

# **Agriculture in Kenya and Uganda: Relevance, Behavior, and Performance**

**Giorgio Zenere**

## ***Abstract***

*Kenya and Uganda are neighboring countries located in the great Lake Regions of East Africa. They share a substantial portion of one of the biggest lakes: Lake Victoria. They are both poor and agriculture-based countries. However, there are significant differences in the level of development, climate, contribution of agriculture to gross domestic product (GDP), agricultural behavior and agricultural performance between these two countries. This paper will focus on illustrating these differences by using the data available from the World Bank's World Development Indicators. It shows that Kenya is overall more developed, uses far more fertilizers, withdraws far more water for agriculture, and uses far more tractors than Uganda. However, Uganda has made more progress during the last three decades in increasing the value added of its agriculture (in constant 2000 US\$). On the other hand, Kenya has made more progress in increasing the production of food per capita.*

## **I. Introduction**

Kenya and Uganda are sub-Saharan African, agriculture-based countries. They are considered to be among the developing world's leaders in a variety of different agricultural productions. The countries' politics concerning agriculture were revolutionized in the 1950s as the British colonial policy encouraged the development of co-operatives for subsistence farmers to increase their production such that the surplus can be sold in international markets. British official David Gordon Hines and his team established a co-operative bank and developed the marketing of agricultural goods of both countries. Despite the same British influence, Kenya turned out to be far wealthier than Uganda in terms of agricultural production, gross domestic product (GDP) per capita, partly for being more industrialized than Uganda. However, some indicators tend to show that Uganda is catching up with Kenya's economic wealth.

This paper will analyze the changes in the relevance of agriculture for the two countries, the different agricultural behaviors of Kenya and Uganda, as well as the different performances in agriculture. It is structured into seven sections. Following this introduction, the next section presents some empirical background on key human development indicators and the share of

agriculture as percentage of GDP. The fourth section summarizes the relevance of the agricultural sectors, while the fifth section examines the different behaviors in the agricultural sector. The sixth section reviews the performance of the agricultural sector before the last section provides some conclusions.

## **II. Literature Review**

Kenya and Uganda are countries where the agricultural strategies have been studied and debated by many scholars. Although academic research on the comparison of these countries' agricultural behaviors is almost inexistent, many publications discuss the countries' agriculture individually. The following five publications discuss some of the most important agricultural strategies implemented in Kenya and Uganda and their consequences on the populations' economic situations.

- Wenner (1983) describes how he changed Kenya's agricultural behaviors by establishing low-cost terraces, using dead crop residues from the field into ridges across the slope. In addition, Wenner talks about educating the farmers to promote soil conservation rather than absolutely striving for the maximum yield possible. Wenner explains how he helped implementing a new agricultural law on soil conservation. Wenner blames the industrial world for implementing practices that cannot sustain agriculture in the long-run, such as "over-irrigation" and the excessive development of agricultural infrastructure that are not compatible with Kenya's situation. Furthermore, Wenner describes how afforestation helped the country prevent the desertification of the land. Finally, the article points out that a) too little research is done on traditional agriculture and b) insufficient funds are allocated towards this type of research.
- The Kenya Institute of Public Policy Research and Analysis (KIPPRA) (2014) reviewed Kenya's food security, focusing especially on the role of irrigation. The report begins with pointing out that even though 80 percent of the country can be considered arid and semi-arid, agriculture contributes about 24 percent of Kenya's GDP. Climate change is worsening the aridity situation, as the weather's variability is not suitable to support a sustainable production of food. The report discusses several strategies to mitigate and facilitate the adaption to the climate variability such as increasing the area under irrigated agriculture.
- A report by Uganda's National Agricultural Research Organization (NARO) (2012) discusses how a new project regarding the use and distribution of seeds was implemented and improved traditional agricultural practices in Uganda. According to the publication, farmers in the West Nile agro-ecological zone of Uganda have been growing mainly local varieties of crops whose productivity was low compared to the improved varieties. This was attributed to lack of adequate access to seeds of improved varieties and inadequate knowledge on good agronomic practices. The primary objective of the project was to make available seeds of improved varieties of groundnuts, beans, rice and cassava to farmers in the West Nile region; thereby establishing a sustainable seed delivery system. The project was executed in the districts of Adjumani, Yumbe and Nebbi, where the lack of adequate access to seeds and poor skills of growing improved crop varieties is reported to be a major cause hindering adoption of improved crop varieties and subsequently low crop production. After some land preparation and training of farmers, farmers were provided with planting

materials such as seeds of rice, cassava, groundnuts and beans. The report shows that the project was a success: there has been an increase in the production based on quality of the seeds but also because of the efficiency of seed distribution.

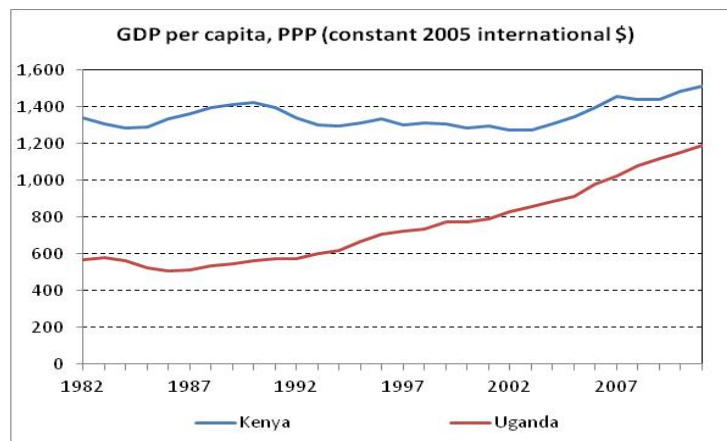
- Okoboi and Barungi (2013) wrote an acclaimed scholarly article, which discusses the use of organic and inorganic fertilizer as a response to the declining soil fertility in Uganda. Uganda is among the countries with the highest-level of soil nutrient loss in the world even though the use of fertilizer in crop production in Uganda remains low. The proper use of fertilizers could lead to higher economic growth and poverty reduction through increased agricultural productivity and output. The article points out that less than one-fifth of agricultural households receive extension services. The article then concludes that this inadequate access to extension services (that provide technical advice) is a major constraint for the broader adoption of fertilizer. Fertilizer use, access to credit and use of irrigation are closely linked. Therefore, any successful intervention to promote fertilizer use in Uganda will have to be accompanied with complementary inputs and services.

### III. Empirical Background

#### III.1. Human Development

As Figure 1 shows, 30 years ago, Uganda was a much poorer country than Kenya, if measuring poverty in terms of GDP per capita. Uganda's GDP per capita (in purchasing power parity (PPP)-adjusted constant 2005 dollars) stood at \$568 in 1982 (which is the first year for which such data is available for Uganda), while that of Kenya was \$1,342. Hence, in 1982, Uganda's GDP per capita constituted 42 percent of Kenya's GDP per capita. However, as Kenya has made very little progress during the last 30 years, Uganda has nearly caught up with Kenya by 2011 (the latest available data). In 2011, Uganda's GDP per capita had more than doubled since 1982, reaching \$1,188 in 2011. Kenya's GDP per capita increased by only 12.5 percent over nearly three decades, reaching \$1,509 in 2011. As we will show below, differences in agricultural behaviors and policies have contributed to these very different developments.

**Figure 1: GDP per capita (in PPP-adjusted constant 2005 dollar), 1982-2011**

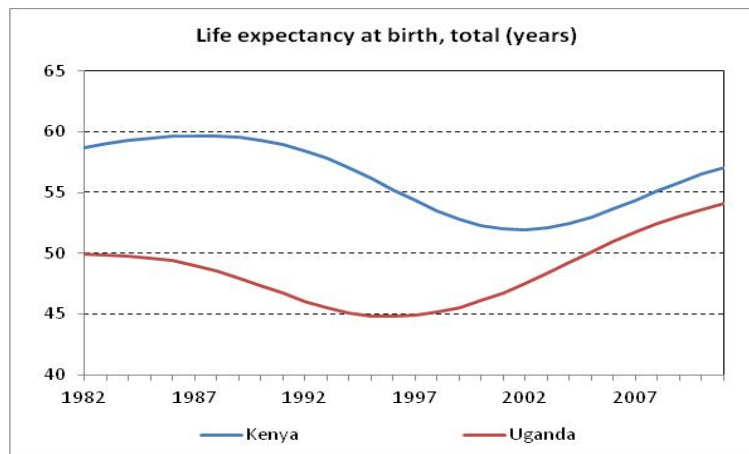


Source: Created by author based on World Bank data (2013).

Despite some differences and some similarities in the evolution of life expectancy between the two countries during the last 30 years, Figure2 shows that Uganda has also nearly caught up with Kenya

in terms of life expectancy at birth. In 1982, Uganda's life expectancy was nearly 9 years below that of Kenya's. By 2011, the difference was reduced to only three years. Mostly due to the HIV/AIDS epidemic, Kenya experienced a relatively sharp decrease in life expectancy from 1988 to 2002, while Uganda experienced a relatively sharp decrease from 1982 to 1996. Due to the late and slow recovery, Kenya's life expectancy of 2011 has actually been below Kenya's life expectancy of 1982, while that of Uganda has overall increased by 4.1 years during the last 30 years.

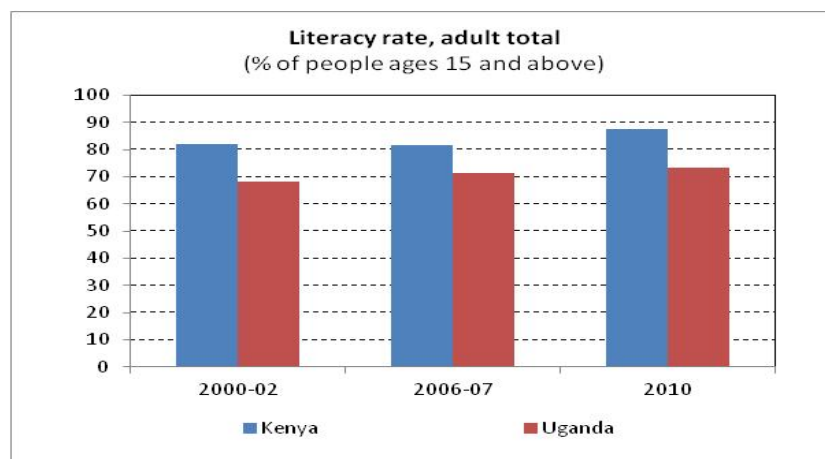
**Figure 2: Life Expectancy at Birth, 1982-2011**



Source: Created by author based on World Bank data (2013).

Even though reliable data on adult literacy rates are scarce for both countries, Figure 3 shows that Kenya's population is far more literate than that of Uganda's. In the early 2000s, Kenya's literacy rate stood at 82.2 percent, while Uganda's stood at 68.1 percent. By 2010, both countries have increased their adult literacy rates by about 5 percentage points: Kenya's increased to 87.4 percent, while that of Uganda increased to 73.2 percent.

**Figure 3: Adult Literacy Rates (selected years)**



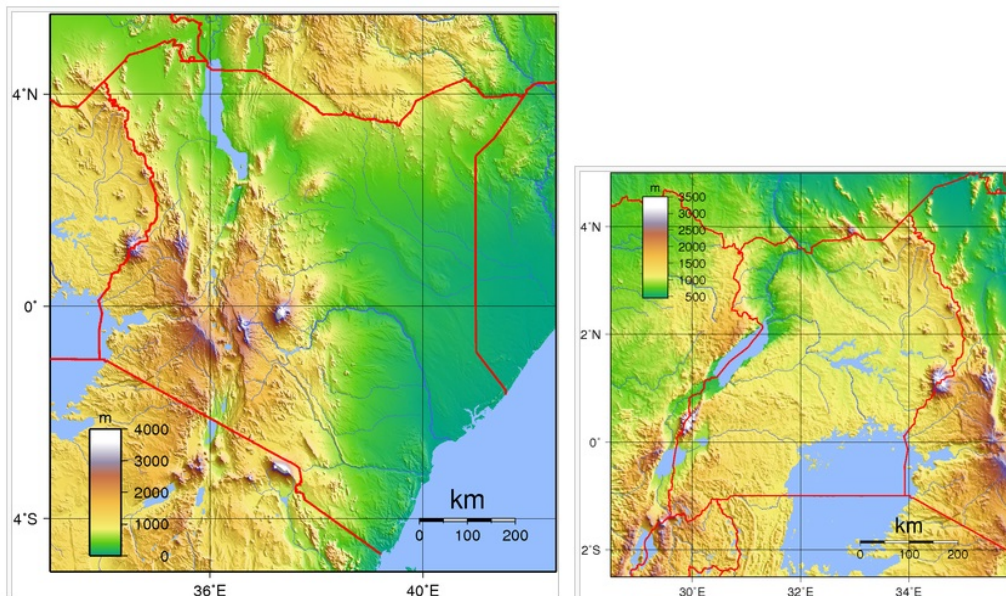
Source: Created by author based on World Bank data (2013).

### III.2. Geographies and Climates of Kenya and Uganda<sup>1</sup>

Kenya's terrain is composed of low plains that rise into central highlands that are, in turn, bisected by the Great Rift Valley. There is also a fertile plateau in the west of the country. Kenya's climate varies by location, from mostly cool every day, to always warm/hot. Along the coast, the climate is tropical, which means that rainfall and temperatures are higher throughout the year. Further inside of Kenya, the climate becomes more arid, with nearly no rainfall.

Uganda is a located country in Eastern Africa, west of Kenya. It is in the heart of the Great Lakes region, surrounded by Lake Edward, Lake Albert, and Lake Victoria. Despite being on the equator, Uganda is more temperate than Kenya due to Uganda's altitude. The country is mostly plateau with a rim of mountains. This has made it more suitable to agriculture and less prone to tropical diseases than other nations in the region. The climate is tropical; generally rainy with two dry seasons (December to February, and June to August). Only in the very north (near Sudan) is the climate semiarid.

**Figure 4: Topography of Uganda (left picture) and Kenya (right picture)**



Source: [http://en.wikipedia.org/wiki/Geography\\_of\\_Kenya](http://en.wikipedia.org/wiki/Geography_of_Kenya) and [http://en.wikipedia.org/wiki/Geography\\_of\\_Uganda](http://en.wikipedia.org/wiki/Geography_of_Uganda).

Though Uganda's land area is with 197,100 square kilometer (km<sup>2</sup>) about one third of Kenya's land area (569,140 km<sup>2</sup>), given that the percentage of arable land is much higher in Uganda (27.94 percent) than in Kenya (9.48 percent), Kenya and Uganda have about the same amount of arable land, amounting respectively to 53,954 km<sup>2</sup> and 55,070 km<sup>2</sup>.

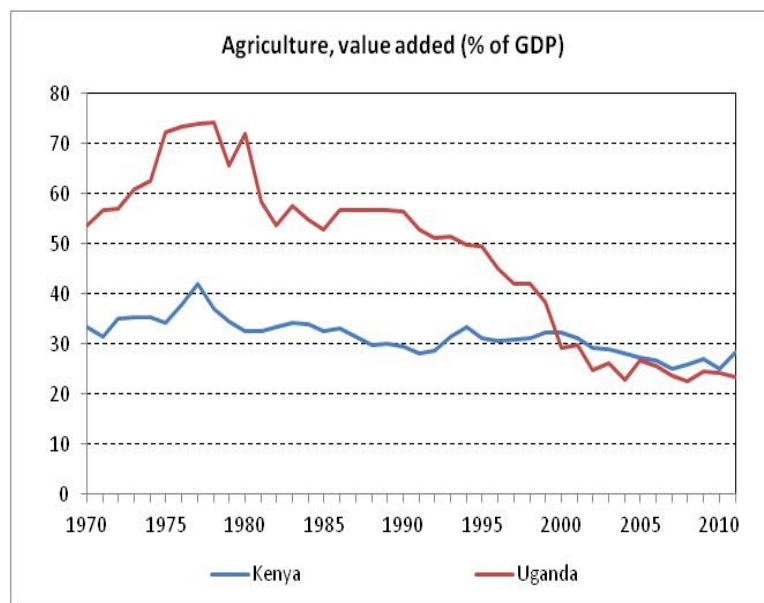
<sup>1</sup> Unless otherwise stated, most of this section has been adapted from Wikipedia's information on the geographies of Kenya and Uganda, respectively available at: [http://en.wikipedia.org/wiki/Geography\\_of\\_Kenya](http://en.wikipedia.org/wiki/Geography_of_Kenya) and [http://en.wikipedia.org/wiki/Geography\\_of\\_Uganda](http://en.wikipedia.org/wiki/Geography_of_Uganda).

However, due to the high level of poverty and resource scarcity in both countries, the land used for agriculture is far larger than what is considered to be arable land. According to the World Bank (2013), Kenya's agricultural land amounted in 2009 (the last year such data is available) to 273,500 km<sup>2</sup>, (which represents 48.05 percent of Kenya's total land area), while that of Uganda amounted to 139,620 km<sup>2</sup> (which represents 69.88 percent of Uganda's total land area) in 2009.

#### IV. Economic Relevance of Agriculture

As of today, agriculture remains a major economic engine in Kenya and Uganda. In 2011, the share of agriculture in GDP amounted to 28.5 percent in Kenya and to 23.4 percent in Uganda. As shown in Figure 5, for Kenya, the share of agriculture in GDP remains almost constant at around 30 percent since 1970. For Uganda, it increased from 53.8 percent in 1970 to a maximum of 74.3 percent in 1978. After two years of volatility, it then dropped very sharply from 72.0 percent in 1980 to 53.7 percent in 1982, after which it remained around that level for most of the 1980s. Since then, Uganda's share of agriculture in GDP experienced a slow, but almost steady decline, reaching 23.4 percent in 2011.

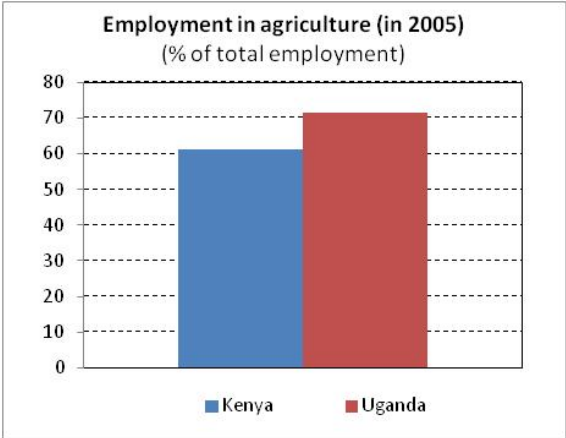
**Figure 5: Share of Agriculture in GDP, 1970-2010**



Source: Created by author based on World Bank data (2013).

Despite these relative small shares of agriculture to GDP, agriculture remains an important source of employment in both countries. In 2005 (which is the only year such data exists for both countries), the percentage of employment in agriculture amounted to 61.1 percent of total employment for Kenya and 71.6 percent for Uganda; see Figure 6.

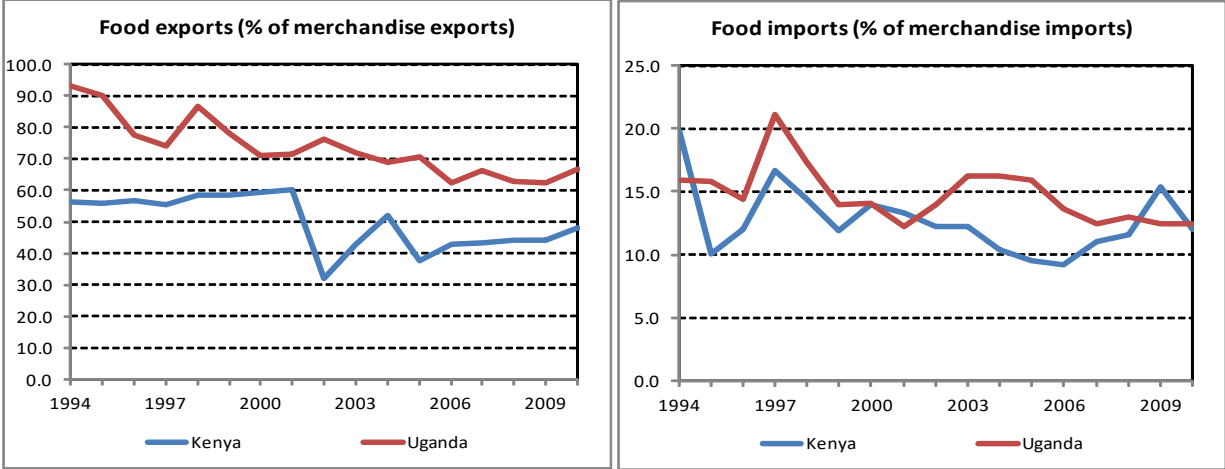
**Figure 6: Share of Agricultural Employment in Total Employment in 2005**



Source: Created by author based on World Bank data (2013).

Agriculture also remains an important source of exports for both countries. As shown in Figure 7, while the percentage of food imports in total merchandise imports ranged between 10 and 20 percent for both countries during 1994-2010, the share of food exports in total merchandise exports was much higher. During 1994-2010, it ranged between 30 and 60 percent for Kenya, and between 60 and 93 percent for Uganda.

**Figure 7: Food Exports and Imports as Percentage of Merchandise Exports and Imports, 1994-2010**



Source: Created by author based on World Bank data (2013).

**V. Agricultural Behaviors in Kenya and Uganda**

Two major agricultural behaviors that shape the productivity of agriculture are intensification and expansion of cultivation. The debate whether one should resort to intensification to produce more yield per hectare (ha) through the use of fertilizers and insecticides or if one should use expand its agriculturally used land in order to produce more has been ongoing for many years.

It is argued that the use of fertilizers impoverishes the soil quality and productivity over time; thus, resorting to intensification works amazingly well in the short run but is incredibly dangerous for the production in the long run (Okoboi and Barungi, 2013). Furthermore, insecticides can permanently damage the plantations, as well as having nefarious consequences on human health.

However, many scholars argue that fertilizers should still be used because their advantage outstand the drawbacks. In fact, not all fertilizers have nefarious effects. There are two types of fertilizers: organic and inorganic. According to Okoboi and Barungi (2013), inorganic fertilizers generate a soil nutrient loss in the long run, whereas organic fertilizers do not.

### **V.1. Use of Fertilizer**

Based on the World Bank's (2013) World Development Indicators, Kenya is using at least ten times more fertilizer than Uganda. During the period of years for which such data is available (2002-2009), Kenya's fertilizer consumption ranged between 27.3 kilogram (kg) per ha of arable land to 36.4 kg per ha of arable land. During the same time period, Uganda's fertilizer consumption ranged between 1.0 kg per ha of arable land and 3.0 kg per ha of arable land. Despite the fraction of Uganda's fertilizer use, Okoboi and Barungi claim that Uganda is among the countries with the highest level of soil nutrient loss in the world because farm-households are uneducated and apply both organic and inorganic fertilizers at the same time. According to their study, women are more likely to use inorganic fertilizers than men. If Uganda would use more organic fertilizers, the drastic increase in production will indirectly lead to higher economic growth and an acceleration in poverty reduction.

### **V.2. Freshwater Withdrawals**

Similar to Uganda's far lower fertilizer use, Uganda's annual freshwater withdrawals due to agriculture is also a fraction of that of Kenya's. Based on the World Bank's (2013) World Development Indicators, Uganda's annual freshwater withdrawals due to agriculture amounted to 120 million cubic meters in 1997, 2002, 2007 and 2011, while Kenya's annual freshwater withdrawals due to agriculture amounted to 1,566 million cubic meters in 1997 and 2002, and to 2,165 million cubic meters in 2007 and 2011. Uganda's far lower freshwater withdrawal is obviously related to a) the different climate of Kenya and Uganda (see section III.2 above) and b) that Kenya's agriculture is more developed than that of Uganda. Consistent with Kenya's much higher freshwater withdrawals is that Kenya's irrigated land amounted to 1032 km<sup>2</sup> in 2003, while that of Uganda amounted to only 144.2 km<sup>2</sup> in 2010.<sup>2</sup>

According to the Kenyan Institute of Public Policy Research and Analysis (KIPPRA) (2014), climate change is worsening Kenya's aridity situation because the increased weather variability is not suitable to support a sustainable production of food. Although the irrigation potential for Kenya is estimated at 540,000 ha, only about 106,600 ha are under irrigation. In other words, only 20 percent of the potential area is irrigated.

On the other hand, Uganda used to rely on natural precipitations for irrigation. However, the Ugandan government has now established a 25-years master plan on irrigation. According to the BBC (2014), officials established the total area under formal irrigation in Uganda to be of 14,418

---

<sup>2</sup> See [http://en.wikipedia.org/wiki/Geography\\_of\\_Kenya](http://en.wikipedia.org/wiki/Geography_of_Kenya) for Kenya and [http://en.wikipedia.org/wiki/Geography\\_of\\_Uganda](http://en.wikipedia.org/wiki/Geography_of_Uganda) for Uganda.

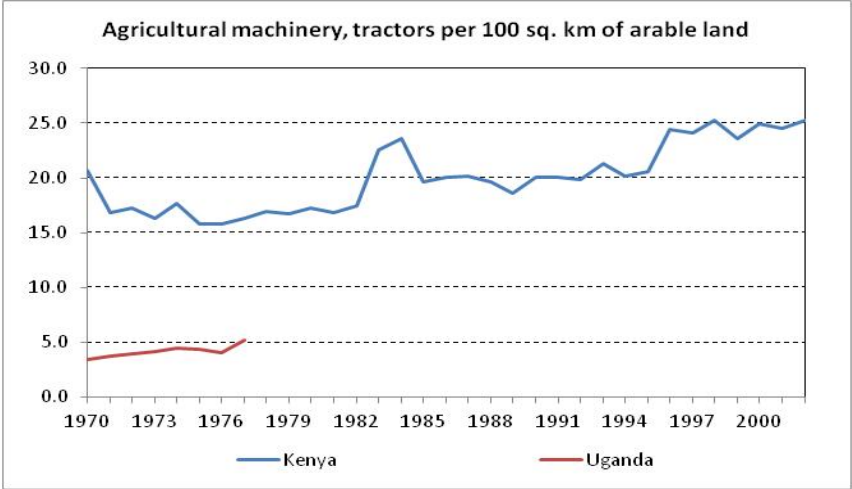


ha out of an estimated 560,000 ha with irrigation potential. The plan is to increase the utilization of land from 5 percent to 10 percent by 2015, to 25 percent by 2020 and to 70 percent by 2035.

**V.3. Use of Tractors**

Kenya also uses far more tractors than Uganda. Despite some data limitations, especially for Uganda, Figure 8 shows that Kenya had three to four times the amount of tractors per 100 km<sup>2</sup> of arable land than Uganda during most of the 1970s.

**Figure 8: Tractors per 100 square km of Arable Land (all available years)**



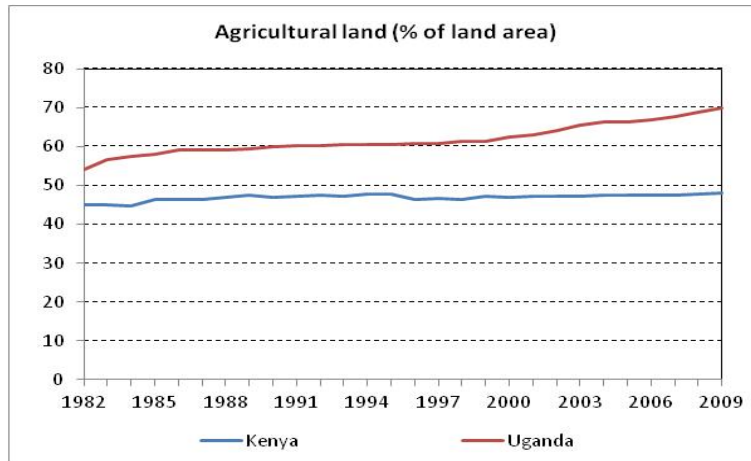
Source: Created by author based on World Bank data (2013).

**V.4. Expansion of Agricultural Land**

When intensification is not adopted, the other strategy to increase agricultural production is by expanding the area of land dedicated to agricultural production. Land expansion is beneficial but has limits due to urbanization as well as the overall limits on surface area of a country. Figure 9 shows that the evolution of agricultural land from 1982 to 2009, which indicates that Kenya has only marginally increased its agricultural land (from 44.94 percent to 48.1 percent of Kenya’s total land), while Uganda has increased its agricultural land from 54.25 percent to 69.88 percent of Uganda’s total land.

In any case, while making these comparisons, we should also take into account that Kenya’s population was about 39.5 million in 2009, while Uganda’s population was 32.4 million in 2009. Kenya’s population growth rates stood at around 3.5 percent during the 1970s and 1980s, but decreased to about 2.5 percent in the 2000s. Uganda’s population growth accelerated from around 3.0 percent in the 1970s to a maximum of 3.65 percent in 1988, after which it gradually declined, reaching 3.2 percent in 2011. In other words, the population pressure has been slightly higher in Uganda than in Kenya.

**Figure 9: Agricultural Land (percent of total land area), 1982-2009**



Source: Created by author based on World Bank data (2013).

### V.5. Specialization, New Seeds and GM Crops

Kenya and Uganda have similar historical background that led to the adoption of specific agricultural behaviors, especially concerning the diversification of their production. After their independence, many commercial farms were implemented in Kenya and Uganda. These commercial farms mostly focus on opportunities in international markets and have led the countries to diversify their agricultural productions based on comparative advantage.

According to Kenya's National Irrigation Board (2013), commercial farms hold about 40 percent of the countries arable land, which shifted the agricultural production from a production focused on provisioning the populations to an agriculture focused on highly valued secondary "niche" that will be sold overseas such as tropical fruits or tobacco. The Kenyan government holds about 18 percent of arable land and produces mainly sustainable agriculture, avoiding extensive use of fertilizers (in some cases), over-irrigation and highly toxic insecticides. Finally, smallholders in Kenya hold about 42 percent of the land, providing the essential food to the provisioning of the populations; most of the time they misuse fertilizers and do not practice sustainable agriculture because of a lack of education; the lack of knowledge impedes them to properly use modern agricultural technique. Commercial farms are leading producers of coffee, tea, and mangoes, whereas smallholders specialized in the production of cabbage, onion, and mangoes (Okoboi 2013).

In Uganda, commercial farms have specialized in the production of sugar and tobacco, whereas smallholders have specialized in the production of cotton, coffee, crops, tea, livestock and beekeeping. However, according to NARO (2012), Uganda has resorted to the use of new variety of seeds that are more productive than traditional seeds, especially concerning groundnuts, rice and cassava. These new seeds have allowed to reduce the cost of production and to increase the productivity of the cultivations.

Another strategy implemented in Uganda but forbidden in Kenya is the use of genetically modified (GM) crops. GM crops are modified to be more resistant to insects, which increases the production of the arable land. Some GM crops were also introduced to provide more caloric and/or more proteinous food, which is very useful to overcome hunger. However, because the long-term effects

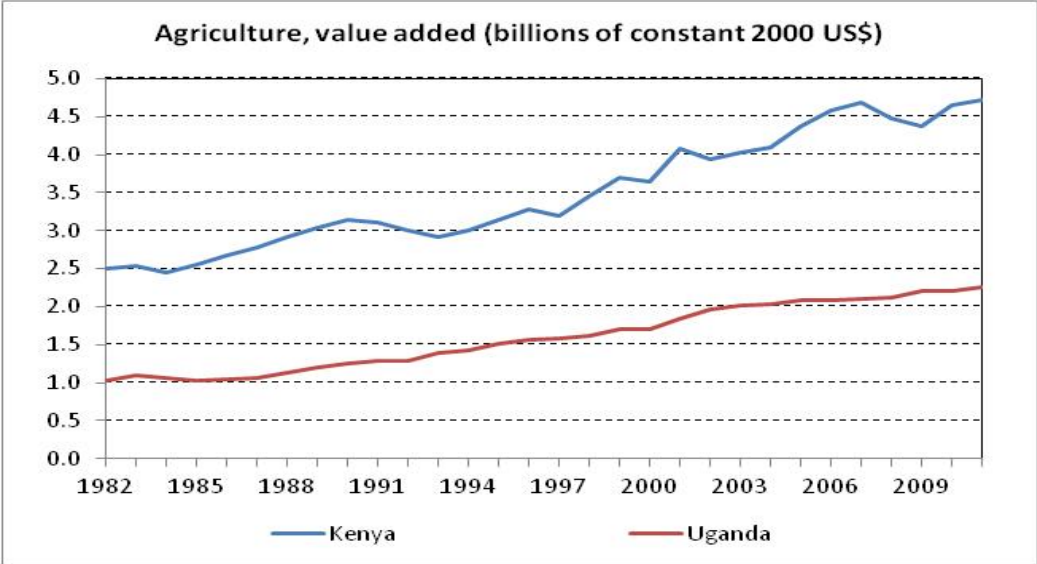
these crops might have are unknown, many people are skeptical regarding the safety of their use. In addition, some scientists argue that there is enough food production in the world and that the food penuries are only due to bad allocations of food. Nonetheless, it is surprising that Kenya has forbidden the use of GM crops (see Owino, 2012) when the United States only sends food aid in form of GM maize.

**VI. Performance of Agriculture**

We had noted above (Figure 5) that the share of agriculture in GDP remained almost constant at around 30 percent for Kenya, while it increased in Uganda from 53.8 percent in 1970 to a maximum of 74.3 percent in 1978, after which it declined with some volatility to 23.4 percent in 2011. Neither trend does however say much about the performance of the agricultural sector as it is normal for the share of agriculture declines as countries develop. We therefore look at value added in constant US dollars and the evolution of the food production index.

Figure 10 shows the value added of agriculture in billions of constant 2000 US dollars for both countries from 1982-2011. A first observation is that Kenya’s agricultural sector is much larger than that of Uganda’s. A second observation is that the value added by agriculture increased in both countries. It nearly doubled in Kenya from US\$2.5 billion in 1982 to US\$4.7 billion in 2011, while it more than doubled in Uganda from 1.0 billion in 1982 to 2.3 billion in 2011.

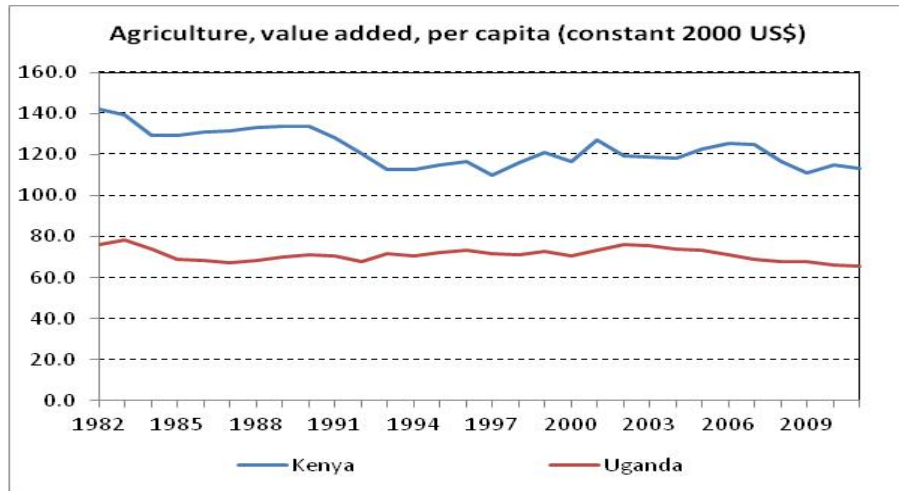
**Figure 10: Value Added of Agriculture (in billions of constant 2000 US\$)**



Source: Created by author based on World Bank data (2013).

However, as Figure 11 shows, in per capita terms, the value added by agriculture shows a slightly declining trend for both counties during 1982-2011. It initially declined in Kenya from US\$141 in 1982 to US\$113 in 1993, after which it remained (despite some volatility) at that level until 2011. For Uganda, the per capita value added by agriculture stood at US\$76 in 1982 and nearly remained at that value until 2002, after which is declined slightly to US\$66 in 2011.

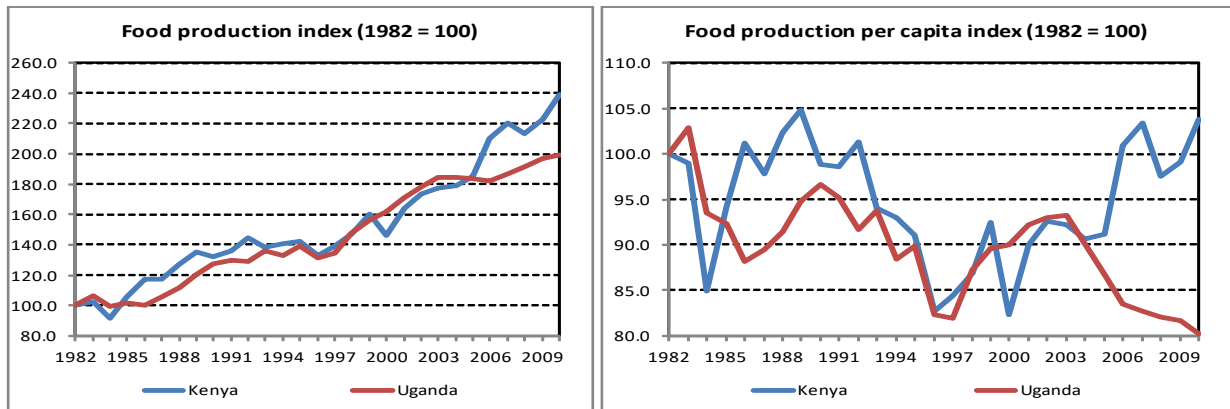
**Figure 11: Value Added per capita of Agriculture (in constant 2000 US\$)**



Source: Created by author based on World Bank data (2013).

Looking at the food production index (left hand panel of Figure 12) and the food production per capita index (right hand panel of Figure 12) provide a slightly different result than looking at value added in monetary terms. Based on food production, Kenya did slightly better than Uganda as the food production index more than doubled in Kenya (from 100 in 1982 to 239 in 2011), while it nearly exactly doubled in Uganda (from 100 in 1982 to 199 in 2011). Given Uganda's higher population growth, Kenya's progress is even better in per capita terms: Kenya's food production per capita index was 4 index points higher in 2010 than in 1982, while it dropped by about 20 index points from 1982 to 2010 in Uganda.

**Figure 12: Food Production Index and Food Production per capita Index, 1982-2010**



Source: Created by author based on World Bank data (2013).

## VII. Conclusion

Due to the similarities in terms of location, colonial past, and the influence of industrialized countries, it could be assumed that Kenya and Uganda have similar agricultural behaviors. However, when comparing the agricultural behaviors implemented in Kenya and Uganda, it can

be seen that Kenya uses far more fertilizer, withdraws far more freshwater for irrigation, and also uses far more tractors. On the other hand, Uganda was more successful in expanding the land used for agricultural production and is also more open to GM crops than Kenya. Overall, there is some indication that agricultural practices are more sustainable in Uganda than in Kenya.

While both countries were successful in increasing the value added of agriculture in terms of constant US\$ during 1982 and 2011, in per capita terms, the value added of agriculture decreased slightly for both countries, though more so for Kenya than for Uganda. However, examining the index of food production over the same time period, shows that Kenya has made more progress than Uganda. In per capita terms, Kenya's food production index increased by 5 index points, while that of Uganda decreased by 20 index points during 1982 and 2011. Clearly, taking the future challenges (like continuing high population growth and climate change) into account, both countries need to make major investments in agriculture if they want to be able to feed their population in the future.

## References

- BBC (2013). Kenya Aquifers Discovered in Dry Turkana Region. Internet resource of: BBC News of September 11, 2013; available at: <http://www.bbc.com/news/science-environment-24049800>.
- Wenner, Carl-Gösta (1983). Soil Conservation in Kenya. *Ambio*, Vol. 12, No. 6, pp. 305-307; available at: <http://www.jstor.org/stable/4312954>.
- Kenya Institute for Public Policy Research and Analysis (KIPPRA) (2014). Achieving Food and Nutrition Security in Kenya: The Role of Irrigation (Nairobi, Kenya: KIPPRA); available at: <http://www.kippira.org/News-and-Highlights/achieving-food-and-nutrition-security-in-kenya-the-role-of-irrigation.html>.
- National Agricultural Research Organization (NARO) (2012). *Establishment of a Farmer-based Seed Multiplication and Delivery System for Improved Varieties of Cassava, Beans, Groundnuts and Rice in West Nile Zone, Uganda* (Westlands, Kenya: Alliance for a Green Revolution in Africa (AGRA)).
- National Irrigation Board (2013). Expanded Irrigation Programme. Internet resource of the National Irrigation Board; available at: <http://www.nib.or.ke/irrigation-programmes/expanded-irrigation-programme.html>.
- Okoboi, Geoffrey and Mildred Barungi (2012). Constraints to Fertilizer Use in Uganda: Insights from Uganda Census of Agriculture 2008/9. *Journal of Sustainable Development*, Vol. 5, No. 10, pp. 99-113; available at: <http://www.ccsenet.org/journal/index.php/jsd/article/view/19887>.
- Owino, Otieno (2012). Scientists Torn over Kenya's Recent GM Food Ban. Internet resource of: SciDev.Net (November 30, 2012); available at: <http://www.scidev.net/global/nutrition/news/scientists-torn-over-kenya-s-recent-gm-food-ban.html>.
- World Bank (2013) *World Development Indicators / Global Development Finance database* (Washington, DC: The World Bank); as posted on the World Bank website: <http://data.worldbank.org/data-catalog/> (downloaded on February 27th, 2013).