They would also receive loans and would sell their produce directly to the auction floors where they would receive world market prices. The smallholders were only allowed to sell their produce to ADMARC at prices far below world prices. Large amounts of customary land were to be converted into estate farm leaseholds leading to the displacement of smallholders in many parts of the country. The end result of these policies was a dramatic upsurge in estate agriculture and a lethargic performance and deepening crisis in smallholders."

So, is there a scope for a smallholder-led agricultural transformation in Malawi? The answer to this question will depend on several factors. First, is increased productivity in a sustainable manner to close yield gaps. Second, development of new technological innovations for farm sizes below one hectare. New technologies that can make tiny farms profitable will delay the unsustainable forms of intensifications associated with small farms. Third, increased efficiency of the land markets to ensure remaining unallocated land is transferred to more productive farmers. This can increase the scope for increased agricultural productivity and commercialization. Fourth, the government policy on food security has the potential of promoting land use efficiency. If smallholder farmers could be guaranteed of food access at affordable prices, then they would be motivated to put their land under high value crops thereby increasing land productivity. If not, they will continue growing maize in their tiny pieces of land even in situations where it does not make economic sense to do so.

3.7. Land Markets are Informal and Land Rights are Largely Tenuous

As observed in the proceeding section, increase in population pressures is likely to push a substantial proportion of the rural populations out of farming due to agricultural land access related constraints. The truth of the matter is that the adult population engaged in farming today is likely remain in farming in the foreseeable future. Thus, a large proportion of the group that will get out of farming is the youths and young adults who are starting families. This group has three pathways to alternative livelihoods outside farming in their home TAs. First, as already mentioned, migrate to other regions in search of agricultural land and settle in farming. Second, look for off-farm or non-farm employment in rural areas. Third, migrate to urban centers in search of non-farm jobs. How successful this group is in these pathways is dependent on a number of factors. In this section, we examine the access to farmland option in more detail. We will come back to off-farm and non-farm employment options later on.

Access to farmland will depend a great deal on vibrancy of land sales and rental markets. For example, if land markets are characterized by high transaction costs (search costs, information asymmetry, etc.) and credit access inefficiencies, land markets may function inefficiently leading to land being reallocated to the wealthy and the already landed persons (Deininger and Jin, 2008). In such situations land markets will provide little reprieve to

Table 4. Sources of farmland across farm sizes

Source of Land	Under 2 ha			2-5 ha			Above 5 ha		
	2010	2013	2016	2010	2013	2016	2010	2013	2016
	--------------------Share of (area/plots/households) acquired/acquiring by source--------------------								
Inherited	78	77	68	77	78	64	77	63	71
Local leaders	9	7	13	9	7	11	13	12	13
Leased/rented	7	9	8	7	9	12	2	8	6
Purchased	1	2	3	2	4	5	5	11	5
Borrowed	2	3	3	2	1	2	0	1	0
Other	3	2	5	4	1	6	3	6	4
Total	100	100	100	100	100	100	100	100	100

Farm size category (spanning header)

Source: Integrated Household Surveys (IHS) 2010, 2013, & 2016. Notes: Farm size is determined by the amount of land (cultivated/owned/operated) at the household level.

persons who need the land the most but lack financial resources to enable them overcome market failure barriers. These are the youths, young adults, landless, and the near landless who are finding themselves either unemployed or underemployed due to shrinking farm sizes in their TAs. Of course, if market operations lead to land being reallocated to more productive users, this could result in efficiency gains which could result in increased farmland productivity.

In Table 4, we examine avenue through which households in Malawi obtain farmland. Using the 2010, 2013 and 2016 IHS/LSMS data, we aggregated farmland area by source across farm categories. The results show that inheritance is by far the most common means of accessing land especially in smallholder farms. The proportion of households reporting to have obtained land through land markets (sales and rental) is still small averaging about 10-12 percent. Land markets are dominated by land rentals. About 10-13 percent of the households reported to have been allocated land by local leaders.

What are the outcomes of land markets in Malawi? Chamberlin and Ricker-Gilbert (2019) examine the efficiency and equity returns to farmland rental markets in Malawi using a matched tenant–landlord survey of smallholder farm households in four districts. They find that land rental markets are promoting efficiency by facilitating a net transfer of land to more productive farmers. They also find that land rental markets somewhat promote equity by transferring land from land-rich households to land-poor households, and from labor-poor to labor-rich households.

The study also identifies some downside to the land rental markets. Tenants are found to be wealthier than their landlords. The motive for renting out land in most cases is as a result of the need for immediate cash, or the lack of labor and/or capital to put the rented-out land under cultivation. Even though land markets are promoting efficiency in land transfers, somehow, they are not promoting fairness in land reallocation. The persons who need the land the most and lack financial resources to buy or lease land are crowded out of the land markets by older or wealthier investors. This group includes the youths as well as persons who are underemployed in farming or being edged out of farming due to land-related constraints. There the need to strike a balance between efficiency gains and fairness in land allocation especially in country where a large proportion of the population is likely to become landless and non-farm jobs are growing slowly. Well-functioning financial credit markets could facilitate the youth and the near landless people who are interested in farming access land.

The importance of developing a rule-based land markets cannot be overemphasized. According to the Malawi Rural Agricultural Livelihoods Survey (MRALS) data, over 95 percent of land parcels in these districts is governed by customary tenure rules, such as allocation without titles by village leaders. Only about two percent of the parcels are owned with some form of formal document (title deed, offer of lease, certificate of lease, papers from court, etc.) out of which only one percent is owned with title deeds. Lack of land tenure security stifles operations of land markets and impedes investments on land for sustainable agricultural productivity (Deininger and Jin, 2005; Holden and Otsuka, 2014).

Before we conclude this section, it is important to mention that the existence of non-market factors that have the potential to inhibit land markets operations and rural-to-rural migrations. For example, cultural consideration such as attachment to one's ancestral lands may limit outmigration to other regions in search of land. Similarly, access to land in other regions may be limited by one's ethnic identity (Muyanga, 2013). Individuals who need land may find themselves inadmissible in land abundant areas outside their home regions due to negative ethnicity.

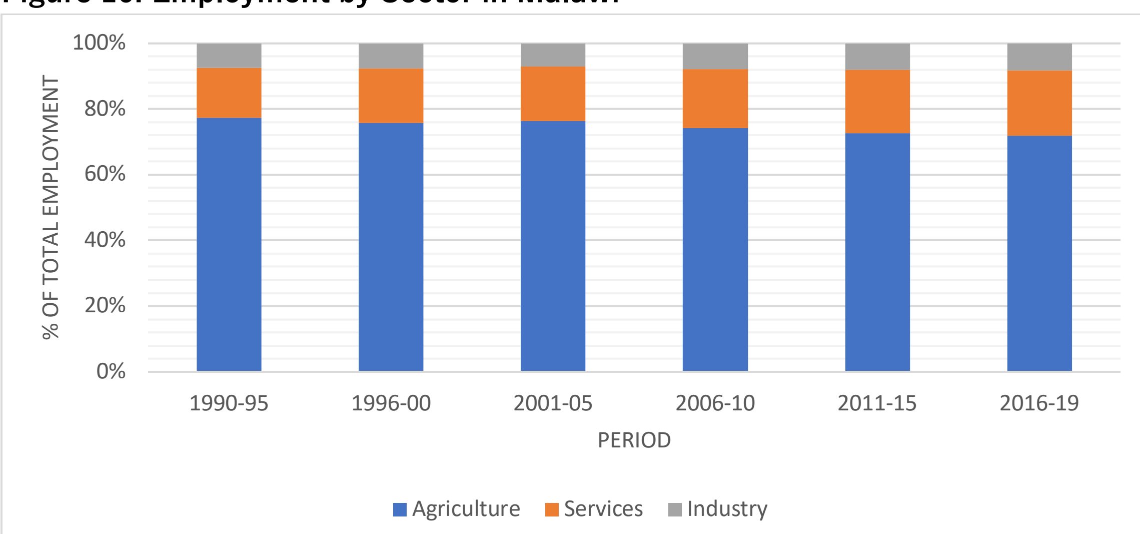
3.8. Limited Opportunities Outside of Agriculture and Skill Sets of Emerging Non-farm Jobs

Limited non-farm jobs in the rural and urban areas

Absorbing this rapidly growing population in the rural areas into non-farms employment is a major challenge at present because of slow economic growth. As shown in Figure 16, agriculture is the leading employer accounting for over 70 percent of total employment in Malawi. However, the share of agriculture sector of the total employment seems to be marginally declining over time. It declined from by 5 percentage points from 77 percent in 1991-95 to 72 percent in 2015-19 period. Employment in the services sector grew marginally from 15 to 20 percent over the same period. The share of employment from the industrial sector has stagnated at about 8 percent. Rather than becoming a producing and exporting economy, it seems the country is fast evolving into a non-producing and vending economy (Mangani et al., 2020).

Even though agriculture sector employs a big chunk of the total population, with the swiftly shrinking farm sizes and degraded soils, the sector is getting saturated and soon will no longer be able to take any more entrants. Existence of off-farm and non-farm income generating activities in the rural and urban areas are essential in the absorption of the excess

Figure 16: Employment by Sector in Malawi



Source: World Bank (2020), based on modeled ILO estimates

Table 5: Mean annual incomes from off-farm and non-farm activities (MK)

	2010	2013	2016	2016 [US$/pp/day
	--------------------*rural off-farm income* ---------------------			
Northern Region	27,886	89,675	133,862	0.12
Central Region	28,165	117,349	148,457	0.11
Southern Region	30,664	111,298	131,573	0.13
OVERALL	29,327	111,098	139,506	0.11
	-------------------- *rural wage employment* ---------------------			
Northern Region	579,524	2,043,881	1,841,881	1.45
Central Region	501,186	1,322,714	1,906,902	1.56
Southern Region	406,001	1,198,309	1,562,806	1.62
OVERALL	464,928	1,313,047	1,711,888	1.32
	--------------------- *urban wage employment* ---------------------			
Northern Region	938,057	1,791,972	3,468,483	2.23
Central Region	947,354	1,896,116	2,369,731	2.94
Southern Region	775,036	2,553,158	2,677,461	2.01
OVERALL	899,512	2,148,244	2,631,690	2.27

Source: Integrated Household Surveys (IHS) 2010, 2013, & 2016.

labor in agriculture. But, what kind of off-farm and non-farm income generating activities exist in Malawi and how much to they contribute to household incomes?

We use the IHS/LSMS data to respond to these questions. According to this data, about 77 percent of the rural sample reported to have been involved some sort of off-farm (*ganyu* employment, value addition and trading in agricultural produce) and non-farm employment (bricklaying, welding, carpentry, masonry, plumbers, hairdressers, barbers, tailors, etc.) activities in 2016. About 12 percent reported to have participated in rural wage employment. These activities included teaching, traditional leaders, shop assistants, religious workers, etc. The main challenge associated with the rural non-agricultural jobs is that earnings from these activities tend to be usually lower than in wage employment. They are basically "poverty jobs" that individuals, and especially the youth, are being pushed into by increasing land constraints. The jobs are characterized by insufficient social protection and thus increased vulnerability to poverty.

In Table 5 we present the mean annual incomes from rural off-farm and wage employment as well as incomes from urban wage employment. The results show that rural off-farm and wage employment incomes are relatively lower those obtaining in urban wage jobs. For example, rural off-farm income is about 8 and 5 percent of the incomes accruing

Table 6: Population Aged 6 to 17 Years in School and Out of School, 2018

	Primary (6-13-year-old)			Secondary (14-17-year-old)		
	In-School	Out-of-school	% out of school	In-School	Out-of-School	% out of school
Total	3,126,670	1,016,202	25	297,339	1,372,806	82
Male	1,523,759	516,619	25	134,712	698,754	84
Female	1,602,911	499,583	24	162,627	674,052	81

Source: 2018 Malawi Population and Housing Census

to rural and urban wage jobs, respectively. Generally, non-agricultural incomes are seemingly low in Malawi. In the last column of Table 5 we present the 2016 incomes converted to USA dollar per person per day. Both rural off-farm and wage income are lower than the US$1.90/person per day, the internationally agreed poverty line. Urban wage employment incomes are barely above this threshold.

Knowledge economy as a source of non-farm employment

The emergence of the knowledge economy presents new opportunities for the youths being squeezed out of farming. However, this economy is very knowledge and technology intensive and thus require new skills and competencies for the youth to successfully enter and thrive in this economy. Muyanga et al (2013) show that post-secondary education training facilitates transitions to decent non-farm employment. The question is if the country is investing in human resource of the population below the age of 24 years. Table 6 shows the population aged between 6 and 17 who are in and out of school. Children between 6 and 13 are supposed to be in primary schools while those between the ages of 14 and 17 in secondary schools. The results presented in Table 6 show that 25 percent of children who are supposed to be in school were out of school in 2018. In the same year, 82 percent of children who are supposed to be in high school were out of school. This implies that only a small proportion of children transition from primary to high school. By extension even a smaller proportion will transition to post-secondary training and potentially gain skillsets required in the emerging knowledge related job opportunities.

Apparently, a huge proportion of the youths is destined to remain in agriculture as low productive farmers or laborers. With land scarcity becoming a binding constraint these youths are unlikely to have livelihoods as good as those led by their parents if they rely solely on farming. With the shrinking land sizes and soil degradation, farming will only be sustainable if farmers embrace modern technology farming. However, Muyanga (2013) argues that education is not only important for securing decent jobs but also necessary for adoption of modern intensive farming technologies – double tragedy of low education attainments.

To conclude this section, it is important to note the following. First, the limited off-farm and non-farm employment opportunities are likely to impede rural-to-rural and rural-to-urban migration. Second, though low paying, non-farm activities remain important source of non-agricultural employment in the rural areas. Their importance in absorbing excess labor in rural areas is likely to continue for several decades owing to high population growth, low education attainments, and limited and stagnant wage employment opportunities. Consequently, agricultural productivity enhancing project must also purpose to increase the productivity of returns to these activities.

4. Discussion and Conclusion

This paper sought to understand the nature of the smallholder agriculture in Malawi, outline the key challenges facing agricultural growth, and identify strategies for moving Malawi forward. Findings from this study indicate that, given the current status of smallholder farming in Malawi, the outlook is quite bleak. Farm sizes are already quite small, with 76 percent of the population of farmers operating farms below one hectare. About 30 percent of the farmers are already virtually landless and struggling to sustain a family on less than half a hectare of land. The population continues to grow while the scope for expanding the amount of land under cultivation seems very near or already at the frontier of its potential. Agricultural productivity is low, despite the high intensity of fertilizer use in the country compared to many other SSA countries. It seems the soils are degraded to a point that crop's response to inorganic fertilizers is impaired by the low soil organic carbon content.

Absorbing this rapidly growing population into non-farms employment is a major challenge at present because of slow economic growth. Agriculture is the leading employer accounting for over 70 percent of total employment in Malawi. The share of employment from the industrial sector has stagnated at about 8 percent. Employment in the services sector is growing and stands at 20 percent. It seems the country is fast evolving into a non-producing and vending economy. The results also show that a large proportion of children in the school going age are out of school and a very small proportion is transitioning to secondary schools. This implies that even smaller proportion is transitioning to post-secondary institution of higher learning and potentially being equipped with skillsets that required in the emerging knowledge economy. Majority of those people being edged out of farming will likely taking the few industrial and service jobs that do not require formal education. The main challenge associated with these types of jobs is that earnings tend to be usually low. They are basically "poverty jobs" characterized by insufficient social protection and thus increased vulnerability to poverty.

That said, by any realistic assessment, agriculture will need to be the engine of growth. For one, barring certain oil-rich countries, no economy in history has successfully transitioned from being poor and agricultural to non-poor and industrial without first increasing agricultural productivity. Most importantly, there are not enough jobs outside of agriculture available to absorb the huge proportion of the population that is underemployed in agriculture or being edged due to increasing land constraints. Majority in this group are the youth and young adults. Therefore, agricultural productivity is the realistic growth engine. In the classic (albeit stylized) model of structural transformation, increases in agricultural productivity lead to surplus production, which simultaneously leads to more disposable income for productive farmers (and their employees), spurring demand for goods and services goods and services generated off the farm, while freeing up labor to supply non-farm goods and services. History suggests that attempts to artificially stimulate one (supply of or demand for non-farm goods and services) without the other are costly and ill-fated. The country needn't look any further than its own stalled attempts at import substitution industrialization for an historical example. The critiques of World Bank and IMF structural adjustment programs notwithstanding, the fact remains that import substitution lead to heavy burdens on national coffers and debilitating explicit and implicit taxation. Both supply of and demand for non-farm goods are necessary and neither is likely without agricultural productivity growth. As bleak as Malawi's situation appears currently, and even though the obstacles in its way are formidable, there is just no evidence to support notions that broad-based economic growth will follow anything except agricultural growth.

Fortunately, there is also no evidence to suggest that Malawi's fate is already determined, and there is ample evidence on ways to avoid the grim Malthusian trap that a 'business as usual' strategy may lead the country into. The fact that current agricultural productivity is so low seems dismal, and it is, but it also represents Malawi's greatest source of potential. The country has large yield gap in virtually all crops. Evidence exists showing that the greatest return on investment for agricultural productivity growth come from: (1) research and development; (2) education (especially farmer extension), and (3) infrastructure (especially roads and electricity). Shoring up land rights and tenure laws incentivize long-term investments in soil health that are necessary for sustainable intensification on Malawi's relatively limited and ultimately finite land resources. Secure land rights also enable mutually beneficial transfer of land towards the most productive uses thereby shoring up land productivity. However, there a need to strike a balance between efficiency gains and fairness in land allocation especially in country where a large proportion of the population is likely to become landless and non-farm jobs are growing slowly.

The country will also need to deal with some of the already known challenges such as unpredictable policy environment featuring frequent *ad hoc* decision-making threatening agricultural commercialization; lack of coordination between government policy, and public and private investment decisions; and limited voice for private sector and civil society in the policy-making processes. Providing a commercially friendly (open, fair and predictable) policy environment and avoiding temptation of reactionary and/or politically expedient rules-of-the-day allows for ruminative commercialization in agriculture and in other sectors too. *Ad hoc* trade rules lead to a large informal sector that is difficult to regulate to ensure fairness.

In conclusion it must be noted that, Malawi's underwhelming performance in the past, there exists a huge potential to revitalize smallholder farming amid the pre-existing challenges and the new megatrends that are threating smallholder farming in Malawi. As mentioned in the introduction several other countries in SSA have overcome similar challenges. It is possible for Malawi to thrive as well, but not without deliberate and informed efforts to guide the process. We call on policy makers to take an honest stock of whether the past efforts have been sufficiently successful and, if not, seek ways to make improvements. It imprudent for anyone to take sides and retreat to corners in a fruitless debate over whether past efforts were "good" or "bad". Such discussions seem to inevitably devolve unproductively into a disagreement on benchmarks, unable to proceed past the fact that outcomes can be simultaneously "better" and "worse" than they could have been. Most importantly, that debate doesn't need to be resolved in order to recognize the need and the potential to do better. Malawi's fate is not sealed, but it depends wholly on the willingness of policy makers and policy researchers to learn and to evolve.

Acknowledgements

This research was produced with the help of a grant from the Foundation for a Smoke-Free World (FSFW) Agricultural Transformation Initiative (ATI) through the Michigan State University (MSU) Food Security Group. We are grateful for this generous support. We are grateful for the helpful feedback from internal and external reviewers. Any views expressed herein are those of the authors and do not necessarily represent the views of the donors.

References

Bryceson, D.F. and Jamal, V. eds., 2019. *Farewell to farms: De-agrarianisation and employment in Africa*. Routledge.

Comstock, A., Benson, T., Nankhuni, F., Kanyamuka, J., Nyirenda, Z. and Nyondo, C., 2019. *A critical review of Malawi's Special Crops Act and Agriculture (General Purposes)* Act (Vol. 1792). Intl Food Policy Res Inst.

Deininger, K. and Jin, S., 2008. Land sales and rental markets in transition: Evidence from rural Vietnam. *Oxford bulletin of Economics and Statistics*, *70(1)*, pp.67-101.

Deininger, K. and Jin, S., 2006. Tenure security and land-related investment: Evidence from Ethiopia. *European Economic Review*, 50(5), pp.1245-1277.

Drechsel, P., Gyiele, L., Kunze, D. and Cofie, O., 2001. Population density, soil nutrient depletion, and economic growth in sub-Saharan Africa. *Ecological economics, 38(2),* pp.251-258.

Edelman, B., Mabiso, A., Nyirenda, Z. and Kazembe, C., 2016. *Have market policies turned Malawi's large-scale farmers into subsistence maize producers?* (No. 24). International Food Policy Research Institute (IFPRI).

Ellis, F., 2005. Small-farms, livelihood diversification and rural-urban transitions: Strategic issues in sub-Saharan Africa. Paper prepared for the Research Workshop on: The Future of Small Farms Organized by International Food Policy Research Institute, Overseas Development Institute, Imperial College, London, and Withersdane Conference Centre, Wye, Kent, UK, 26-29 June 2005.

Foster, V., and Shkaratan, M., 2011. *Malawi's infrastructure: A continental perspective.* The World Bank.

Fox, L. and Sohnesen, T.P., 2012. *Household enterprises in sub-Saharan Africa-Why they matter for growth, jobs, and livelihoods*. The World Bank.

Galarza, L., Ximena, M., 2019. Resilience to food insecurity: theory and empirical evidence from international food assistance programmes in Malawi. AgEcon Search. doi:10.22004/ag.econ.289674 .

Goldberg, J., Thornton, R., Yang, D., Keleher, N., Mueller, A., and Raballand, G., 2011. *Are rural road investments alone sufficient to generate transport flows?* The World Bank.

Government of Malawi, 2019. *Main Report, 2018 Malawi Population and Housing Census.* National Statistical Office, Zomba. Available: http://www.nsomalawi.mw/images/stories/data_on_line/demography/census_2018/2018%20Malawi%20Population%20and%20Housing%20Census%20Main%20Report.pdf [Accessed July 2, 2020].

Holden, S.T. and Otsuka, K., 2014. The roles of land tenure reforms and land markets in the context of population growth and land use intensification in Africa. *Food Policy, 48,* pp.88-97.

IAPRI (Indaba Agricultural Policy Research Institute), 2019. *Rural Agricultural Livelihoods Survey (RALS) 2019 Survey Report*. IAPRI, Lusaka, Zambia.

JICA (Japan International Cooperation Agency), 2020a. *Transport Sector Position Paper*. Lilongwe: JICA.

JICA, 2020b. *Energy Sector Position Paper*. Lilongwe: JICA.

Jayne, T.S., Muyanga, M., Wineman, A., Ghebru, H., Stevens, C., Stickler, M., Chapoto, A., Anseeuw, W., Van der Westhuizen, D. and Nyange, D., 2019. Are medium-scale farms driving agricultural transformation in sub - Saharan Africa?. *Agricultural Economics*, *50*, pp.75-95.

Jayne, T.S. and Rashid, S., 2013. Input subsidy programs in sub-Saharan Africa: A synthesis of recent evidence. *Agricultural economics*, *44*(6), pp.547-562.

Johnston, B. F. and Kilby, P., 1975. *Agriculture and structural transformation: Economic strategies in late developing countries*. New York: Oxford University Press.

Josephson, A.L., Ricker-Gilbert, J. and Florax, R.J., 2014. How does population density influence agricultural intensification and productivity? Evidence from Ethiopia. *Food Policy*, *48*, pp.142-152.

Mangani, R., T.S. Jayne, M. Johnson, P. Hazell, M. Muyanga, S. Chimatiro & W.J. Burke. 2020. Agricultural Transformation in Malawi: Call to Action. MwAPATA Institute Working Paper #20/01. MwAPATA Institute, Lilongwe, Malawi.

Marenya, P.P. and Barrett, C.B., 2009. Soil quality and fertilizer use rates among smallholder farmers in western Kenya. *Agricultural Economics*, *40*(5), pp.561-572.

Mellor, J.W., 2014. High rural population density Africa–What are the growth requirements and who participates?. *Food Policy*, *48*, pp.66-75.

Mellor, J. W., 1995. *Agriculture on the road to industrialization*. International Food Policy Institute, Johns Hopkins University Press: Baltimore, MD.

Misselhorn, A.A., 2005. What drives food insecurity in southern Africa? A meta-analysis of household economy studies. *Global environmental change*, *15*(1), pp.33-43.

Mkandawire, T., 1982. Economic crisis in Malawi. In Jerker Carlsson Eds. *Recession in Africa: Background Papers to the Seminar on 'Africa- Which Way Out of Recession?'* Uppsala, September 1982.

Muyanga, M., Aromolaran, A., Jayne, T., Liverpool-Tasie, S., Awokuse, T. and Adelaja, A., 2019. Changing farm structure and agricultural commercialization in Nigeria. Agricultural Policy Research in Africa (APRA) Working Paper 26/2019. Institute of Development Studies, University of Sussex, Brighton, UK.

Muyanga, M. and Jayne, T.S., 2014. Effects of rising rural population density on smallholder agriculture in Kenya. *Food Policy*, *48*, pp.98-113.

Muyanga, Milu. 2013. Smallholder Agriculture in the Context of Increasing Population Densities in Rural Kenya. Dissertation Submitted to Michigan State University in partial fulfilment of the requirements for the PhD degree of Agricultural, Food and Resource Economics.

Ricker-Gilbert, J., Jumbe, C. and Chamberlin, J., 2014. How does population density influence agricultural intensification and productivity? Evidence from Malawi. *Food Policy*, *48*, pp.114-128.

Ricker-Gilbert, J., Jayne, T.S. and Chirwa, E., 2011. Subsidies and crowding out: A double-hurdle model of fertilizer demand in Malawi. *American journal of agricultural economics*, *93*(1), pp.26-42.

SADC, 2019. Synthesis Report on the State of Food and Nutrition Security and Vulnerability in Southern Africa. Regional Vulnerability Assessment and Analysis Program.

Sabet, D., Rostapshova, O., Kruze, A., & Tisch, S. 2014. Evaluation Design Report: Malawi Infrastructure Development and Power Sector Reforms Project. Lilongwe: Mellenium Challenge Cooperation.

Seidman, R.B., 1973. Contract law, the free market, and state intervention: a jurisprudential perspective. *Journal of Economic Issues*, *7*(4), pp.553-575.

Sesmero, J., Ricker-Gilbert, J. and Cook, A., 2018. How do African farm households respond to changes in current and past weather patterns? A structural panel data analysis from Malawi. *American Journal of Agricultural Economics*, *100*(1), pp.115-144.

Sheahan, M., & C.B. Barrett. 2017. Ten striking facts about agricultural input use in Sub-Saharan Africa. *Food Policy*, 67, 12-25.

Sheahan, M., Black, R. and Jayne, T.S., 2013. Are Kenyan farmers under-utilizing fertilizer? Implications for input intensification strategies and research. *Food Policy*, *41*, pp.39-52.

Sustainable Energy for All. (2020). Country data - Malawi. Retrieved from Sustainable Energy for All, Africa Hub: https://www.se4all-africa.org/seforall-in-africa/country-data/malawi/

Traub, L., Yeboah, F.K., Meyer, F., Jayne, T.S., 2015. Megatrends and the future of African economies. In Badiane, O. and Makombe, T. (eds), *Beyond a Middle-Income Africa: Transforming African Economies for Sustained Growth with Rising Employment and Incomes*. ReSAKSS Annual trends and outlook report 2014. Washington, D.C.: International Food Policy Research Institute (IFPRI).

Tittonell, P. and Giller, K.E., 2013. When yield gaps are poverty traps: The paradigm of ecological intensification in African smallholder agriculture. *Field Crops Research*, *143*, pp.76-90.

United Nations, Department of Economic and Social Affairs, 2018. World Youth Report: Youth and the 2030 Agenda for Sustainable Development.

Willy, D.K., Muyanga, M. and Jayne, T., 2019. Can economic and environmental benefits associated with agricultural intensification be sustained at high population densities? A farm level empirical analysis. *Land use policy*, *81*, pp.100-110.

World Population Prospects 2019: Volume 1 Comprehensive Tables. UN Department of Economic and Social Affairs. NY 2019. https://population.un.org/wpp/Publications/Files/WPP2019_Volume-I_Comprehensive-Tables.pdf

World Bank. 2019. *Measuring Rural Access*. Washington, D.C.: World Bank Group.

World Bank. 2018. *Malawi - Systematic Country Diagnostic: Breaking the Cycle of Low Growth and Slow Poverty Reduction*. Washington, D.C.: World Bank Group.