Uganda: A Reform Agenda for More and Better Jobs through Agriculture

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Summary of Recommendations

- Strengthen public institutions and policies for agricultural productivity.
- Increase both the efficiency and amount of public spending for agricultural research and extension, especially for smallholder farmers.
- Coordinate and strengthen the work of line ministries, extension agencies, and agricultural research institutes.
- Reform the regulatory environment to ensure consistent quality of inputs and outputs without undue compliance burdens.
- Promote commercialization of agriculture and trade through improving institutions and infrastructure.
- Improve access to agricultural finance along entire agrobusiness value chains.
- Assess policies related to transport and other transfer costs for agricultural commodities entering regional trade.
- Analyze and carefully plan investments in infrastructure—roads, electricity, communications, water—which are especially critical to how agribusinesses will locate.
- Invest in information systems and databases.
- Improve rural ICT.
- Continue to foster land tenure security through better land demarcation and delivery of adequate documentation to land owners.
- Pursue initiatives to promote agro-processing and encourage agro industry vertical coordination.
- Support development of rural cooperatives.
- Increase resilience in agro ecosystems and of rural livelihoods.
- Increase collaboration between the many resiliency-building actors.

Introduction: Why Agricultural Growth is Critical for Economic Transformation with More and Better Jobs in Uganda

Economic transformation in low-income countries (LICs) starts in agriculture, where most workers earn their living.[1] Growth in agricultural labor productivity releases labor for off-farm work, typically increasing overall labor productivity. A vibrant agriculture sector stimulates downstream jobs in production of farm inputs (plant propagation, seeds, fertilizers, tools and equipment), creates waged jobs on commercial farms, and generates downstream off-farm jobs in transportation, storage, and pack houses. In time, growing commercial surpluses of farm products lead to development of downstream off-farm jobs in agro-processing plants, including for export. In addition, income flowing to remote areas from agricultural sales outside the local region increases demand for local services and non-tradable goods, such as locally processed and perishable prepared foods. This effect can be substantial in remote areas where labor is underemployed, whether due to seasonality or due to high costs of transferring local products out.[2]

The Ugandan economy is very dependent on agriculture. The agricultural sector accounts for 70 percent of employment—overwhelmingly on small farms and often at low productivity—occupies half of all land area, and provides half of all exports and one-quarter of Uganda's GDP. Agriculture is considered a leading sector for future economic growth and economic inclusion in Uganda's National Development Plan.[3] Agricultural income growth in Uganda has fueled consumption, stimulated demand for off-farm services, and has led poverty reduction and inclusive growth compared to other sectors by a wide margin.[4] This is consistent with studies of a number of other agriculturally-dependent LICs, where agriculture has shown to be two to three times more effective at reducing poverty than growth originating in industry or services.[5] The potential for agricultural growth to reduce poverty compared to other sectors is greatest in the poorest countries, where agricultural productivity tends to be much lower than in industry and services, and labor resources are underemployed for much of the year.[6] It Is not surprising therefore that development of higher value agricultural value chains through private sector development continues to be a fundamental tenet of Ugandan national strategy, and World Bank advice, for both economic growth and creation of more and better jobs.[7]

Drivers of agricultural growth and poverty reduction for more than a decade in Uganda, largely unrelated to specific Ugandan agricultural policy, are unlikely to repeat. Examples of such events include the relative regional food price spike after 2008; cropland expansion into dwindling forests and wetlands; a peace dividend after the Lord's Resistance Army was pushed back from the north; emergence of newly independent trading partner, South Sudan, eager to import Ugandan processed foods; the opening up of the East African Community (EAC) to free regional agricultural trade; and a change to local procurement and processing of food aid in Uganda by the World Food Program (WFP) for its operations in South Sudan.

Prospects for being able to continue to promote overall growth and rapid job creation through agricultural growth in Uganda are uncertain. Average Total Factor Productivity (TFP)[8] growth in Ugandan agriculture has been negative for the last two decades.[9] This suggests that on balance the country is now getting less for equal or greater effort. National agricultural output has grown at only two percent per year over the last five years, compared to agricultural output growth of three to five percent in other EAC

members, while the Ugandan population has grown 3.3 percent per annum over the same period. Furthermore, food insecurity, poverty, and nutritional quality remain major challenges in rural Uganda, and national food imports have increased in the last decade.

Uganda has a number of concerning issues related to economic growth and agricultural employment. These concerns include continued high rural population growth and youth unemployment rates, despite growing outmigration to towns, and the potential for rapid urban population growth of 5.8 percent per annum in 2017 (highest in EAC) to exceed absorption capacity.[10] This has increased rural population density on arable land and continued to degrade land and water resources in the absence of adequate on-farm investments in soil and water management. Exposure to climate-related hazards is especially high in Uganda, and the danger to rural resilience is exacerbated by low adaption capacity in rural communities. This stems from having few assets, few alternatives due to low education levels, and little access to financial or other safety nets.

It is questionable whether the Uganda agricultural sector can continue to drive poverty reduction and economic growth and provide enough more and better jobs.[11] Accommodating projected Ugandan youth who will be completing school from 2020 to 2030 will require well over 3 percent per annual growth in jobs, and progress will require that a substantial share of these be higher productivity non-farm jobs in rural areas.[12] Uganda has relatively few alternatives to agriculture to create a large number of jobs and widespread growth in domestic consumer income capable of stimulating demand for local services, products, and foreign exchange.

We can draw on evidence and lessons from what has worked in other countries to support Ugandan agriculture sector growth and jobs. Fundamental policy choices are at hand and the stakes are high**.** If the measures set out in this paper are taken, Uganda could achieve agricultural GDP growth at the high end of the range achieved by other EAC members in recent years of about per year, compared to the present two percent. Total factor productivity in Ugandan agriculture has been declining more than one percent annually, but could increase to the more than two percent per year experienced by neighboring Rwanda. Labor productivity growth in agriculture in Uganda could rise from an annual average of about 0.2 percent per year over the last decade to perhaps even more than the 3.5 percent Tanzania has experience given the 6 percent annual growth achieved by Kenya and Rwanda.

Progress in rebooting agricultural productivity growth and continued agricultural trade growth is tied to growth in formal jobs. About 125,000 Ugandans are employed in formal sector jobs in food manufacturing, and in 131,000 formal jobs in food and beverage services, as measured in the most recent Census of Business Enterprises in 2010. Extrapolating to 2018), about 362,000 Ugandans have formal jobs in these two areas, and about 560,000 will be employed in formal sector jobs extrapolating estimates to 2028**.** Formal sector manufacturing jobs in agricultural, food, and beverage processing in 2010 accounted for two-thirds of all manufacturing employment in Uganda that year. Since food manufacturing has been growing faster than overall manufacturing, this share is likely to increase. Agro-processing and food services could exceed the estimated 560,000 jobs by 2028 if processed agricultural exports grow faster than the more than 10 percent annual experienced from 2006 to 2016. In addition, growth in persons

employed in food services can exceed the conservative 2028 estimate if Ugandan urbanization rates rise closer to rates seen in other EAC countries.

The agro, food processing, and food services together can generate about new 200,000 formal jobs in Uganda over the next decade, which represent better, more regularly paid work than in smallholder farming. If overall economic growth and agricultural trade expand more quickly than in the last decade under a new agricultural productivity and marketing thrust, 200,000 represents a low estimate. If, however, agriculture is treated like a low-growth holding sector for the majority of the population, deserving of equity transfers but without major growth prospects, this promise is unlikely to be attained, with serious consequences for the overall economy.

Labor Productivity, Employment, and Structural Change for Agriculture in Uganda

Insights from trends across all sectors and select countries

An in-depth review (Merotto, Weber, and Aterido, 2018) examined structural changes in employment—sustained increases in labor productivity from work transitions—during 16,000 economic growth episodes in IDA-eligible countries The study synthesized patterns from separate individual "Jobs Diagnostics" for each country that take into account countries' structural characteristics in terms of demography, growth patterns, and economic transformation. Household and firm-level data are then analyzed to understand how workers transition into higher labor productivity jobs (value added per worker), and how firms hire as they grow. Considered together, they yield insights on employment growth patterns in different kinds of countries by level of formality, gender, age group and sub-sector. The data generated also permit analysis of determinants of labor transitions to higher productivity jobs.

The Jobs Diagnostic work above yields a wide variety of labor market insights for growth, but four are of especial relevance for Ugandan agriculture. First, and foremost, structural change in poor countries involving labor transfers to higher-productivity jobs (typically outside agricultural production) tends to happen fastest, and economic growth tends to be higher, when agricultural productivity is rising. Second, while aggregate productivity rises as low-productivity agricultural labor moves to higher-productivity non-farm—typically urban—jobs, average labor productivity in the receiving sectors tends to fall. Third, most creation of new "better" (higher value-added per worker) jobs in the non-farm production sectors is by new, smaller firms. Larger established agri-business firms maintain their position during growth spurts, but tend to not create new non-farm jobs. Fourth, formal non-farm jobs tend to be associated with very high capital intensity relative to the resource endowments of the poor countries concerned. The implication of these four findings is that a jobs-oriented growth strategy for poor countries requires: (i) boosting agricultural productivity, (ii) improving the skill base of rural-to-urban migrants to capture the benefit of the demographic transition, (iii) promoting more labor-intensive technologies, and (iv) spreading capital more evenly across jobs in both agriculture and non-agriculture.

Although similar geographically and demographically to other Sub-Saharan African countries, three key relevant trends in Uganda stand out compared to most of its neighbors. First, real GDP growth per capita in Uganda has been quite volatile, generally high from the 1999 to 2011 average of over 6.6 percent per year, but with a pronounced slowdown to an average 1.1 percent per year from 2013 to 2017. This is low compared to the 3.3 percent in Tanzania, 3.2 percent in Kenya, and the 2.8 percent in Rwanda.[13] Uganda also stands out in terms of the youthfulness of its workforce. Births per mother declined from about 7 per mother in the mid-1990s to 5.7 in 2015, a decline much slower than in neighboring countries. Labor force growth from 2013 to 2017 was 3.8 percent per year, compared to 3.3 percent in Tanzania, 3.2 percent in Kenya, and 2.8 percent in Rwanda. This suggests that Uganda needs to be even more concerned than its neighbors about creating large numbers of jobs for young people for some time to come, even though its economy has slowed.[14]

The Ugandan pattern of industrial (and especially manufacturing) stagnation and growth of the service sector is widespread in Africa. In a few cases, the services in question are "tradables", in the sense of tourism and ICT exports (or import substitutes) that bring in (save) foreign exchange. In most cases, however, services are urban-based, most often informal, and "non-tradable".[15] Moreover, they have been stimulated by public spending on urban wages and consumption financed by foreign aid and trade taxes.[16]

A recent study analyzed economic and overall labor market trends in Uganda from 1992 to 2016 and their relationship to GDP and demographic trends.[17] Labor force participation rose impressively during the decade of rapid real GDP growth after 1999, rising from 74 percent in 1999 to 89 percent in 2012, with particular gains for women and youth in urban areas. However, it fell with the economic slowdown back to 79 percent in 2016. Labor force participation for youth fell from 80 percent in 2012 to 60 percent in 2016, a result that should elicit deep concern. The share of employment directly in agriculture fell from 77 percent in 1999, to 72 percent in 2013, and again to 64 percent in 2016.[18] The eight percent fall in the share of agriculture between the 2013 and 2016, derived from the Uganda National Household Surveys (UNHS), is matched by an eight percent increase in the share of services in the Ugandan economy.[19] Despite these sectoral changes, the share of rural employment (ages 15 to 64) was still 75 percent in 2016 (according to the UNHS), down only two percent from 2012 but down 10 percent from 2005.[20]

Thus, Ugandan employment remains mostly rural and informal, but trends differ from EAC neighbors in only a few respects. Overall, the share of rural employment and the share of employment in agricultural production in Uganda are about 10 percent higher compared to other EAC members, differing widely only with the low share of employment in agriculture in Kenya, estimated at 38 percent in 2017.[21] Further, Uganda does not stand out in East Africa in terms of its high share of informality in work (all sectors). Wage employment was 24 percent of total employment in 2016, and the share of wage employees with formal contracts was only 32 percent for all workers aged 25 to 64 (12 percent for youth).[22] The share of all employment that is waged in other EAC members in 2017 ranged from 14 percent in Tanzania to 38 percent in Kenya.[23]

Trends in value-added, employment, and labor productivity in agriculture

Similar to neighboring countries, while the number of people employed in agriculture in Uganda has increased, labor productivity (per worker, per year) in agriculture is much lower than the rest of the economy.[24] Using household survey data per worker, per annum (not per hour worked), labor productivity per agricultural worker, including smallholders, was estimated to be at 13 percent of that for workers in other sectors in 2013. However, labor productivity per person, per hour worked was found to not be much different, with 1,850 hours/year spent in non-agriculture (seven hours/day) vs. 700 hours/year (2.7 hours/day) in agriculture.[25] The apparent disparity in labor productivity results mainly from the seasonality of agriculture. Rural households often have insufficient opportunities to access wage employment in non-agricultural businesses to smoothen labor calendars. In contrast, urban households have more access to countercyclical work, resulting in smoother labor calendars and lower poverty rates.[26]

Uganda exhibits two significant differences compared to neighbors over the last two decades that suggest a growing problem with agricultural labor productivity. The share of agriculture in GDP in Uganda is falling, while the share of agriculture in total employment continues to be high. The evolution from 1999 to 2017 of sectoral shares in GDP in Uganda and three comparable EAC members are shown in Table 1.[27] The absolute decline in share for agriculture in Uganda over the entire period was roughly 6 percent, compared to a decrease of 2 percent in Tanzania, and an absolute increase in share of 3 percent in Kenya. The annual compound rate of decline of the sectoral share of agriculture in GDP from 2009 onwards (-1.1% per annum) is also shown in Table 1, along with positive growth rates for the same period in Kenya, Rwanda, and Tanzania.

Surprisingly, Uganda's employment share in agriculture in 2015-2017 was virtually the same as in 1999-2001, despite its 6 percent absolute loss of share in value-added. By contrast, the absolute share of agriculture in total employment fell 8 percent in Kenya, 10 percent in Tanzania, and nearly 22 percent in Rwanda over the same period. The implied loss of labor productivity in agriculture for Uganda relative to neighbors, and the failure to move low-productivity farm workers into higher productivity non-farm jobs, illustrates a slower rate of structural transformation than for neighbors likely to become more competitive in agricultural production relative to Uganda over time.

Labor productivity growth in Ugandan agriculture appears to have slowed from around 2010 onwards, unlike in neighboring countries. A "macro" approach can be used to roughly estimate trends in sectoral labor productivities over 1999-2017, using the same national accounts data and International Labor Organization (ILO) imputed data on employment (see Tables 1 and 2)**.** This is useful for seeing macro trends, but is not a substitute for more accurate results culled from household-level employment data. Table 3's columns A and B repeat the compound annual growth rates estimated respectively in Tables I and 2 for sectoral growth in value-added shares and employment shares 1999-2017. Adding the corresponding cells together in column C yields rates of change in sectoral shares of labor productivity growth.[28] Adding in the compound annual growth rates of overall value-added per person employed from ILO reported in the World Development Indicators (WDI) (shown in Table 3) yields a rough estimate of compound annual labor productivity growth rates for sectors and time periods specified, in column D. For

Uganda, estimated labor productivity growth in agriculture was decent at 2.1 percent annually from 1999-2011 (bearing in mind that this only covered persons that ILO counted as "employed", which does not appear to include most of self-employed smallholder farmers). Nonetheless, growth in labor productivity by the same measure was almost nil for agriculture in Uganda from 2009 to 2017, unlike 1999 to 2011. By contrast, labor productivity growth in agriculture was over 6 percent in Kenya, almost 6 percent in Rwanda, and 3.5 percent in Tanzania annually from 2009 to 2017.

Labor productivity in Ugandan firms in agricultural supply chains differs based on sub-sector and size of firm. From survey data in 2001 and 2010,[29] Table 4 shows results for four ISIC revision 4 2-digit sub-sectors in agricultural value chains from production through food and beverage retail. It details changes in employment, labor cost per worker, and total real value-added per worker in 2010. Similar results for the financial sector (not restricted to agriculture or rural areas but excluding pensions and insurance) are shown for comparison because they represent a highly urban and capital-intensive sector with different drivers of value added per worker compared to agricultural supply chains[30].

Labor productivity growth (change in real value added per worker) in formal agricultural (primary) *production* has been strong on average in medium-sized firms. Labor productivity for these firms grew more than five-fold between 2001 and 2010, but declined for small firms (less than 20 workers) by about one-quarter over the same decade (see Table 4). Conversely, labor productivity for medium-sized firms in *food manufacturing* grew about 66 percent over the decade, and labor productivity in small firms grew 284 percent, but declined by 21 percent for large firms (greater than 99 workers, of which there are relatively few). In food and beverage retail, medium-sized firms exhibited relatively higher labor productivity growth. Finally, for comparison, financial services firms of all sizes together experienced negative labor productivity growth (mostly urban) over the same period. Even so, average labor productivity in financial services in 2010 was on average almost seven times higher when compared to formal sector agricultural production, and 1.6 times higher compared to food manufacturing. In both cases, these labor productivity ratios were about half what they were in 2001, showing that average labor productivity in formal sector agriculture and urban non-agriculture converged significantly between 2001 and 2010. However, they are still far apart in the case of primary agricultural production vis-à-vis other activities.

Agricultural growth trends and total factor productivity in agriculture since 1961

Aggregate agricultural production growth has been low and erratic in Uganda since 1961. Understanding why requires decomposing agricultural growth into its various components to isolate growth due to a combination of increased efficiency and technological change.[31] Figure 1 decomposes agricultural growth into components due to area expansion (in orange); increased use of inputs other than land, including labor (in grey); and total factor productivity growth (TFP). TFP is calculated as the residual obtained after netting out output from all other measurable sources of growth, such as agricultural land expansion, increased numbers of workers living on farms, and increased use of purchased inputs like

fertilizer.[32] Growth in the TFP residual reflects a combination of increased technical efficiency, allocative efficiency, and (or) technological progress. Improved technical efficiency derives from redeploying existing inputs, land, and labor regardless of prices in a way that leads to net physical gains using existing technologies[33]; gains can be thought of as catching-up to good practices. Greater allocative efficiency arises from taking into account resource allocation, the costs of using different inputs and factors in addition to technical issues, to maximize profitability; gains here can be thought of as the "art of business", since private sector gains stem from using inputs and choosing outputs more profitably. Finally, technological change embodies scientific and technical innovation to get more from less.

Between 1991 and 2000, overall agricultural growth averaged 2.5 percent annually, lower than average annual population growth above 3 percent in the same period. From 2001 to 2014, agricultural growth was negative, averaging -0.2 percent year, with per capita growth decreasing an average of -.3 percent per annum. Although crop estimates for 2005-2014 show that cereal yields improved steadily from 1.6 to 2.0 metric tons per hectare (mt/ha), root crop yields halved during this period. Cash crops also performed poorly. For example, tobacco yields declined on average by 3.2 percent annually and coffee yields stagnated.[34] Within Sub-Saharan Africa, Uganda has one of the lowest adoption levels of improved seeds, inputs, or mechanized traction.[35] In 2014, only 16 percent of farmers used purchased inputs of fertilizer or pesticide.[36] The use of inorganic fertilizers remains concentrated on larger and more commercially-oriented farms in the central region, on which cash crops such as tea, coffee, and increasingly sugarcane or oil palms are grown. Fertilizer-use has been increasing slowly in Uganda in recent years, but the average application level was still below 2 kg/ha in 2014, well below the already low average for Sub-Saharan Africa of 16 kg/ha.[37]

Total factor productivity (TFP) growth has been largely absent from Ugandan agriculture for the last three decades. As illustrated in Figure 1, TFP weakness has been worsening, especially since 2010. Although not clear what underlies Uganda's massive losses in TFP since 2000, it seems that these losses - particularly large outside the cereals sector - stem from growing pest and disease incidence and are likely related to policy distortions that harm allocative efficiency. They also likely reflect insufficient public priority on innovation in Ugandan agriculture.

Trends in Agricultural Commercialization, Agro-processing, and Agro-industrial Development in Uganda

Uganda has created jobs and higher labor incomes from agri-business, agro-processing, and food exports. Between 2001 and 2010, the number of businesses in Uganda expanded almost threefold to 458,106, with 78,753 businesses specifically identified as being in agriculture, forestry, fishing, food processing, and restaurants (UBOS 2003, 2011). This count does not include any of the 87,236 businesses identified in the 2010 census as having more than one employee and being primarily engaged in trade, although perhaps half of the latter could be counted as downstream or upstream from agriculture based on the importance of agricultural and fish trade. The 2010 census also shows that 268,317 Ugandans were formally employed through businesses in agricultural production (excluding smallholder farm families

working on their own farm), food and beverage processing, and food and beverage services retail (see table 4). This represents a 14.6 percent annual growth rate in employment in these sectors from 2001 to 2010, and more than a quarter of all formal business employment in 2010.[38]

Across the food and beverage value chains, large food manufacturing has created the most jobs in Uganda since 2001. As shown in Table 4, employment growth from food manufacturing alone grew nearly 400 percent from 2001 to 2010, at an annual compounded rate of 16.5 percent. The Uganda Bureau of statistics (UBOS) databases underlying Table 4 (UBOS 2003, 2011) show that 47 percent of employment in food manufacturing in 2001 was in firms with at least 100 employees. In 2010, the corresponding share was 76 percent, illustrating that large firms accounted for most of the growth in employment, even though employment in all size firms grew. Furthermore, Table 5 shows that in 2010, food manufacturing accounted for half of all manufacturing jobs in Uganda, and more broadly 2-digit sub-sectors downstream from agricultural production accounted for two-thirds of all manufacturing jobs.

Around 30 to 40 larger companies import and wholesale agricultural inputs, and hundreds of small traders re-sell to individual farmers (1,992 agro-input dealers according to a 2008 census). The Uganda National Agro-Input Dealers Association (UNADA) has 1,300 members, including 48 larger scale ones. Seed traders are another important stakeholder, organized in the Uganda Seed Trade Association (USTA) with 18 ordinary members. As discussed below, ensuring the quality of traded seeds, fertilizers, and other inputs is a key bottleneck for increasing sector performance. However, growth of this sector is held back by institutional uncertainties in the public sector, most particularly by free distribution to selected farmers of agricultural inputs by State actors, and widespread fake ingredients contamination.[39]

Substantial jobs growth has stemmed in recent years from establishment of large-scale commercial farms, especially in northern Uganda, devoted to grain and pulse production for sale to the World Food Programme (WFP) and exports to South Sudan and Democratic Republic of the Congo (DRC). These have typically been developed by foreign investors, while farms of 10-200 ha are being developed by domestic investors. These domestic commercial farms mostly came into being in the past decade. To some extent, uncertainties over property rights have constrained this mode of job creation. Land conflicts are more prevalent in districts with a substantial number of refugees, or where there is high population growth and ethnically diverse communities. One study found that yields were 22 percent lower on land parcels associated with disputes compared to parcels without.[40] Land disputes not only affect productivity, but also overstretch legal institutions, as it takes on average about 32 months to settle disputes (Justice Law and Order Sector 2016). Disputes also negatively affect the viability of commercial farming investments, particularly in Northern Uganda where 93 percent of land is under customary tenure and where refugee influx is most pronounced.[41]

The value-added standouts in the food and drink sector from 2002 to 2011 have been beer, soft drinks and bottled water, and edible oils. Since 2011, while beer has fallen into negative growth, sugar processing has come into its own with about 15 percent growth annually, soft drinks and bottled water have continued grower steadily at 9 percent growth annually, as has edible oils processing at 6.1 percent annually. Coffee processing has also made a growing contribution to manufacturing value-added in the later in the period at 7.5 percent per year, compared to negative growth in the earlier period. Sugar, soft

drinks, coffee, and edible oils appear to be the most likely candidates to attract increased private investment if supply continues to grow to meet apparent demand.

Food and beverage manufacturing increased in importance in Uganda, driven mainly by domestic and regional demand. These sectors were responsible for 56.8 percent of all manufacturing value-added from 2011/12 to 2015/16 period, a growth in share from the 53 percent in 2010 (see Table 6). Less than 16 percent of total manufacturing value-added in this period came from traditional coffee and tea; if including processing of the other traditional export crops (cotton ginning and textiles, not shown), this would rise to about 19 percent. This illustrates that the contribution of agriculture to manufacturing value-added is not driven by traditional export crops.

Rapid growth of food and beverages is beginning to provide a bridge between low-wage agricultural sector work and high-wage, low employment sectors such as banks. At the high end of the dualistic labor economy, banking is a good example of labor costs in a primarily urban and primarily capital-intensive industry. It represents one pole of the African dual economy with smallholder agriculture at the other pole. Average labor costs per employee for large employers in financial services in 2001 and 2010 were ten times more than for large employers in food manufacturing. Yet the latter were roughly double the average labor costs in formal sector primary agricultural production or the food and beverage service industries. The emergence of food manufacturing and food service jobs over the past two decades provides a middle ground for wage employment in Uganda.

Trends in Agricultural Trade in Uganda

Agriculture as a sector is highly sensitive to the overall economic and trade climate. Overall economic growth, both domestically and among trading partners, determines demand for agricultural output, influences fiscal space and exchange rates, and affects the opportunity cost of labor and capital used in agriculture. In Uganda, as elsewhere, the share of agriculture in the economy is shrinking as the economy develops, as is to be expected. Despite remaining by far the largest source of livelihoods at roughly 70 percent of employment in 2016, the share of agriculture in GDP in Uganda declined from 55 to about 23 percent between 1990 and 2016. Meanwhile, the share of services jumped from 31 to 47 percent, and the share of industry rose from 14 percent to 31 percent.[42] Core inflation since 2013 has ranged between five to six percent per annum. Food prices, a critical part of core inflation, decreased significantly in 2016 to 3.1 percent for the year compared to 6.7 percent in 2015.[43] Nonetheless since 2006 food prices have outstripped the overall CPI.

Agricultural products, primary and processed, accounted for 54 percent of total exports over the last decade, and for 49 percent in 2016 (Table 7). Trade decreased globally in 2016 to a low point. While a gradual decreasing over the long term as a share of total exports, agricultural products have nonetheless displayed solid growth in nominal value, and unlike share of GDP, the role of agriculture in exports remains high. As of 2016, total agricultural exports were more than fourfold their early 1990s level in nominal terms, and more than threefold their early 2000s level. They also represent about 20 percent of Uganda's

total foreign exchange earnings. Note that the figures represent only recorded (formal) exports, and UBOS estimates that informal, unrecorded, exports amount to about 15 percent of all exports, but no disaggregated data is available.[44] Unrecorded exports are primarily regional.

Uganda remains a traditional exporter to world coffee markets, and coffee remains the country's main export, along with tea, tobacco, and cotton. Aggregate exports of these four crops tripled in nominal value and increasing 2.4 times in real US dollar terms between the early 2000s and the early 2010s (Table 7)**.** Coffee exports almost doubled, while the other three traditional exports rose between five and 10 times. Compared to the same baseline, traditional exports in 2016 more than doubled, even with coffee exports decreasing 11 percent compared to the previous five-year average. After an export boom in the first decade for the other three traditional commodities, with a peak of a 476 percent increase for tobacco, their export growth continued at a more moderate pace in the recent decade, ranging from 98 percent increase for tobacco to 126 percent for tea.

The country has also become a major supplier of non-traditional agricultural products. Including fish and fish products, which have grown nine-fold in nominal terms during the past two decades, non-traditional agricultural products have become the largest non-traditional export category (Table 7). Traditional agricultural exports were larger in value terms than non-traditional ones through the 2000s, although steadily diminishing. After 2010, non-traditional agricultural exports began to dominate, a trend likely to grow. Significant concern arose about decline in export volumes in the late 2000s, a consequence of declining catches, falling stocks, and overfishing[45] especially in Lake Victoria. Ugandan fish exports and fish products leveled off in the early and mid-2010s, consistent however with observed stable overall catch from the country's open fresh water bodies during the last five years. The largest markets for Uganda's fish and fish products exports are Hong Kong, OECD countries, Gulf countries, Israel, and the U.S.., and increasingly include neighboring countries such as Rwanda, Kenya, and the DRC.

There are other rapidly expanding, non-traditional exports. These include sugar and sugar confectionary, cocoa beans, vegetable oils and sesame seeds, cereals (maize, sorghum and rice and their flours), hides and skins, beans and other legumes, flowers, and vegetables (Table 7). In some cases, the cumulative growth of these exports is in the thousands of percent, increasing from a very small level to significant levels in recent years. An example is sugar and sugar confectionary, now representing the second largest non-traditional agricultural export at around US$100 million. Over the same baseline, maize exports tripled by the early 2010s, and increased four-fold by 2016.

Growth in most non-traditional exports is driven by increasing demand in neighboring countries. This is the case except for cocoa beans, hides and skins, and flowers, mostly shipped to OECD countries and China along with traditional exports. The largest markets for Uganda's cereal exports in 2016, for example, are South Sudan ($70 million), Kenya ($38 million), Rwanda ($18 million) and the DRC ($12 million). Other smaller markets are Burundi, Tanzania, and Sudan (ranging from $3 million to $1.5million) (ITC 2018a).

In recent years, the most significant cause of distress to Uganda's regional export performance. By 2013, South Sudan had become the largest destination for Ugandan exports. However, this market has become

extremely unpredictable due to serious unrest, and the resulting intermittent blocking of trade routes. In addition, severe drought in Uganda in 2016 decreased production of agricultural commodities for export, particularly maize and beans.[46]

Uganda is also a large importer of processed foods, and a growing one for fresh food, including cereals. This trend is widespread in Eastern and Southern Africa.[47] Processed foods accounted for 9.3 percent of all Ugandan recorded imports from 2012 to 2016 period; fresh unprocessed) food accounted for 3.4 percent.48 While imports of processed food declined by 5 percent annually from 2012 to 2016, fresh food imports increased at an annual rate of 21 percent. In particular, wheat imports, mostly from Russia, peaked at US$165 million in 2014, ten times as much as recorded in 2012. Rice imports also peaked in 2014 at US$72 million and remained high in 2016 at US$47 million. Rising food import dependency reached almost 13 percent by 2016,49 which increases Uganda's vulnerability to global price fluctuations, and its ability to generate foreign exchange.

Domestic, Regional, and Global Demand Shifts Will Create Further Opportunities for Job Creation in Uganda

Demand-side opportunities for agriculture and food in Uganda and its neighbors are the strongest they have ever been. This demand is both domestic and regional. Domestically, it is certainly driven by the high population and urbanization rates. Urban income growth is also rapidly expanding the middle class, similar to most countries in the region (Tschirley et al. 2015b). A detailed, comprehensive analysis of the 2013 household panels for rural and urban areas in Uganda in 2012/13 shows that household consumption is very responsive to income growth (ie *income elastic*, ref Boysen 2016). As expected, income response for food consumption expenditures are higher for the poorest quintile of households than for the richest, and on average are higher in rural areas than urban ones. However, it is striking how high (>1 or elastic) mean urban consumption response with respect to income is in both urban and rural areas for meat, fish, milk, and fruits. Widespread demand for these items will likely continue to grow more quickly than income in both rural and urban areas.

Increasing regional demand for food, and dietary shifts into higher-value and more processed foods, offer massive opportunities for Ugandan farmers and value chains. Unlike domestic demand, which will always be constrained by the relatively small size of domestic markets, regional and global demand is huge and growing. Africa's demand for food is projected to more than double by 2050, driven by population growth, rising incomes, rapid urbanization, and more open intra-regional trade policies. The value of the African food market is predicted to rise to US$ 1 trillion by 2030 from US$ 300 billion currently, with rapid growth of both the urban and rural middle class.[50] Diets increasingly move away from cereal and tuber staples towards greater consumption of animal protein, fruits, and vegetables a(Ibid.).

Uganda has subscribed to a growing number of regional treatises and commitments concerning agriculture. Regional treatises and commitments include those linked to the EAC and to Common Market for Eastern and Southern Africa (COMESA), the East African Common Market Protocol (CMP) 2010, and

the East African Community's Agriculture and Rural Development Strategy 2005-2030, and the COMESA Seed Harmonization Implementation Plan (COMSHIP) validated by COMESA Member States in 2014. While these regional commitments reflect agriculture having become a priority among many African countries, implementation of regional commitments tends to lag among most members.

Trade patterns show the current expansion of regional agricultural trade. Examination of agricultural incentives in the policy section below shows that Uganda has potential to expand regional agricultural trade. Uganda benefits from both a very favorable resource endowment and a terrific location to meet rapidly expanding demand from inland neighbors like South Sudan and the DRC. Uganda is especially well placed for meeting rapidly rising regional demand for processed foods, maize, dairy, fish, and animal products.

Uganda's agricultural export performance is likely still well below potential. According to the ITC Trade Performance Index's global performance rankings, Uganda is ranked 44th in fresh food and 68th in processed food. The comparable rankings for Kenya are 37 and 94, respectively; for Rwanda, 94 and 119; and for Tanzania 40 and 99. Thus, compared to its neighbors, Uganda's performance is average to better than average. However, significant export potential for most traditional and non-traditional agricultural products is left unrealized. To traditional destinations such as the OECD, ITC primarily sees substantial underutilized potential for unroasted coffee, and to a small extent for cocoa beans. To both Sub-Saharan Africa and other Non-OECD destinations, ITC calculates underuse of export potential in the high 40 to 80 percent range depending on the commodity.[51]

Domestic and regional trends in overall economic growth in the last year have been positive after a difficult 2016 for Uganda. Growth in Sub-Saharan Africa as a whole is estimated to have rebounded to 2.4 percent in 2017 after slowing sharply to 1.3 percent in 2016 as commodity prices recovered, global financing conditions remained favorable, and slowing inflation lifted household demand.[52] This trend has been especially pronounced in Uganda, where real GDP growth was estimated at 2.5 percent in CY 2016, twice as much in CY 2017, and is likely to be well above 5 percent annually for the next two calendar years.[53] In contrast, neighboring Kenya, Ethiopia, Rwanda, and Tanzania are projected to have real GDP growth rates ranging from 5 to 8 percent annually in 2017, well above the figures for Sub-Saharan Africa as a whole. These rates are likely at least twice as high growth expected in the industrialized Europe and North America countries representing traditional agricultural export markets (Ibid.). Furthermore, income elasticities of demand for higher-priced, more processed foods and beverages are much larger in East Africa than in the OECD, as the dietary transition is only just beginning to get underway in Africa. This illustrates the stakes Ugandan agriculture has in contesting regional and other emerging country markets for agricultural products that increase in demand with income.

Regional trade, particularly for agricultural commodities, has potential to stimulate growth and improve living conditions for a high proportion of Ugandans employed in the agricultural sector.[54] At the same time, Uganda who must buy their food, mainly residents in urban areas, may find it more difficult to buy higher value food items that are increasingly exported. The balance of overall costs and benefits is expected to be positive for Uganda. However, there will most likely be adjustment costs for some, at least

initially. Over time, the added national income going to rural producers and urban processors and shippers will generate growth that adds broadly to income opportunities. This means that it is vital to engage in dialogue with all relevant actors in Uganda, for which the recently revived public-private dialogue mechanism offers an appropriate framework.

Constraints and Prospects for Further Growth of Agro-industrial Development and Trade in Uganda

Agribusiness development can increase farm productivity, but also create better job opportunities along supply chains for the predominantly young African population. Dietary change is driving structural changes in labor demand, a critical issue in African policy debates given that over 700 million youth are predicted to enter the labor market over the next three decades.[55] About 60 percent of the agricultural labor force in Africa is already between 15 and 35 years of age, and the share of this age group is growing.[56] An analysis of six Sub-Saharan African countries showed that transforming their food systems could add more jobs than the rest of the economy between 2010 and 2025.[57] Already in 2010, the number of jobs in agribusiness amounted to 10 percent of the number of jobs in agriculture in Eastern and Southern Africa.[58] Labor productivity in agribusiness was up to seven times higher than in agriculture, depending on the type of activity.

About 362,000 Ugandans were employed in formal jobs in the food manufacturing and food and beverage services sectors in 2018. We can extrapolate that the 125,000 formal sector jobs in food manufacturing and the 131,000 formal jobs in food and beverage services, as measured in 2010,[59] now represents 362,000 jobs. Although 2010 is the last comprehensive census of businesses, this simple extrapolation is derived from adding two separate calculations using available data. First, sample surveys provide annual data from 2011 to 2016 on the numbers of formal sector workers in food manufacturing (UBOS 2017, and preceding issues). These suggest that the compound annual growth rate of food manufacturing jobs in Uganda from 2010 to 2016 was 5.1 percent annually. This can be reliably extrapolated two years to get a present estimate for food manufacturing jobs in 2018 of 186,000. Similarly, a UBOS survey of employed urban labor force in 2015 allows an estimate of 3.7 percent annual compound growth in that variable. Applying this to demand for formal food services (irrespective of any income effects) yields a conservative estimate of growth in demand for food services of 3.7 percent annually. This yields the estimate for 2018.

By 2028, we estimate that about 560,000 Ugandans will be employed in formal jobs in food manufacturing and food and beverage services. Applying the same annual percentage to 2028 is less accurate, suggesting the wisdom of using a conservative approach and growth rates. At 306,000, employment in food manufacturing will exceed employment of 253,000 in food services, consistent with the rise of a service-based urban economy. Formal sector manufacturing jobs in agro, food, and beverage processing in 2010 accounted for two-thirds of all manufacturing employment in Uganda that year. Since food manufacturing has grown faster between 2010 and 2016 at 5.1 percent compared to overall manufacturing at 4.4 percent, this share is likely to continue to increase. More than the estimated 560,000 jobs in agro-processing and food services in 2028 can be created if processed agricultural exports grow

even faster than the more than 10 percent annual growth in real value added from agricultural exports from 2006 to 2016 (Table 7). In addition, growth in persons employed in food services in 2010 would likely be greater than the conservative estimate incorporated in the total for 2028 if Ugandan urbanization rates rises closer to rates seen in other EAC countries.

Assessment of Challenges for Developing Agricultural Value Chains[60]

Numerous barriers to agricultural commercialization continue to exist for smallholder farmers in Uganda. A study assessing factors driving commercialization in Uganda found that a main determinant was access to physical, human, and financial capital.[61] Larger farm holdings were more eager to commercialize since they could realize economies of scale by adopting modern technologies. Farmers with access to assets and connectivity to markets actively engaged in markets. The geographic dispersion of smallholder farmers and poor infrastructure quality, in contrast, present barriers to commercialization. The lack of rural roads and poor road maintenance hamper smallholders' access to input and output markets, drive up transaction costs, and lead many to pursue more subsistence-oriented practices.[62] High transportation costs are moreover a significant barrier to trade, and lead to lower farm gate prices or higher market prices since traders exploit their market power over farmers.[63]

Access to finance is critical for smallholders to invest in better farming equipment and practices, but also to improve their livelihoods more generally. Commercial banks provided 95 percent of all agricultural finance in Uganda in 2013, but generally not to smallholders[64], as in Uganda smallholders rarely hold collateralizable property rights to land. While the financial inclusion of Ugandans in general has improved markedly, agriculture-related finance made up only 8.4 percent of commercial bank lending in 2013.[65] Since the 2008 food crisis, formal financing for marketing has tended to grow more quickly than for production or processing; however, production loans more than doubled in 2013 and processing loans also doubled in 2014. As of 2014, formal loans for production, processing, and marketing each accounted for about one-third of agricultural finance.[66] This is unusual in East Africa, where the production share (but not amount) of formal sector agricultural finance has tended to decrease over time due to the rise of agribusiness post-harvest value chain lending[67]. The difference in Uganda may be explained by the surge of new commercial production of maize in the north after the peace agreement.

Private sector investment in Ugandan agriculture—whether by smallholders on their own plots or by large-scale investors—has been modest compared to Kenya, Tanzania, or Ethiopia. For smallholders, this appears to be linked to difficulties in securing finance and uncertainties about whether they can retain their land. Less than 20 percent of land can be said to have secure tenure of the type required as collateral for formal loans. The guaranteed market for quality maize provided by long-term WFP procurement in Uganda, coupled with sudden availability of contiguous larger plots of land from peace in the north, has enabled significant private sector supply response to the Government's liberalization of maize markets, but insecurity of usufruct rights has limited this expansion as well.

Uganda has fragmented set of agricultural institutions with overlapping and unclear responsibilities, leading to inefficient public spending. Public spending on agriculture and the institutional base for public engagement in stimulating agricultural development in Uganda have gone through wide swings in approaches over the past 20 years. This resulting inefficiencies in public investment exacerbate the deficit in private investment in agriculture. Together the effects are manifested in poor sector productivity growth, which ultimately must be at the heart of a pro-jobs growth strategy.

Agricultural extension services, which account for up to half of all public agricultural expenditure, are ineffective. Extension services, once a world-renowned model of innovation in Uganda, are today emblematic of the failure of public support to foster agricultural productivity growth. Services include subsidized inputs distributed by the military for redistributive purposes rather than productive ones. There is widespread recognition among agricultural stakeholders at all levels for the need to use scarce funds to provide non-capturable public goods, such as improved research, extension, and institutional development to facilitate widespread private investment (including smallholders) in the sector.

The combination of Uganda's natural resources and agricultural skills place it in a strong position to stimulate overall economic growth. Ugandans can sell into a new regional agricultural commodity boom and growing demand for products such as confectionary, fish, maize, animal feed, vegetable oil, and dairy, which have grown rapidly in Uganda's exports since 2000 (Table 7). Likewise, Ugandan export growth has been strong globally for high-value traditional coffee and tea exports, and for non-traditional ones such as fish, cocoa, spices, and flowers. This demand is powered by high population growth, urbanization, and income growth per capita throughout the region. Agricultural value chains everywhere—including in Uganda—are rapidly becoming higher value, more processed, longer, wider, and more anonymous. They are also becoming more demanding in terms of quality and reliability of shipments. Private firms in Uganda and elsewhere in the region struggle to secure raw material supplies. Farmers, on the other hand, have increasing difficulty achieving market recognition for their products sold in spot markets.

Larger sized food processing establishments in Uganda locate where infrastructure is accessible. The spatial patterns of food processing establishments by size in Uganda indicate the strong correlation of size of firm with infrastructure availability and other supply side factors, but demand is also clearly important. A forthcoming mapping study shows that roughly half of the largest food processors (greater than 99 workers), and many of the smaller ones, are located in and around Kampala, the economic capital.[68] Kampala, a major growing market, is also endowed with energy supplies and roads, and fosters economies of agglomeration. National distribution of smaller firms is highly correlated spatially with the density of smallholder farming, another supply-side and agglomeration driver. Not surprisingly, fish processing firms tend to congregate at Lake Victoria.

Firm location data illustrates the importance of demand-side drivers in understanding the location of agricultural processing firms. The large majority of firms outside the major Kampala domestic market are located on the few major national all-weather roads. Yet it is striking that about one-third of the largest food processing firms, and many of the smaller ones, are located close to export markets and national borders, even relatively remote ones. There is a heavy concentration in Eastern province, near the Kenyan

border, another concentration in the Western province (Bundibugyo and Kabarole) near the DRC border, another cluster in Mbarara on roads leading to and passing through Rwanda to the DRC, and, perhaps most surprising, is the remote cluster in the northwest (Yumbe and Arua) close to the border with South Sudan. The locations on the borders clearly are driven by demand form the other side of the border.

The primary constraint East African food processors face is reliable supply of raw material.[69] Capitalizing on growing urban and regional demand for processed and higher value foods requires vertical coordination of smallholders into higher value supply chains. Under such arrangements, smallholders will have incentive to produce more and better, and have access to the tools to do so. This would support better post-harvest handling, particularly storage, at smallholder and aggregation/warehouses to reduce post-harvest losses and improve prices received by smallholders. More skills and capital transfers, and better branding can benefit smallholder suppliers.

Improving the implementation of Uganda's agricultural regulatory environment will be key. This includes a wide variety of agricultural issues such as import licenses, grading, and phyto-sanitary, sanitary, and food safety regulation. The quality of agricultural inputs available in smaller quantities to smallholders is a particular problem, including, but not limited to, those distributed by government. Doubts about the quality of seed and fertilizers sold or distributed represent a serious barrier to producer investment. They also harm productivity and explain why Uganda has one of the lowest inorganic fertilizer use rates in the world. The weak regulatory system is directly related to the poor state of agriculture-related public institutions. A pro-farmer, pro-business, and pro-jobs objective requires helping the "Made in Uganda" label to strengthen sales of agricultural inputs and outputs.

ICT development in rural areas is critical to overcoming the remoteness of the multitude of diverse and widespread small farms. These issues create high transaction costs for firms attempting to work with smallholders, and vice versa. Rapidly expanding high-value agricultural supply chains require good connectivity and reliable, accessible databases between suppliers and integrators for passing market and technical information in both directions in near real time. Relatedly, it requires building trust, currently lacking, among different actors along the supply chain. Vertical coordination works best over time for all parties when market incentives are transparent, competitive, and both sides have recourse in the case of non-performance.

Finally, a pro-jobs growth strategy in a natural resource-based sector such agriculture will increasingly need to deal with climate change risks. Average temperatures in Uganda have increased by 1.3°C since 1960, and could rise by up to 2.5° by 2050. Seasonal rainfall has become more variable and less predictable, with consequences for fluctuating yields. Crop and animal pests and diseases linked to climate change are increasing problematic. While most countries in the same tropical latitudes as Uganda face similar dangers from climate change, Uganda is one of the least adapted agro-economic system, and thus one of the most vulnerable. This impacts the welfare of smallholders directly, and increasingly discourages potential investors in more formal, long-term agricultural enterprises.

Recommendations[70]

Strengthen public institutions and policies for agricultural productivity. Uganda needs a rapid turnaround in agricultural productivity growth, where it lags other countries in the region despite having better agricultural resources. This is a necessary precondition for sustainable agricultural growth and, arguably, for any truly pro-jobs growth strategy in the country.

Increase both the efficiency and amount of public spending for agricultural research and extension, especially for smallholder farmers. Present extensive public procurement funds should be repurposed for agricultural inputs for redistribution, on a free or subsidized basis, by agents other than qualified extension personnel. The current extension system should move away from free distribution of sub-standard inputs and should be rebuilt to increase its efficiency and effectiveness. The Government may consider achieving equity support goals through means other than inputs distribution, for example using social protection linked to climate-smart soil and water management practices. Extension should be supported by adequate staffing, data collection systems and capacities, and could be improved by non-governmental approaches, investments in radio programs, and farmer field schools.

Coordinate and strengthen the work of line ministries, extension agencies, and agricultural research institutes. The Ministry of Agriculture (MAAIF) needs to coordinate public activities in the sector with many public agencies and private firms. MAAIF needs to monitor public spending and funding, including donor funding. It will be critical for MAAIF and its agencies to regain capability to design and carry out agricultural policy and economics analysis, and monitoring and evaluation, especially under a shifting macroeconomic environment. It will be vital to improve the institutional and human capacity of line ministries to carry out activities such as agricultural public expenditure reviews, policy analysis monitoring, and document experiences in this area. They need to be able to generate and use policy analyses, monitor programs, and carry out credible technical evaluations. Without this capacity they will always be at a disadvantage in dealing with domestic and external funding sources, and will find it difficult to lead effectively. This has implications for staffing and institutional roles, and development partners should assist with start-up costs.

Reform the regulatory environment to ensure consistent quality of inputs and outputs without undue compliance burdens. To improve input quality, regulatory burden should be shifted from controlling registration (such as licensing of traders), to controlling actual operations through random sampling, in addition to regular controls of seed companies. Reforms should help support successful quality-certification initiatives such as AgVerify (a pilot program to allow checking the authenticity of seed package labels on the internet) and assess the potential for expanding its procedures from seeds to fertilizer. Licensing procedures and import processing for improved inputs and new seed varieties should be also be enhanced to reduce delays and to foster inputs for agribusiness development.

Promote commercialization of agriculture and trade through improving institutions and infrastructure. To date, private sector successes are modest in agriculture in Uganda, except in processing driven by urban and regional demand. An improved public framework for research, extension, regulation of input quality, rule of law, infrastructure, and access to regional markets is needed. Under these circumstances, the private sector is central for taking agriculture forward in a market-led economy, whether through

supplying, producing where plantation or other large-scale agriculture makes sense, developing markets, or processing for export.

Improve access to agricultural finance along entire agrobusiness value chains. This includes better land titling and enforcement, warehouse receipt programs, banking reforms, and the rule of law in commercial matters. Mobile money transfers, value-chain financing, digitizing land titles, and warehouse receipt systems (WRS) are promising approaches to de-risk the sector, to overcome the lack of collateralizable land titles for loans, and to increase farmers' access to finance. The over 500 Savings and Credit Cooperatives (SACCOs) currently registered in Uganda could be better supported through inclusion in legal banking frameworks, governance, and supervision mechanisms.

Assess policies related to transport and other transfer costs for agricultural commodities entering regional trade. Costs for transporters, such as high fuel taxes and expensive equipment, should be reduced and associated fiscal drag dealt with through measures that do not discourage exports . High-level leadership is needed to build mutually beneficial trade relationships with neighbors that can endure weather shocks, local shortages, and electoral cycles, and to contain border closures and other administrative hinderances to trade, including arbitrary ones imposed at short notice by local officials.

Analyze and carefully plan investments in infrastructure—roads, electricity, communications, water—which are especially critical to how agribusinesses will locate.[71] Considerations related to raw material source locations, perishability, intended markets, potential economies of agglomeration, economies of scope and scale are all important factors. While specific recommendations go beyond the scope of this note, we strongly recommend that Government urgently focus on how to promote secondary and tertiary towns as growth poles for agriculture.

Invest in information systems and databases. Agribusinesses and government need better market information, including agricultural transport flows and costs for producers by radio and cell to demonstrate least-cost pathways and target areas needing attention. Public databases on key household-level data and agricultural variables, such as market prices, are critical for boosting national competitiveness, food security, and for decision makers to steer pragmatic policies based on evidence. Consideration at a high level is needed to identify what data pertaining to food and agriculture are most relevant, and how they can be collected and analyzed cost-effectively in near real time. The MAAIF should provide leadership for data collection (for instance, about inputs, yields, post-harvest losses, soil quality) management and use by a range of stakeholders.

Improve rural ICT. Larger-scale agricultural operations, and both vertical and horizontal agribusiness coordination, require significant improvements in rural ICT. Identification and implementation of a set of investments and policies specific to rural ICT for agriculture is critical. Modern infrastructure is needed to support emerging technologies and services.[72] Suggested measures include optimizing connectivity of rural users by, for instance, using international undersea fiber optic cables arriving in the interior of East Africa; encouraging private sector participation in ICT infrastructure development; and hastening enforcement and awareness of ICT related (property) laws.

Continue to foster land tenure security through better land demarcation and delivery of adequate documentation to land owners. Multiple initiatives ongoing for this purpose should be supported and

upscaled. Examples include the Systematic Land Adjudication and Certification (SLAAC) program, or the GIZ-partnership with the Ministry of Lands, Housing and Urban Development (MLHUD). One way to support faster resolution of land disputes would be to support relevant courts. Greater use could be made of GPS-data, and of technologies such as drones to reduce the time and cost of data collection about field boundaries. New technologies are already transforming the digitization and securitization of land records in neighboring countries.

Pursue specific initiatives to promote agro-processing and encourage agro industry vertical coordination. Agribusiness will benefit from all the above initiatives, but agro-processing typically requires aggregation of products from many small farms. Initiatives to foster successful vertical coordination of production into whole value chains capable of meeting increasingly strict quality and safety requirements are needed. We suggest a three-pronged approach for the public sector to foster private vertical integration. First, create a knowledge platform for recording and diffusing good practices in agricultural vertical coordination arrangements. Second, clarify the legal status of vertical coordination agreements and obligations, such as under contract farming. Third, identify and empower a public authority with tools to oversee a level playing field in vertical coordination between farmer groups and aggregators, and across firms, and assist in contract enforcement. Establishment and enforcement of grading and quality standards for inputs and outputs will also facilitate vertical coordination by making it easier for aggregating firms to offer incentives to suppliers to provide quality raw materials. These approaches can also help attract multi-national agricultural investors willing and able to foster inclusive growth.

Support development of rural cooperatives. Policies limiting development of farmer cooperatives as economic actors should be reviewed and revised. Policies have been in place to limit development of rural cooperatives to avoid economic groups straying into politics, but the economic role of cooperatives needs to be supported. Independent rural coops are important to strengthen the bargaining power of smallholders under vertical coordination, and they also simplify aggregator interface with suppliers. They also spread the costs and simplify the governance of ownership and maintenance of technical equipment too expensive for individual smallholders, such as electronic soil scanners.

Increase resilience in agro ecosystems and of rural livelihoods. It is vital that Uganda take steps immediately to increase agro-ecological systems resilience to climate change to protect rural livelihoods and firms. The ongoing efforts to increase irrigation from its current very low level are critical given the breadth of risks and the urgency low resiliency demands, but a much broader multi-stakeholder approach is needed for these efforts to succeed High-level national leadership is needed to build widespread consensus on the dangers and to develop a practical and coordinated action plan to increase resilience through technology and better land and water management.

Increase collaboration between the many resiliency-building actors. The activities of climate and agriculture-related ministries, research institutes, civil society and farmers' groups, development partners, and private sector actors need to be better coordinated. For instance, establishment of a multi-stakeholder platform is needed. This can help identify and prioritize the most cost-efficient Climate-Smart Agricultural (CSA) practices for a given agro-ecological zone and local context. This includes implementation of the New National Irrigation Plan in consultation with stakeholders, building the capacity of user groups, and adapting planning based on economic feedback from users and upstream

and downstream value-chain participants. All stakeholders need adequate and timely access to credible meteorological, price, and disease-related information and early warning information. To support vulnerable communities to develop local emergency response mechanisms aligned with national-level institutions, it will be critical to coordinate a simple communication campaign across government authorities, private sector entities such as telecommunication companies, academia and civil society.

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Table 1: Sectoral Shares of GDP 1999-2017 Uganda and Selected Other EAC Countries

		(A) Annual% value-added (% of GDP)			(B) Compound Annual Growth Rates		
		1999-2001	2009-2011	2015-2017	1999-2011	2009-2017	1999-2017
Uganda	**Agriculture**	30.0	25.8	24.2	-1.5%	-1.1%	-1.3%
	Services	42.4	47.4	47.5	1.1%	0.0%	0.7%
	Industry	20.2	19.5	20.2	-0.3%	0.6%	0.0%
	Other	7.4	7.3	8.0	-0.1%	1.7%	0.5%
Kenya	**Agriculture**	28.4	24.8	31.3	-1.3%	3.9%	0.6%
	Services	45.3	48.2	45.4	0.6%	-1.0%	0.0%
	Industry	15.1	18.7	17.4	2.2%	-1.2%	0.9%
	Other	11.2	8.3	5.9	-3.0%	-5.6%	-4.0%
Rwanda	**Agriculture**	37.3	29.2	29.4	-2.4%	0.1%	-1.5%
	Services	45.5	48.4	47.2	0.6%	-0.4%	0.2%
	Industry	16.3	15.2	16.4	-0.7%	1.3%	0.0%
	Other	0.9	7.3	7.0	23.4%	-0.6%	13.8%
Tanzania	**Agriculture**	31.4	29.8	29.5	-0.5%	-0.2%	-0.4%
	Services	44.2	44.1	38.9	0.0%	-2.1%	-0.8%
	Industry	18.1	20.6	25.2	1.3%	3.4%	2.1%
	Other	6.4	5.5	6.4	-1.5%	2.8%	0.1%

Source: Data are from World Bank, World Development Indicators, last updated June 28, 2018. The sectoral definitions are as follows: "Agriculture" covers activities under ISIC rev. 4 codes 1-5, and includes cropping, livestock, forestry and fishing; "Services" includes ISIC rev. 4 codes 50-99; "Industry" covers ISIC rev. 4 codes 10-45, including both construction and manufacturing. Together the three categories cover well over 90% of economic activity in the countries and years in question (with the narrow exception of Kenya in 1999-2001). "Other" is a residual calculated by the author that permits summing all value-added shares to 100% and mainly covers mining and extractives and certain transportation services (ISIC codes 6-9 and 46-49). The compound growth rates in Columns (B) are computed between mid-points of the three-year averages shown.

Table 2: Changes in Employment Share by Sector in Uganda and Selected other EAC Countries 1999-2017

		(A)% of All Employment			(B) Compound Annual Growth		
		1999-2001	2009-2011	2015-2017	1999-2011	2009-2017	1999-2017
Uganda	**Agriculture**	70.4	71.0	70.1	0.1%	-0.2%	0.0%
	Services	21.9	21.7	23.0	-0.1%	0.8%	0.3%
	Industry	7.8	7.2	6.9	-0.7%	-0.8%	-0.8%
Kenya	**Agriculture**	45.8	39.1	37.9	-1.5%	-0.4%	-1.2%
	Services	40.6	45.4	47.7	1.1%	0.7%	1.0%
	Industry	13.7	15.4	14.3	1.2%	-1.0%	0.3%
Rwanda	**Agriculture**	88.6	79.6	66.9	-1.1%	-2.5%	-1.7%
	Services	8.7	14.8	25.0	5.4%	7.8%	6.8%
	Industry	2.7	5.6	8.1	7.6%	5.5%	7.2%
Tanzania	**Agriculture**	77.2	72.1	67.2	-0.7%	-1.0%	-0.9%
	Services	18.1	22.4	26.8	2.2%	2.6%	2.5%
	Industry	4.8	5.4	6.0	1.3%	1.5%	1.5%

Source: World Bank, World Development Indicators (WDI), last updated June 28, 2018.
Columns (A), "% of All Employment" by sector are three-year averages computed from ILO modeled values in ILOSTAT, reported in WDI.
Columns (B) are compound annual growth rates between the mid-year points of the averages in Columns (A).

Table 3: A Macro Approach to Estimating Trends in Labor Productivity 1999-2017 by Sector in Uganda and Other Selected EAC Countries

		(A) Growth in % of value-added			(B) Growth in Employment Shares			(C) Change in Sectoral Share of Labor Productivity Growth			(D) Annual Sectoral Labor Productivity Growth		
		1999-2011	2009-2017	1999-2017	1999-2011	2009-2017	1999-2017	1999-2011	2009-2017	1999-2017	1999-2011	2009-2017	1999-2017
Uganda	**Agriculture**	-1.5%	-1.1%	-1.3%	0.1%	-0.2%	0.0%	-1.6%	-0.9%	-1.3%	2.1%	0.2%	1.5%
	Services	1.1%	0.0%	0.7%	-0.1%	0.8%	0.3%	1.2%	-0.8%	0.4%	4.9%	0.4%	3.2%
	Industry	-0.3%	0.6%	0.0%	-0.7%	-0.8%	-0.8%	0.4%	1.4%	0.8%	4.1%	2.5%	3.6%
	Overall growth in value-added per person employed												
		3.7%	1.1%	2.8%									
Kenya	**Agriculture**	-1.3%	3.9%	0.6%	-1.5%	-0.4%	-1.2%	0.2%	4.4%	1.8%	2.1%	6.2%	3.7%
	Services	0.6%	-1.0%	0.0%	1.1%	0.7%	1.0%	-0.5%	-1.7%	-1.0%	1.4%	0.1%	1.0%
	Industry	2.2%	-1.2%	0.9%	1.2%	-1.0%	0.3%	1.0%	-0.2%	0.6%	2.9%	1.6%	2.6%
	Overall growth in value-added per person employed												
		1.9%	1.8%	2.0%									
Rwanda	**Agriculture**	-2.4%	0.1%	-1.5%	-1.1%	-2.5%	-1.7%	-1.4%	2.6%	0.3%	4.0%	5.9%	5.1%
	Services	0.6%	-0.4%	0.2%	5.4%	7.8%	6.8%	-4.8%	-8.2%	-6.5%	0.6%	-4.9%	-1.7%
	Industry	-0.7%	1.3%	0.0%	7.6%	5.5%	7.2%	-8.3%	-4.2%	-7.1%	-2.9%	-1.0%	-2.3%
	Overall growth in value-added per person employed												
		5.4%	3.3%	4.8%									
Tan-zania	**Agriculture**	-0.5%	-0.2%	-0.4%	-0.7%	-1.0%	-0.9%	0.2%	0.8%	0.5%	3.5%	3.5%	3.7%
	Services	0.0%	-2.1%	-0.8%	2.2%	2.6%	2.5%	-2.2%	-4.7%	-3.3%	1.1%	-2.0%	0.0%
	Industry	1.3%	3.4%	2.1%	1.3%	1.5%	1.5%	0.0%	2.0%	0.6%	3.3%	4.6%	3.9%
	Overall growth in value-added per person employed												
		3.3%	2.7%	3.2%									

Data: All underlying data are from World Bank, World Development Indicators (WDI), last updated June 28, 2018. The figures in the table are computed values as detailed below.

Methodology: All figures shown are compound annual growth rates between the mid-point years of annual three-year averages of the underlying variables: 1999-2001, 2009-2011, and 2015-2017.

The sectoral definitions are as follows: "Agriculture" covers activities under ISIC rev. 4 codes 1-5, and includes cropping, livestock, forestry and fishing; "Services" includes ISIC rev. 4 codes 50-99; "Industry" covers ISIC rev. 4 codes 10-45, including both construction and manufacturing. Together the three categories cover well over 90% of economic activity in the countries and years in question. Not covered are ISIC rev. 4 codes 6-9 and 46-49, mainly mining and extractive industries and certain transport services.

Columns (A), “Growth in % of value-added” are computed directly from estimates of annual value-added shares by sector in WDI (see Table1).

Columns (B), “Growth in Employment Shares” are computed from annual modeled ILO estimates of annual sectoral shares in total employment reported in WDI (see Table 2). In this case, the three main sectors sum to 100%, so there is a minor discrepancy in definition with the sectoral definitions used for value-added.

Columns (C), “Change in Sectoral Share of Labor Productivity Growth”, are computed as (A) + (B) for the corresponding cells, which is an identity if the minor discrepancy in definitions noted above is ignored, and bearing in mind that labor productivity growth is used synonymously with growth in value-added per employed worker, and that the sum of two growth rates is equivalent to the growth rate of the product.

Columns (D), “Annual Sector Labor Productivity Growth” are obtained by (C) + the corresponding annual compound rate of growth in overall real value-added per person employed, using the same logic as in Columns (C). The annual compound rate of growth in overall real value-added per person employed is computed for the time periods of interest from ILO estimates of annual GDP per person employed per country in constant 2011 dollars, reported in WDI, and are reported in the table for each country.

Table 4: Labor Productivity Change 2001-2010 in Private Agriculture Related Firms in Uganda
(in constant 000's 2010 UgSh, workers and%)

	Crop & Livestock Production ISIC4=1		**Food Manuf. ISIC4=10**		**Beverage Manuf. ISIC4=11**		**Food & Bev. Svcs. ISIC4=56**		**Financial Services ISIC4=64 (for comp.)**	
Employment in 2001 (workers)	14,965		18,888		2,463		42,562		4,363	
Value Added in 2001 (2010 UGS 000)	**LC/ wkr[1]**	**VA/ wkr[2]**	**LC/ wkr[1]**	**VA/ wkr[2]**	**LC/ wkr[1]**	**VA/ wkr[2]**	**LC/ wkr[1]**	**VA/ wkr[2]**	**LC/ wkr[1]**	**VA/ wkr[2]**
All firms	1,971	4,584	2,981	16,624	15,307	84,044	1,795	4,511	39,881	57,988
Small firms (1-19 wkrs.)	1,492	7,046	1,715	6,543	2,068	10,182	1,787	4,517	19,335	33,569
Med. Firms (20-99)	1,047	3,282	3,415	23,165	3,015	29,799	1,943	4,520	49,429	65,836
Large Firms (100+)	2,174	4,305	4,013	24,124	17,770	95,910	none	none	40,206	59,450
Employment in 2010	36,980		93,988		5,755		131,594		31,024	
Aggregate Change 2001 to 2010 (real terms)%										
Employment in 2010 All firms (% chg)	147		398		134		209		611	
Value Added Per Worker in 2010 (% real change from 2001)										
All firms	-27	106	-37	29	-89	-56	-34	20	-60	-42
Small firms (1-19 wkrs.)	-52	-26	28	**284**	-28	**105**	-35	15	-75	-71
Med. Firms (20-99)	208	**559**	6	66	-42	-10	6	**127**	-66	-74
Large Firms (100+)	-12	182	-59	-21	7	-53	none	none	-37	-1

Source: Data from Business Censuses carried out by the Uganda Bureau of Statistics (UBOS 2003, 2011).
Notes: All financial variable shown are in thousands of constant 2010 UgSh. In mid-year2010, US$1 exchanged for UGS 2,230. Labor productivity in the table can be viewed from two perspectives:
(1) The average labor cost per person employed (LC/wkr) is the wage bill and associated costs divided by the number of employees. This can also be thought of as the labor share of value-added on a per employee basis. (2) Alternatively, total value-added per worker is real total value-added divided by the number of employees. It includes remuneration to other factors of production, such as capital. It helps illustrate the relative capital (and possibly skill) intensity of production. While it does not represent what each employee adds to production, it does help illustrate what each employee is entrusted with on average. The financial services column is given for comparison purposes; it excludes insurance and pensions.

Table 5: Manufacturing Employment in Uganda by 2-Digit Sub-Sector 2010

ISIC4 2 digit Sub-Sector	Employment	Share%
10. Manufacture of food products	93,988	50%
11. Manufacture of beverages	5,755	3%
12. Manufacture of tobacco products	321	0%
13. Manufacture of textiles	4,665	2%
14. Manufacture of wearing apparel	18,879	10%
15. Manufacture of leather and related products	1,925	1%
Sub-total downstream from agriculture	125,533	66%
16. Manufacture of wood and of products of wood except furniture	1,470	1%
17. Manufacture of paper and paper products	665	0%
18. Printing and reproduction of recorded media	5,333	3%
19. Manufacture of coke and refined petroleum products	635	0%
20. Manufacture of chemicals and chemical products	4,616	2%
21. Manufacture of basic pharmaceutical products	1,659	1%
22. Manufacture of rubber and plastics products	1,704	1%
23. Manufacture of other non-metallic mineral products	4,983	3%
24. Manufacture of basic metals	2,348	1%
25. Manufacture of fabricated metal products, except machinery and equipment	16,476	9%
26. Manufacture of computer, electronic and optical products	56	0%
27. Manufacture of electrical equipment	778	0%
28. Manufacture of machinery and equipment	2,718	1%
29. Manufacture of motor vehicles, trailers and semi-trailers	95	0%
30. Manufacture of other transport equipment	110	0%
31. Manufacture of furniture	18,990	10%
Manufacturing employment (ISIC4 10-32)	188,169	100%

Source: UBOS (2011) and background data files from UBOS (2011).

Table 6: Changes in Real Value-Added of Food and Beverage Manufacturing in Uganda 2011/12 to 2015/16

Item	Weight in total manufacturingvalue-added over period	2011/12 (2002 = 100)	2015/16 (2002 = 100)	Average annual% compound growth over 2002 to 2011/2012 period	Average annual% compound growth over 2011/2012 to 2015/2016 period
All food and drink processing[1]	56.8%	176	218	6.5%	5.5%
Share of food and beverage sub-sectors in total manufacturing:					
Sugar processing	13.9%	124	216	2.4%	14.9%
Beer	9.9%	282	216	12.2%	-6.5%
Coffee processing	8.9%	84	112	-1.9%	7.5%
Soft drinks and bottled water	6.9%	362	509	15.3%	9.0%
Tea processing	6.8%	122	131	2.2%	1.8%
Edible oils and fats	4.2%	275	349	11.9%	6.1%
Total manufacturing all sectors	100%	186	224	7.1%	4.8%

Source: Calculated from data in UBOS Statistical Abstract 2017

Note: (1) Weighted index that excludes tobacco. The sub-categories below this are the main sub-components in terms of weight of this entry. Only sub-categories that had a weight of at least 4% of total manufacturing are shown here.

Table 7: Recorded Annual Agricultural and Food Exports in Nominal US$ Millions 1990 - 2016

	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016
Traditional Export Crops	**225.2**	**331.4**	**191.3**	**398.3**	**569.3**	**507.2**
Coffee	209.2	285.7	118.3	284.6	415.4	371.7
Tea	9.2	28.3	34.2	54.7	77.3	71.5
Tobacco	6.7	17.4	38.7	59.0	76.6	64.1
Cotton	7.7	18.9	21.7	19.2	47.1	31.6
Non-Traditional Agric/Food Exports	**56.6**	**88.0**	**183.7**	**378.8**	**666.4**	**703.8**
Fish and products	12.8	35.0	100.1	128.0	128.7	121.5
Sugar and Confectionary	0.1	5.8	2.3	38.0	84.9	100.3
Cocoa Beans	0.5	1.3	5.5	22.3	50.8	75.0
Maize	16.6	10.4	16.2	26.7	52.1	70.3
Animal/Veg Fats and Oils	0.1	2.3	5.5	46.2	98.6	62.1
Sorghum	0.0	0.1	0.1	1.5	20.2	55.3
Hides and Skins	7.1	8.6	10.5	12.3	55.2	51.4
Beans and other Legumes	9.7	9.5	5.6	12.3	28.9	50.5
Flowers	1.1	6.0	21.5	24.3	25.8	24.6
Other Non-Trad Agric and Food Exports[1]	8.5	8.9	16.4	67.2	121.2	93.0
Total Agricultural and Food Exports[2]	**281.7**	**419.4**	**375.0**	**777.2**	**1,235.7**	**1,211.0**
% Share of Total Exports All Sectors	**n.a.**	**n.a.**	**63%**	**54%**	**54%**	**49%**

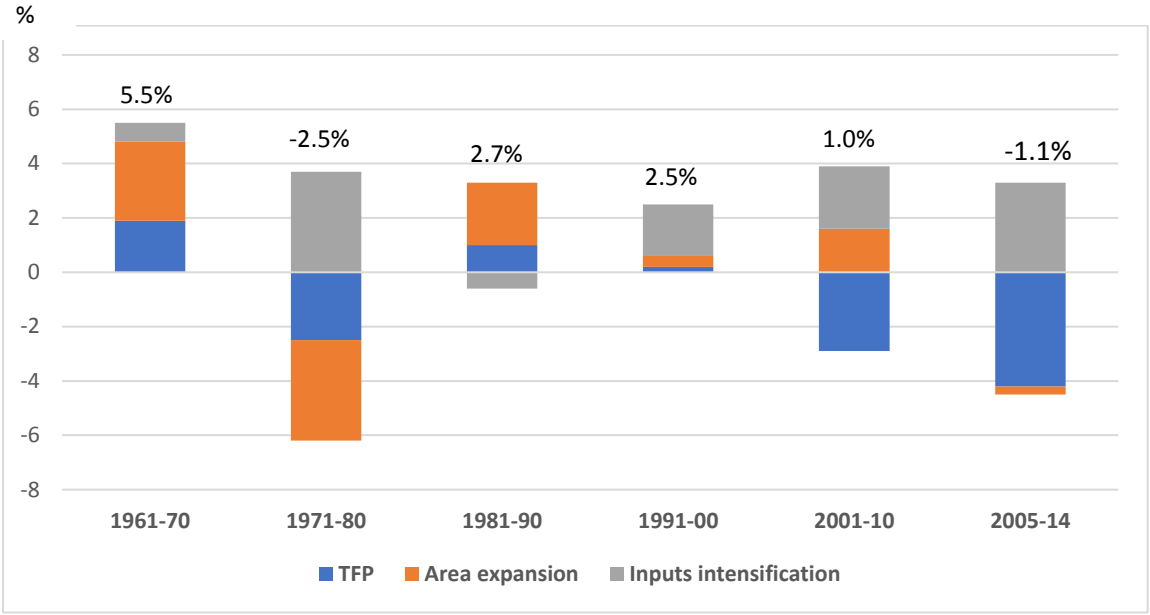
Source: COMTRADE database accessed via WITS and UBOS (2017).

Note: (1) In declining order of importance in 2016: rice, vegetables, sesame seeds, beer, mineral water, soybeans, fruits, pepper, vanilla, groundnuts, live animals, bananas. Note that UBOS (2017) has the same commodity specific totals, but also lists exports of "other commodities" of US$583.5 million in 2016, after accounting separately for the items lumped together in this line item and for big-ticket non-agricultural items such as gold and petroleum. None of this "other category" in UBOS (2017) is included here, although it seems likely that some of the items in question are agricultural in origin.

(2) The cumulative rate of inflation of United States consumer prices in US$ was 76.2% from 1991 to 2016 (U.S. Bureau of Labor Statistics Consumer Price Index). Therefore, the inflation-adjusted growth in US$ terms of agricultural exports from 1991 to 2016 was +176% or a multiplicative factor of 2.76. This implies that in US$ inflation-adjusted terms, non-traditional agricultural and food exports grew by a factor of 7 from 1991 to 2016, while total agricultural and food exports grew by a factor of 2.4 over the same period.

Figure 1. Decomposition of sources of agricultural growth in Uganda 1961-2014 (% per annum)

(Net agricultural output growth in% per annum at top of column in period indicated)



Source: World Bank (2018a).

Notes: (1) The three sources of growth listed sum to output growth in the period in question. Output growth may be different than column height because of negative contributions to growth in the period in question. Growth not explained by area expansion or increased use per ha of inputs (including labor) is attributed to TFP. TFP is a combination of increased allocative and technical efficiency, and technological change.

Source: Compiled from the USDA International Agricultural Productivity database, available at: https://www.ers.usda.gov/data-products/international-agricultural-productivity/

[1] Both these findings were found to hold on a global basis by World Bank (2007), which had assembled a massive amount of evidence to this effect.
[2] See Delgado et al. (1998), a partial equilibrium demonstration of agricultural growth multipliers at work in four African countries in the 1990s based on household survey data. A far more comprehensive, elegant, up-to-date economy-wide modeling investigation of the multiplicative impact on overall growth of growth of agricultural tradables in selected LICs is found in Diao, X., P. Hazell, and J. Thurlow (2010).
[3] Unless otherwise referenced, the original sources of data and analysis for Ugandan agriculture in this policy note are detailed in the new report, "Closing the Potential-Performance Divide in Ugandan Agriculture" (World Bank, 2018a). Note that the share of employment in agriculture fluctuated up and down between 77% in 1999 and 72% in 2013 according to the Uganda National Household Surveys in various years but fell suddenly to 64% in the 2016 survey.
[4] World Bank 2015. Also see Christiaensen and Kaminski (2015).
[5] This is the conclusion of a series of peer-reviewed empirical studies recently published in a special issue of *World Development*, see Christiaensen and Martin (2018a), also consistent with insights published in World Bank (2007).
[6] Ibid, also see Christiaensen and Martin 2018b for a summary of key points for a lay audience.
[7] Garlati et al. (2018) and Merotto et al. (2018)
[8] The difference between aggregate output growth and the growth of all inputs and factors of production that produced it.
[9] World Bank (2018a)
[10] World Bank, *World Development Indicators*, accessed October 12, 2018, shows a growth rate for urban population in Uganda of 5.8% per annum in 2017, compared to 5.7% in Burundi, 5.3% in Tanzania, 4.3% in Kenya, and 2.8% in Rwanda. See: https://data.worldbank.org/indicator/SP.URB.GROW
[11] Following Merotto et al. (2018), "better jobs" is used synonymously with "higher labor productivity" jobs.
[12] Merotto et al. (2018)
[13] Arithmetic means of annual real growth rates per capita in domestic currency in the period concerned, from data in World Bank (2018b).
[14] Garlati et al. (2018)
[15] African Growth Initiative at Brookings (2018); a similar view is developed in Fardoust et al. (2011).
[16] *Ibid.*
[17] World Bank *forthcoming*. Garlati et al. (2018) also uses the results of that work; labor transitions in Uganda were analyzed from 2009 to 2016, using five waves of the Uganda National Panel Survey (UNPS) of households.
[18] These results from the Uganda National Household Surveys rounds in 1999, 2003, 2005, 2009, 2013 and 2016, reported in Garlati et al. 2016. As suggested in note 1 above, the rapid transition out of agriculture since 2013 implied by the 2016 survey result is surprising, but conceivable. It does not match urban employment trends however, and suggests rapid growth in informal service jobs in rural areas.
[19] Garlati et al. (2018)
[20] *Ibid.*
[21] World Bank, *World Development Indicators.*
[22] Garlati et al. (2018)
[23] World Bank, *World Development Indicators.* Data from the different countries may contain small differences in what is counted in waged employment, but the main insights from the comparison is judged to be robust.
[24] This paragraph draws on "Closing the Potential-Performance Divide in Ugandan Agriculture" (World Bank, 2018a).
[25] McCullough (2017).
[26] Gollin et al. (2014) and McCullough (2017).
[27] Variable levels and compound growth rates in Tables 1, 2, and 3 are computed between the mid-points of 3 year annual averages, to mitigate the arbitrary volatility of annual outcomes that affects rainfed agriculture and that can greatly influence computed growth trends between any pair of years.

[29] Descriptive statistics cited by firm sub-sector, size group, and time period were computed by the World Bank Jobs Group and supplied to the present author by Dino Merotto.
[30] Average labor cost per worker is a measure of average labor productivity that effectively nets out the share of value-added due to other factors such as capital and land. Average total value-added per worker gives a sense of average overall production per worker and is taken as average labor productivity for present purposes.
[31] This section is taken from World Bank (2018a), which includes more detail and a methodological appendix.
[32] This approach using national level data implicitly calculates a weighted average (by field area) of data for all fields in the country, and assumes that the stock workers living on farms is a reasonable proxy for the flow of labor to agriculture and that this relationship is constant over time. While the latter assumption in particular is questionable, only panel data at the level of individual farms would allow escaping these limitations. The results are sufficient for present uses.
[33] Conversely, it could also reflect losses from systematic decreases over time in the average quality of inputs, such as land degradation or declining quality of fertilizer used, but this is not measured in the data.
[34] FAO (2017a)
[35] Sheahan, M. and C. B. Barrett (2014).
[36] Adjognon et al. (2017)
[37] Joughin, J. and L. Adupa 2017.
[38] Data are taken from ISIC rev 2 digit estimates for 2010 underlying more aggregated figures in UBOS (2013), although there is some uncertainty in disaggregating "other manufacturing" and "trade" and thus these are not included here. The Census of Business Enterprises in question reports only jobs in businesses enumerated in the census.
[39] The issues here are complex and explored in detail in World Bank (2018a).
[40] Mwesigye and Matsumoto (2016).
[41] Joughin and Adupa (2017).
[42] Uganda Bureau of Statistics (2017).
[43] Ibid.
[44] Ibid.
[45] Mwijagye (2009).
[46] World Bank (2017).
[47] See Tschirley et al. (2015). To some extent, importing more cereals, especially feed grains, is an anticipated counterpart to exporting more higher value foods such as vegetables and fruits more suited to Uganda's topography and climate. Importing more processed foods however may be a lost opportunity for development of secondary cities, see World Bank (2018a).
[48] International Trade Commission (2018a).
[49] Ibid.
[50] Alliance for a Green Revolution in Africa (2017).
[51] International Trade Commission (2018b).
[52] World Bank (2018c).
[53] World Bank (2018d).
[54] See World Bank (2013).
[55] AGRA (2017).
[56] Yeboah and Jayne (2016).
[57] Townsend et al. (2017).
[58] Tschirley et al. (2015).
[59] As measured in the most recent Census of Business Enterprises in 2010.
[60] This section summarizes the main conclusions of a comprehensive study that itself is summarized in 92 pages in World Bank (2018a).
[61] Nivievskyi et al. (2010)
[62] Oryokot (2017).
[63] FAO (2017b).
[64] World Bank (2015).
[65] Bank of Uganda (2015).

[66] Ibid.
[67] Meyer (2015)
[68] Preliminary results from forthcoming work at the World Bank by B. Blankespoor, D. Merotto, and T. Norman (personal communication from D. Merotto) that uses the COBE database and the UBoS 2014 Population Census.
[69] This is a widespread result from firm surveys in East and Southern Africa, that is documented for Uganda in World Bank (2018a).
[70] Like the previous section, this section summarizes the main recommendations of a comprehensive study that itself is summarized in 92 pages in World Bank (2018a), to which the reader is referred for detail and evidence.

[71] This important topic and its spatial aspects goes beyond the scope of the present note, but is being investigated in Uganda by World Bank teams and will be the subject of a future note.
[72] Interested readers ae referred to World Bank (2018a)