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AGRICULTURAL PRODUCTIVITY AND SUSTAINED ECONOMIC GROWTH IN SUB-SAHARAN AFRICA: EVIDENCE FROM GHANA

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Abstract

The past two decades have seen sub-Saharan Africa emphasizing improved agricultural productivity as a major source of economic breakthrough. However, improving agricultural productivity may dampen economic growth, contrary to the prescription of some development economists. The openness of an economy could set in motion the law of comparative advantage, rendering a less productive agricultural economy relatively better off than the rest of the world. This paper assessed sub-Saharan Africa's prospects of attaining sustained economic growth through agricultural productivity improvements. Beginning from a two-sector model, the study examined the relationship between agricultural productivity, manufacturing sector productivity, services sector productivity, GDP per capita, inflation, oil production, external debt stock, net forest depletion, openness of the economy and economic growth rate. Data from the World Development Indicators of 2017 covering 1960 to 2016 were analyzed for Ghana, one of the top three success stories from the African agricultural initiative. The results showed that GDP per capita, external debt stock, net forest depletion and openness were significant determinants of economic growth rate at the 5% level of significance, service sector productivity was significant at the 10% level, while agricultural productivity, manufacturing sector productivity, oil production and inflation were not statistically significant. The negative but insignificant link between agricultural productivity and economic growth rate, predicts a perverse welfare implication for agricultural productivity improvement through the use of scarce state resources. Ghana, just like the rest of sub-Saharan Africa would need major policy restructuring, to redirect public investments in agricultural productivity improvement to the services and manufacturing sectors, if the desired sustained real economic growth is to be attained.

Keywords: Agricultural productivity, economic growth, comparative advantage, Ghana, Sub-Saharan Africa

INTRODUCTION

The Industrial Revolution in Great Britain saw agricultural productivity positively influencing industrialization. Since then, many development economists have recommended improvement in agricultural productivity as a necessary condition for economic growth (Nurkse, 1953; Rostow, 1960; Sachs et al. 2004; Jayne et al., 2010; McArthur and Sachs, 2013). To these economists, improved agricultural productivity provided food for the labour force and their dependents, excess labour for the manufacturing sector, income to purchase manufactured products and savings that could be channeled into investment in manufacturing.

Contrary to this view however, was the experience of some economies which depicted a negative relationship between agricultural productivity and industrialization (Field, 1978; Wright, 1979). Here, the manufacturing sector was seen to be competing with the agricultural sector for existing labour. Thus a failing agricultural sector released cheap labour for industrialization. The Law of Comparative Advantage was seen to be of much relevance here.

The theoretical explanation for the two opposing experiences was derived from the openness of the economy concerned. While a closed economy (like Britain during the Industrial Revolution), revealed a positive link between agricultural productivity and industrialization, many open economies which did not have endowments for agricultural productivity improvement, had a comparative advantage in manufacturing. These economies channeled their labour force into manufacturing, imported agricultural products and raw materials while exporting manufactured products (Matsuyama, 1992).

Evidence regarding agriculture's relatively low value added per worker compared to other sectors provided byGollin et al. (2014) prompted some researchers to narrow the number of developing countries in which the agricultural sector was recommended as a priority sector for investment, as against higher growth prospects in non-agricultural sectors (Collier and Dercon, 2014).

These arguments could lead the way toward understanding why some countries have not experienced long-term economic progress and the way out. If agriculture can play a central and somewhat predictable role in developing economies, then it essentially must be a sector for targeted public investment in these economies (McArthur and McCord, 2014). Substantial evidence on these arguments abound in the economies of sub-Saharan Africa, where the African Union has initiated a strategy for agricultural productivity improvement as a source of sustained economic growth over the past two decades.

Background of the Study

Majority of inhabitants in sub-Saharan Africa depend on subsistence farms for their livelihoods. These settings are categorized by low and slow-growing agricultural value added per worker, low staple crop yields, soil nutrient depletion, and low levels of modern input use (Stoorvogel and Smaling 1990; McArthur 2015). Yet input technologies now exist—such as fertilizer, modern seeds, land management, and small-scale irrigation— which could boost productivity in these areas (McArthur and Sachs, 2018).

The AGRA (2018) observed that the African continent had most of the world's arable land, over half of the African population is employed in the sector, and it is the largest contributor to total gross domestic product (GDP). Yet, Africa is still producing too little food and value-added products. Productivity has been broadly stagnant since the 1980s. Despite recent efforts to increase investment, it is still too slow.

While efforts have been made by development partners to provide the missing links for agriculture to become an effective tool for long term economic growth, it still remains an unresolved paradox why such efforts are failing. Yet an important puzzle running through the agriculture induced growth arrangements for Africa is the most often ignored comparative advantage and open economy effects on these efforts.

Collier (2016) argues that large markets bring productivity gains. From technological efficiency to learning-by-doing, by observing and copying he holds that scale incentive makes markets more competitive. If the market is large enough to support twenty firms it will be more competitive than if it can only support two. Competition is a spur to dynamic efficiency where firms struggle to innovate in order to succeed (Collier, 2016). While Collier's observation about productivity growth is valid, the struggle of firms and hence economies in a competitive world with resource scarcity, where wastage comes at a high cost, is most naturally favoured by comparative advantage. Ignoring a country's comparative advantage and urging it on in the current global competition could generate failure and frustration. This is probably where most sub-Saharan African countries stand, when it comes to agricultural productivity improvements for sustained economic growth.

While agricultural productivity growth is an important component of economic transformation, such growth is not in itself sufficient for poverty reduction and welfare gains (Darko, Palacios-Lopez, Kilic, & Ricker-Gilbert, 2018), and, in some cases, may not even be a major driver of economic growth (Diao et al., 2018).

A distinction with Asia is that sub-Saharan Africa's agricultural growth still relies mainly on expansion of area under cultivation, not yield growth (Fuglie & Rada, 2013). Improvements in road infrastructure appear to have facilitated cropland expansion in the region (Berg et al.,

2018). Area expansion has been accompanied by massive land degradation and soil fertility depletion (Barbier & Hochard, 2016), suggesting unsustainable forms of intensification in much of the region (Drechsel, Gyiele, Kunze, & Cofie, 2001; Tittonell & Giller, 2013). Continued reliance on area expansion cannot be sustained as rural populations continue to grow and exhaust the land frontier (Masters et al., 2018; also Chamberlin, Jayne, & Headey, 2014). This argues for renewed emphasis on promoting agricultural productivity growth (Jayne et al., 2018), which must necessarily engage Africa's comparative advantage situation in agriculture as well as the extent of the openness of its economies.

Theoretically, two arguments explain sub-Saharan Africa's current predicament with agricultural productivity. These are the closed economy, conventional wisdom argument and the open economy, comparative advantage argument. Policy formulation and practice does not appear to have placed any premium on these theoretical considerations, as can be seen from the formulation and implementation of the Comprehensive African Agricultural Development Programme (CAADP). This policy document recognizes the need for agricultural productivity improvements as one way out of sub-Saharan Africa's agricultural sector stagnation. However, outlined measures and initiatives do not appear to be supportive of this recognition on a scientific basis. It will be misleading, for instance, to prescribe that African countries with vast endowments of natural resources, should concentrate on improving agricultural productivity to attain sustained economic growth. Such a policy could be prescribed only after the comparative advantage, openness and agricultural productivity relationships have been scientifically assessed to yield a positive outcome for economic growth.

The next two sections examine the theoretical framework and some empirical issues for the study. These are followed by a discussion on the state of agricultural productivity in Africa, and then the model. The results of the empirical analysis are then discussed. A discussion of the implications of the findings for economic growth policy then follows. The paper concludes with lessons for sub-Saharan African countries seeking economic growth through agricultural productivity improvements.

THEORETICAL FRAMEWORK

The theoretical framework for this study builds on a two-sector model of endogenous growth derived from the Ricardo-Viner-Javes variety (Matsuyama, 1992). This model assumes labour to be the only mobile factor combined with factors characterized by diminishing returns, where preferences are considered non-homothetic. Also, income elasticity for agricultural goods is less than unitary and productivity in manufacturing improves overtime due to learning-by-doing.

If the economy is a closed one, labour will be moved to manufacturing when an exogenous increase in agricultural productivity occurs, leading to economic growth. On the other hand, if the economy is an open one, the presence of a less productive agricultural sector will allocate more labour to manufacturing to grow faster bringing in a higher welfare than the rest of the world at a relatively small discount rate. If the agricultural sector here is organized to compete for labour with manufacturing, it only squeezes out manufacturing, eventually causing a decline in industrialization over time to deliver lower economic growth and welfare. Therefore the openness of the economy becomes a very important consideration for economic growth decision making as far as the agricultural sector is concerned. The remainder of the two sector model theory as discussed by Matsuyama (1992) is summarized below.

Technologies in the two sectors (manufacturing and agriculture) are given by,

$X_t^M = M_t F(n_t), \qquad F(0) = 0, F' > 0 \; and \; F'' < 0 \qquad (1)$

$X_t^A = AG_t(1 - n_t), \qquad G(0) = 0, G' > 0 \; and \; G'' < 0 \qquad (2)$

Where n_t is the fraction of labor employed in manufacturing as of time t (time is continuous). Agricultural productivity, A, which indicates the existing state of technology, land endowment, and climate, among other things, is constant over time and an exogenous parameter. On the other hand, productivity in the manufacturing sector M_t, which represents knowledge capital as of time t, is predetermined but endogenous.

Competition between the two sectors for labor leads to the following equilibrium conditions in the labor market:

$AG'(1 - n_t) = P_t M_t F'(n_t) \qquad (3)$

Where P_t is the relative price of the manufactured good, culminating in the closed economy condition,

$n_t = v(A), \qquad with \; v'(A) > 0$

Which implies the employment share of manufacturing is constant over time and positively related to A.

This positive link between agricultural productivity and the growth rate essentially depends on the closed economy assumption. A further demonstration of this assertion requires the assumption that there is a continuum of economies in the world, each of which is infinitesimally small. Labor is immobile across economies. The economy of interest is treated as the closed economy. The rest of the world being homogeneous, differs from the economy of interest such that their agricultural productivity and the initial knowledge capital in manufacturing are given by A* and M_0^*, instead of A and M_0. It is also assumed that learning-by-doing effects do not spill over across economies.

Then, the world manufacturing sector grows at the constant rate, $\delta F(v(A^*))$, such that the relative price of the manufactured good, P_t, satisfies

$$A^*G^{'}(1-n^*) = P_t M_t^* F^{'}(n^*), \qquad (4)$$

Where $n^* = v(A^*)$. In the absence of any barriers to trade, and under incomplete specialization, the economy of interest's manufacturing employment is determined jointly by (3) and (4). Taking the ratios of each side of these two equations, n_t satisfies

$$\frac{F'(n_t)}{G'(1-n_t)} = \frac{AM_t^*}{A^*M_t} \cdot \frac{F'(n^*)}{G'(1-n^*)} \qquad (5)$$

First, by setting $t = 0$ in (5) and noting that $\frac{F'(n_t)}{G'(1-n_t)}$ is decreasing in n, one can conclude that

$$n_0 \gtrless n^*, \qquad if\ and\ only\ if\ \frac{A^*}{M_0^*} \gtrless \frac{A}{M_0}. \qquad (6)$$

This means that manufacturing accounts for a larger (smaller) share of the economy of interest's employment, compared to the rest of the world, if the economy of interest has a comparative advantage in manufacturing (agriculture). Next, differentiating (5) with respect to time gives

$$\left[\frac{G"(1-n_t)}{G'(1-n_t)} + \frac{F"(n_t)}{F'(n_t)}\right]\dot{n}_t = \delta\big(F(n^*) - F(n_t)\big), \qquad (7)$$

as long as $n_t \in (0,1)$, where use has been made of the no spillover assumption, $\frac{\dot{M}_t}{M_t} = \delta F(n_t)$ and $\frac{\dot{M}_t^*}{M_t^*} = \delta F(n^*)$. Because the expression in the square bracket is negative, the manufacturing employment in the economy of interest will rise over time if $n_t > n^*$, and decline if $n_t < n^*$. Thus, equation (6) and (7) jointly state that, when the economy of interest initially has a comparative advantage in manufacturing (agriculture), its manufacturing productivity will grow faster (slower) than the rest of the world and accelerate (slow down) over time.

Equations (5) – (7) also suggest that the path of the manufacturing sector employment, n_t and therefore, that of its productivity growth rate, $\delta F(n_t)$ shift down if A increases. This means in the case of the open economy, a negative link exists between agricultural productivity and economic growth and also suggests a perverse welfare implication of agricultural productivity improvement.

EMPIRICAL OBSERVATIONS

Literature on agricultural productivity has shown that in poor countries with no access to international markets, low agricultural productivity implies large proportions of the working population must be employed in the Agricultural sector. Until an economy overcomes what

Schultz (1953) describes as “the food problem,” it becomes difficult for it to release workers and productive resources to other sectors of the economy.

Caselli et al. (2012) argue that, even in an open economy, low agricultural productivity can constrain the process of structural transformation. They explain that domestic transport costs make it expensive to supply food to rural areas, implying that many rural people will remain engaged in subsistence food production even through their productivity is quite low. They consequently write off the usefulness of a distinction between an open and a closed economy for agricultural policy effects, in economies where high transport costs exist in developing countries. This prescription does not take into account the comparative advantage of the economies concerned. A developing country with high transportation costs could still have a comparative advantage in agriculture which could more than compensate for the effect of high transportation costs.

It is worth noting also, that a closed economy with high domestic transport costs could discover innovative ways of making agricultural produce accessible to consumers to promote economic growth. The openness of the economy probably makes it easier for state authorities to shirk their responsibility to open up rural areas for efficient food supply, since urban dwellers may be easily reached with imported food. This means the openness of an economy would still be a relevant consideration for agricultural productivity improvements to benefit developing economies.

Thirtle et al. (2001) found that the size and openness of the market greatly determine the elasticity of demand. Where the staple crop sector is large and mostly nontradable (beyond regional trade), productivity gains will increase the aggregate food supply and drive down food prices (World Bank 2007, Thirtle et al. 2001). A negative correlation between per capita production and staple prices has been observed in maize (Ethiopia, Ghana), sorghum (Burkina Faso, Mali, Sudan), cassava (Ghana), and weakly in millet (Burkina Faso, Mali, Sudan). However, staple food prices have not followed this pattern in Kenya (World Bank 2007). While decreasing prices are not good for producers, Irz et al. (2001) highlight that recent market liberalizations have increased the tradability of goods, which probably increase producers’ share of the benefits from agricultural growth. This likely occurs because increased output at the local level is unlikely to affect prices when the good in question is traded in a larger market (Irz et al. 2001).

Bravo-Ortega and Lederman (2005) also found that agricultural labor productivity (output per worker) had a significant effect on the average income of the first income quintile (the poorest) and this relationship was consistent across regions. However, they also showed that agricultural productivity had a smaller effect on the incomes of the poorest than non-agricultural

labor productivity. They contended that agricultural productivity explained an increasing share of the income for quintiles two and three (the second poorest and median quintiles) for poor countries. Finally, they also asserted that richer quintiles benefited more from advances in agricultural labor productivity than the poorest households. This assertion was consistent with the importance of assets gain from agricultural productivity increases.

The World Bank (2007) asserts that agriculturally driven growth generates a larger welfare effect than non-agriculturally driven growth, especially for the poorest 20% of the population. Also, Irz et al. (2001) argued that the most direct contribution of agricultural sector growth was through generating higher incomes for farmers.

The general equilibrium effects linking agricultural and overall economic growth have been modeled with increasing degrees of sophistication. Although the model results are generally supported by empirical evidence, no single comprehensive or generally accepted model appears to have emerged (Thirtle et al. 2001).

THE STATE OF AGRICULTURAL PRODUCTIVITY IN SUB-SAHARAN AFRICA

The African Initiative

The African Union (AU) sponsors a large, highly professional, continuing development of an Africa-wide blueprint for accelerated agricultural growth—the Comprehensive African Agricultural Development Programme (CAADP). The Heads of State of all African countries have signed off on it and it has formed the basis for agricultural growth strategies in those countries. CAADP quantified national targets of 6% agricultural growth rate; 10% of national budgets to agriculture; and 1% of agricultural GDP to agricultural research. Yet few African countries have come even close to meeting these targets. They are expected to be the national targets as more and more African countries commit to accelerated agricultural growth (AGRA, 2018).

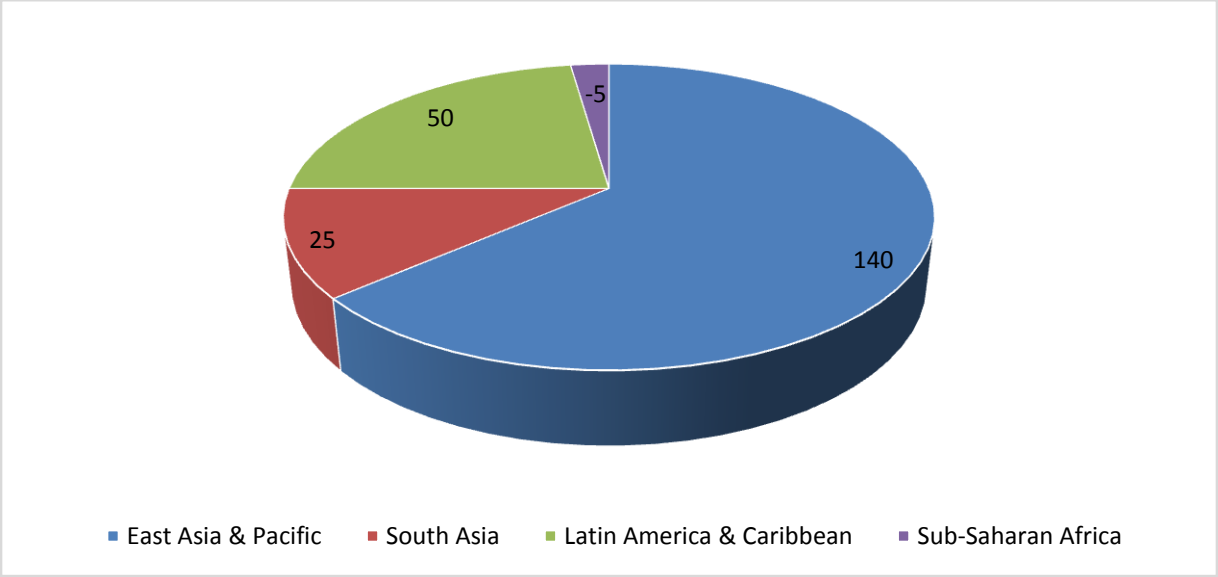
Three African countries were mentioned as success stories of agricultural growth in CAADP's report in 2018 – Ethiopia, Ghana and Rwanda. Ethiopia was described as a major success in agricultural growth with 25 years of exceeding the CAADP target of a 6% growth rate, with consequent halving of rural poverty, which had carefully patterned its strategy and plan on the CAADP model. Many have hailed Ethiopia's public sector investment driven growth, given that the country is a non-oil exporting country and its mineral resources are limited. The challenge is, however, whether Ethiopia would be able to sustain this progress in the coming decade and be able to fully transform its agriculture sector in the face of dwindling sources of growth that used to be low-hanging such as additional land for expansion (AGRA, 2018). Ghana was commended for emphasizing its large tropical export potentials through adherence to CAADP principles, while Rwanda had also followed CAADP precisely (AGRA, 2018).

While appearing to celebrate Africa's agricultural breakthrough over the past decade as a result of the CAADP, the AGRA (2016) points out that Africa remains "the world's most food insecure continent, with relatively low levels of agricultural productivity, low rural incomes, high rates of malnutrition and a worsening of food trade balance." Certainly, Africa has a growth dilemma whose solution goes beyond food and jobs from agricultural sector productivity improvements.

The Comparative Advantage Dilemma

McArthur and McCord (2014) computed Indexed regional trends from World Bank (2013) data on food production per capita across the developing world from 1961-2001, using a base of 100 (Figure 1).

Figure 1: Index of Food Production per capita in Developing Regions (1961-2001)



Source: Based on World Bank (2013) data and McArthur & McCord (2014)

These showed major growth in East Asia and the Pacific over the period, with per capita values nearly doubling, and considerable growth in Latin America and South Asia since the mid-1970s. Africa is the one region to have experienced a decline in per capita food production over the period, including a major decrease since the early 1970s and relative stagnation since 1980.

This performance is reinforced by trends of cereal yields per hectare from 1961-2001. Again McArthur & McCord (2014) found that, all developing regions except Africa experienced major sustained growth rates in land productivity over the period, despite varying starting points, and all except Africa more than doubled yields by 2001. East and Southeast Asia boosted yields from less than 1.5 tons (t) per hectare (ha) in 1961 to more than 4 t/ha in 2001; Latin America's

yields grew from 1.3 t/ha to greater than 3 t/ha; and South Asia's from 1 t/ha to nearly 2.5 t/ha. Africa had the lowest starting point at 0.8 t/ha, and still after 40 years had barely crossed the threshold of 1 t/ha, which was South Asia's starting level in 1961. It is thus evident that sub-Saharan Africa does not have comparative advantage over any part of the world in agriculture.

A simple Boserup (1965) hypothesis could argue that, relative to other regions, Africa's yield stagnation is a product of its land abundance, and yields could increase as land becomes scarce. Three main reasons are provided to justify the invalidity of this hypothesis described in McArthur (2013). First, the history of 20th century yield take-offs in the developing world was predominantly characterized by proactive public policies supporting a package of yield-boosting inputs, rather than by factor scarcity (Djurfeldt et al., 2005). These policies could explain much of the regional variations in fertilizer use since 1960. Second, labor/land ratios vary tremendously across Africa but they are just as high as or higher in many African countries than they were in pre-green revolution Asian countries. Third, land productivity is driven by the crucial latent variable of soil nutrients, which are being depleted at dramatic rates in Africa. High rates of soil nutrient loss strongly suggest that land pressures are not being surmounted by agricultural practices in sub-Saharan Africa (McArthur and McCord, 2014).

On some 65 percent of Africa's farmable lands, soils lack necessary nutrients, and many farmers lack the inputs and technical knowledge to revive them. This costs African farmers at least US $68 million in lost income opportunities. For example, African farmers cultivating new, improved varieties of maize and other crops see only a 28 percent bump in yields on average while farmers in Asia are harvesting an 88 percent increase (AGRA, 2016). With a view to analyzing some key missing elements, this paper focuses on examining agricultural productivity data from Ghana, one of Africa's most successful agricultural countries based on CAADP's 2018 assessment, to draw lessons for the rest of sub-Saharan Africa. It is also worth noting that Ghana had been predicted by the World Bank to have the highest economic growth in the world in 2018.

THE GHANAIAN SITUATION

Ghana's medium term development plan, the Ghana Shared Growth and Development Agenda II (2014-2017) identified low agricultural productivity as a major problem for the country's economic growth (NDPC, 2014). Over reliance on rain-fed agriculture, low level of mechanization and technology adoption have officially been assumed to be the underlying causes of low agricultural productivity. This setback deprives the agricultural sector of resources for expansion, foreign exchange and food to feed the labour force. Baah-Nuakoh (1997) predicted that Ghana's stagnant agricultural sector was going to continue for a long

time to dictate the pace of economic growth in the country. The relevance of this prediction stems from the fact that for several decades, the agricultural sector which currently employs about 40% of Ghana's active population (ISSER, 2018) had been made up predominantly of subsistence smallholder farmers with weak linkages to industry and the service sectors (NDPC, 2014).

Despite the admission that low productivity is a major problem for Ghana's economic growth, policies to address low agricultural productivity in Ghana have always been formulated and implemented without recourse to scientific economic analysis (Seini, 2002). While the GSGDA II sees improvement of agricultural productivity as crucial for Ghana's development, there has not been any scientific proof of the need to do so. The policy prescription thus rests on the assumption that improving agricultural productivity will always be the right approach to economic growth in Ghana. However, this assumption could be misleading since agricultural productivity improvement could trigger lower economic growth for some economies.

The contribution of Agriculture to Ghana's national output has been on the decline since it peaked at 31.8% of GDP in 2009. In 2014, this contribution was 22% of GDP despite its expansion in absolute terms. Rapid expansion in the oil and services sectors have been blamed for this trend (ISSER, 2015). This trend notwithstanding, there appears to be increasing expenditure in the Agricultural sector over the past decade, rendering agricultural output uncompetitive. Thus there is a need to critically assess the productivity of the Agricultural Sector as a driver of economic growth in Ghana.

Food crops

Nearly all Ghana's farmers produce mostly food crops using rudimentary technology with associated low yields. Between 2014 and 2015, aggregate food crop production grew by 1.8 percent, 0.7 percentage point (or 27 percent) below estimated annual population growth of 2.5 percent. The 2015 aggregate food production figures represent a fall of about 20 percent (or 0.5 percentage point) from what was achieved in 2014 (ISSER, 2016).

There continues to be a wide yield gap between Ghana and some African countries, not to mention the world's best performers. For example, the Ghana-Mauritius mean maize yield gap over the last half-decade has been about 76 percent, meaning that Ghana achieved only 24 percent of maize yields in Mauritius. Also, Cote d'Ivoire Ghana's neighbor, shows a mean gap of 10 percent above Ghana that continues to rise rather than narrow. It is not hard to find explanations for these gaps. For example, more than 22 percent of total agricultural land is under irrigation in Mauritius (compared with Ghana's under 1 percent), and mean fertilizer

consumption per hectare of arable land is approximately nine times Ghana's level (World Bank, 2016). These show that much more effort and targeted investment are required to make adequate progress toward breaching the yield gap toward sustained economic growth through agriculture, compared with many nations of similar economic status (ISSER, 2016).

Disregard for comparative advantage

Historically, Ghana's official position since independence in 1957 for development was a direct rejection of the theory of comparative advantage. The application of the theory was thought to lead to slow growth of the manufacturing sector and a continued reliance on primary production just as when the country was under colonial rule. Thus industrialization was pursued without any concern for the normal criteria of economic efficiency. Agriculturalists advised the government to industrialize explaining that living standards could not be improved using traditional methods (Killick, 2010). Government thus created state farms as a means to break away from primitive traditional methods of agriculture.

However, industrialization led to slower growth, not capable of producing enough food, leading to inflation and importation of large amounts of food, accounting for about 15-20% of all imports in the economy throughout the 1960s (Killick, 2010). Reusse (1968) found that productivities of Ghana's modern fishing fleet were so low that it was a net loser of foreign exchange. Alongside Ghana, it was becoming evident in other African countries that their mechanization drives had not become successful (Dumont, 1962).

In a report of the World Bank mission which assessed Ghana around the end of 1965, it was concluded that Ghana's agricultural production had failed to improve despite the mechanization drive. It is on record that the yield in tons per acre for peasants was 0.94 as against 0.21 for the state farms, while the labour productivity in tons per worker was 3.33 for peasants and 0.59 for the state farms. Thus Ghana's drive for agricultural productivity improvement had become a value subtraction venture, contributing to a decline in economic growth.

The condition of Ghana's recent agricultural sector performance is not significantly different from the historical past. The generally low level of both land and labour productivity in agriculture has been a major concern in Ghana's agricultural development for several decades (Nyanteng and Dapaah, 1997). Tables 1 and 2 reveal that as at 2015, about 90% of the achievable agricultural productivity targets of Ghana for the 1987-1996 period had still not been attained.

Table 1: Average yield per hectare of major crops in Ghana, 1987 – 1996 (Mt/ha)

Crop	Ghana		Africa	World	Percentage
	Actual (A)	Achievable (B)			A/B
Roots/Tuber					
Cassava	7.8	28.0	7.7	9.9	28
Yam	6.1	10.0	9.1	9.0	60
Cocoyam	5.6	8.0	4.3	5.6	70
Plantain	7.1	10.0	19.0	25.0	70
Cereals					
Maize	1.2	5.0	1.6	3.7	24
Sorghum	0.7	2.5	0.8	1.3	28
Millet	0.7	2.0	0.7	0.8	35
Rice	1.0	3.0	2.0	3.5	33
Pulses/Nuts					
Groundnut	1.4	2.0	na	na	70
Cowpea	0.9	2.0	na	na	45

Source: Nyanteng & Dapaah (1997)

From the tables, Ghana's average yield per hectare has been around 44% of the achievable yield per hectare, 66.8% of the average African yield per hectare and 51.4% of the average World yield per hectare with respect to the major crops. Thus it is well established that Ghana does not have agricultural sector comparative advantage with respect to its major crops (that is A < A*). As at 2016, MOFA (2017) data showed that the percentage achievement of the potential yield for the major crops had deteriorated to 36.7% of the yield per hectare, worse than it was from 1987-1996.

Table 2: Yield per hectare of major agricultural products in Ghana from 2009 to 2015

Yields (t ha^{-1})	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Cassava	13.8	15.4	16.3	16.8	18.3	18.6	18.8
Yam	15.3	15.5	15.5	15.6	16.8	16.6	17.0
Cocoyam	6.7	6.6	6.1	6.5	6.5	6.5	6.5
Plantain	10.9	10.8	10.8	10.5	10.8	10.7	10.9
Maize	1.7	1.9	1.7	1.9	1.7	1.7	1.9
Sorghum	1.3	1.3	1.2	1.2	1.2	1.1	1.2
Millet	1.3	1.2	1.0	1.0	1.0	1.0	1.0
Rice (Milled)	1.5	1.6	1.4	1.7	1.8	1.9	1.9

Source: Ministry of Food and Agriculture (2016)

POLICY INITIATIVES IN AGRICULTURE AND THEIR OUTCOMES

Operation Feed Yourself (OFY)

In February of 1972, a national crash program to expand food production was launched in Ghana, titled Operation Feed Yourself (OFY), with a declaration of 1972/74 as agricultural years. The program was aimed at producing enough food to feed Ghana's population, production of raw materials for agro-based industries, diversification and increases in sources of foreign exchange and raising the farmer's productivity. There were three phases of the program. The initial phase was to get traditional farmers to increase their output and obtain a marketable surplus, it at the same time aimed at getting more people to undertake farming. Particular areas of the country were targeted for the production of maize, rice, cassava, millet, plantain, yam, groundnuts and vegetables. Both private and state institutions were required to participate.

The aim of the second phase was large-scale production of consumer and agricultural raw materials. This phase, launched in 1975 was outlined in the 1974/75 annual budget of Ghana. Foreigners were provided the opportunity to participate in this phase of the program. Incentive packages included land on leased basis, minimum guaranteed prices for all products, tax concessions and transfer of accumulated dividends. The OFY was incorporated in the Five – Year Development Plan of 1975/76 – 1979/80, which never got implemented together with many of the measures which were supposed to ensure progress in the agricultural sector of the country (Baah-Nuakoh, 1997).

Frimpong-Ansah (1991) argues that the OFY was the only episode when public policy had actively promoted the food sector, after the failed State Farms efforts. Killick (2010) observed, that Frimpong-Ansah's assertion was true even up to 2008. It is worth noting that both approaches to improve the food sector had been heavily state-driven.

The initial response to the OFY appeared robust even though short-lived. There was growth in per capita incomes from 1972 to 1974, investment was buoyant, international reserves increased (Killick, 2010). The massive injection of state resources in the OFY programme probably got some returns through these gains.

However, the Operation Feed Yourself programme was a complete failure, such that by 1976, the government was still hoping for rainfall to help the programme succeed (Baah-Nuakoh, 1997). The findings of (Baah-Nuakoh, 1997) to support his assertion of massive failure of the OFY were that; there was falsification of over-fulfilment of output targets, where sometimes estimated acreage in regions exceeded the cultivable lands in the regions. A vivid example provided was with respect to output of rice in 1972; the Annual Report of the Bank of Ghana showed a decrease from 54,000 long tons to 46,000 tons while the 1973/74 Budget Statement reported an increase of 69,000 tons in rice production.

In addition, the Economics and Marketing Division of the Ministry of Agriculture reported that the bulk of food was in short supply in most parts of the country for most of the time. The Consumer Price Index showed that local food prices were increasing, with processing companies short of agricultural raw materials.

Dadze (1974) provides two main reasons why the OFY was a failure. He argues that the government adopted a wrong agricultural strategy, which emphasized increased acreage of cultivated land rather than increasing food supply through improvements in marketing, distribution and input supply. Secondly, he found a poor implementation of the policy, where traditional inputs like cutlasses and feed for livestock were in short supply while foreign exchange was spent on combine harvesters for a few medium scale rice farmers.

Planting for Food and Jobs (PFJ)

Ghana's planting for Food and Jobs (PFJ) programme appears to be the third most cherished state programme on the food sector since independence. The main highlights for the 2017 budget of the Ministry of Food and Agriculture was the "Planting for Food and Jobs" campaign. The campaign was designed to encourage all citizens (both urban and rural) to take up farming as full or part-time activity. It was intended to be structured along the lines of the erstwhile "Operation Feed Yourself" (OFY) programme in the 1970s. The reason for which the Planting for Food and Jobs programme would be fashioned after the failed OFY may only be for the sake of correcting its shortcomings. The campaign involves the production of maize, rice, soybean and vegetables. Other crops are to be adopted in subsequent years.

The campaign is anchored on five pillars namely: provision of improved seeds; supply of fertilizers; provision of dedicated extension services; marketing and e-Agriculture and monitoring. It is expected to increase the production of maize by 30 percent, rice by 49 percent, soybean by 25 percent and sorghum by 28 percent from current production levels. This will create 750,000 jobs in both direct and indirect employment (GOG, 2017).

The 2018 Budget Statement revealed that 201,000 farmers were registered across the country while 2,160 graduates, and 1,070 youth were recruited for the programme. In addition, 121,000 tonnes out of a target of 233,356 tonnes of subsidised fertilizers and 4,454.98 tonnes out of a target of 5,767.50 tonnes of subsidised seeds of maize, rice, sorghum, soybean and vegetables were distributed to beneficiary farmers. However, ISSER (2018) reports that there was no evidence readily available on what gains have been made in the production of the anchor crops.

The priority given to the agricultural sector as far as state investment was concerned was explained by the vice president of the Republic of Ghana at the International Conference on

the Political Economy of Economic Transformation in Accra, Ghana on 19th September, 2018. He explained that the agricultural sector engaged a majority of Ghana's population, hence the commitment of government to prioritize investment in the sector (Agyemang, 2018). Following the official explanation of the reason for the Planting for Food and Jobs programme, it appears that a consideration of the comparative advantage and openness of the Ghanaian economy were not considered to arrive at the decision to invest heavily in agricultural productivity improvement.

RESEARCH METHOD

Following the prescriptions of the two-sector model described in the theoretical framework, the study employs annual time series data on Ghana to analyze the relationship between agricultural productivity and the rate of economic growth. Data covering the period 1960 to 2016 was sourced mainly from the World Development Indicators (WDIs) of 2017. The use of the WDIs was necessitated by the current absence of data on agricultural productivity at the Ghana Statistical Service. Data on crop yields were however available from the Ministry of Food and Agriculture. The variables of interest as guided by theory, were; agricultural productivity (A_t) measured as agricultural value added, manufacturing sector productivity (M_t) measured as manufacturing value added, services sector productivity (S_t) measured as services value added, GDP growth rate (GDP_r) being the dependent variable, GDP per capita (PCI), Inflation rate (Inf), external debt stock (ED), net forest depletion (NFD), oil production (Oil) as a dummy variable and openness of the economy (OPEN) which was derived by computing the trade ratio for each year. Since the study did not intend to assess openness as a policy, trade ratios were considered sufficient to depict the intensity of Ghana's participation in international trade, the exact measure the analysis required. The analysis was carried out using Stata 14.1 MP Parallel Edition and R.

Trend analysis was used to ascertain the trends of variables of interest mainly from 1960 to 2016. This was followed by testing the significance of association between agricultural productivity and economic growth rate. For many policy makers, this step may appear deceptively conclusive. However, a significant association between agricultural productivity and economic growth rate is woefully inadequate for policy decision making in developing countries due to factors such as open economy and comparative advantage arguments. Hence policy makers who are in a hurry to find a good reason to invest in agricultural productivity should note that they need to proceed further than this point. The hypothesis tested the relationship between agriculture productivity and economic growth rate as well as the effect of trade openness on agricultural productivity.

To correctly specify the economic growth rate model, the lag of agricultural productivity, manufacturing sector productivity and service sector productivity were used, since previous productivity becomes an effective input for current economic growth. The presence of GDP per capita recognizes the contribution of the effect of purchasing power on both agricultural and non-agricultural output. Inflation rate serves as an input on the relative pricing of manufactured goods, particularly relevant for economic growth rates in developing countries.

External debt stock represents a mobilization of external capital for local economic growth. Since 2014, the country's public debt has been dominated by external debt. This in part is due to the fact that after attaining lower middle-income status, Ghana has been active on the international capital market, raising funds for the budget and for liability management operations (ISSER, 2018).

Net depletion of forests represent a strong source of the natural resource component for economic growth while oil revenue constitutes a strong source of current growth. Thus, the agricultural productivity related economic growth rate model was stated as:

$$\mathbf{GDP_r = F(A_{t-1}, M_{t-1}, S_{t-1}, PCI_{t-1}, Inf, OPEN, ED, NFD, Oil)}$$

The theoretical assumption for constant and exogenous agricultural productivity was altered for Ghana, since in real terms, due to high environmental degradation, soil erosion, deforestation and indiscriminate pollution of water bodies through illegal mining activities, agricultural productivity becomes endogenous within the model. It is also worth noting that the inclusion of services sector productivity, which is currently a major employer of skilled labor in the Ghanaian economy introduces a third sector within the model. However, the manufacturing sector would continue to compete for labor with the agricultural sector, due to the similarity of the labor characteristics for agriculture and manufacturing, without altering the model.

The data set was subjected to the Dickey Fuller unit root test at the levels of the variables and first differences of variables that were not stationary in their levels, to satisfy the stationarity requirements. The diagnostic tests for multicollinearity and heteroskedasticity were also carried out. The VIF for the used variables were less than 10, indicating the absence of multicollinearity, while the Breusch-Pagan Test concluded there was no problem of heteroskedasticity.

RESULTS

Observations for 56 years summarized in Table 3, show that the mean annual agricultural productivity was about US$3 billion. The manufacturing sector's mean annual productivity in the 56 years was US$0.72 billion, which is less than 25% of the mean annual productivity in the agricultural sector as well as the mean annual services sector productivity. The mean annual

services sector productivity (US$3.8 billion) was more than the sum of both the mean annual agricultural sector productivity and manufacturing sector productivity.

Table 3: Summary of descriptive statistics

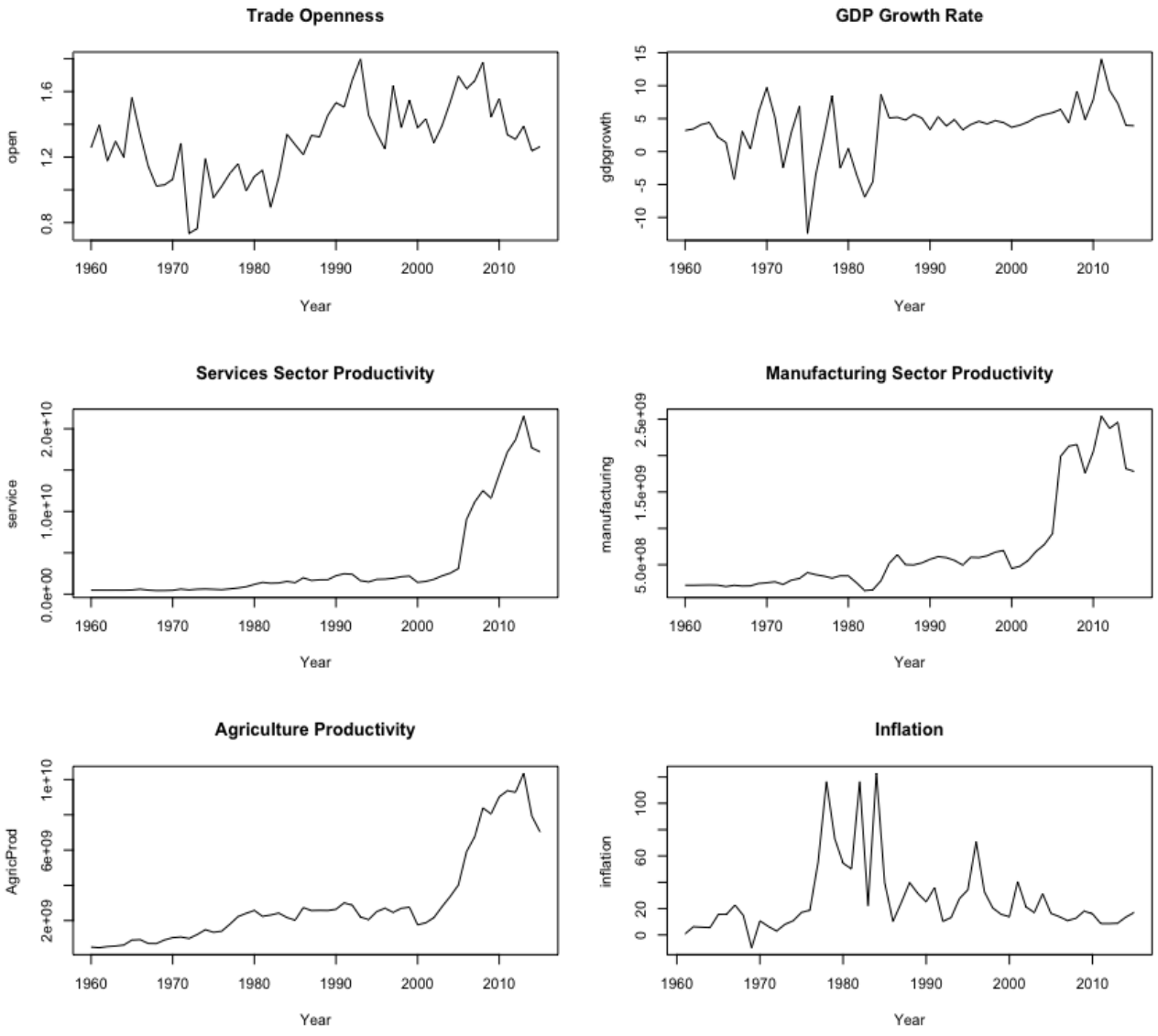
Variable	Obs.	Mean	Std. Dev.	Min	Max
GDP per Capita	56	510.3	419.3	183.0	1827.1
GDP Growth Rate	56	3.6	4.4	-12.4	14.1
Service Sector Value Added	56	3.8E+09	5.6E+09	4.4E+08	2.2E+10
Manufacturing Sector Value Added	56	7.2E+08	6.9E+08	1.5E+08	2.5E+09
Agricultural Sector Value Added	56	3.0E+09	2.6E+09	4.6E+08	1.0E+10
External Debt Stock	56	4108.6	4164.4	16.0	17611.8
Net Forest Depletion	56	5.2	2.8	1.5	13.4
Openness	56	55.2	27.8	6.3	116.0
Inflation	56	26.5	27.2	-8.4	122.9

Trend and association of variables

The time series plots in Figure 2 show the trends of variables of interest. It shows that the Ghanaian economy had had some occurrences of relative closeness and openness since 1960. The Trade Intensity Index (TII), calculated as the ratio of total trade (exports and imports) to GDP, is a measure of the size of a country's trade with the rest of the world relative to its national output. Ghana's TII index has fluctuated, with significant peaks between 1990 and 2010.

From 1960 to about 1983 was a period of relatively closed economy. Beyond 1983, the economy opened up and has since been relatively more open. It is worth noting that in 2000, the Ghanaian economy was more open than it has been in recent times.

Figure 2: Trends of Variables



The pace of agricultural productivity growth before 2000 was relatively slow and low. Even though the rate of improvement increased after 2000, it is currently below the historical peak and headed downwards. The trends of manufacturing and service sector productivities are a replication of agricultural sector productivity. This depicts a general downturn of economic value added in the Ghanaian economy in recent times. The trend of GDP growth rate depicts a very unstable performance over the period. There is a clear picture of stagnation or a trap around growth rates of 5% with the exception of a few years.

Table 4: Correlation between agricultural productivity and GDP growth rate

Correlation Coefficient	T	df	P-value
0.436972	3.5367	53	0.000851

Table 4 presents the Pearson correlation coefficient between agricultural productivity and GDP growth rate. The results indicate a correlation coefficient of 0.4369, which was statistically significant given the test statistic of 3.5367 and a p-value of 0.0008. Thus there exists a positive and significant association between agriculture productivity and GDP growth rate in Ghana. This association should however not be misconstrued for causation, and therefore, there is the need to proceed with regression analysis to ascertain the relationship between the two variables, which will be most relevant for policy making. It is this correlation which has for decades deluded Ghanaian policy makers to assume causation between agricultural productivity and GDP growth rate.

Agricultural productivity and economic growth

Table 5 presents the regression results of GDP Growth Rate and natural logs of Net forest depletion, External debt stock, lag of GDP per capita, Openness, lag of Service Sector Productivity, lag of manufacturing sector productivity, lag of Agricultural Sector Productivity, Oil production and Inflation. The results show that the previous year's GDP per capita, openness of the Ghanaian economy, external debt stock and net forest depletion significantly influence the growth rate of GDP in Ghana at the 5% level of significance.

Table 5: Regression Results

GDP Growth Rate	Coefficient	Robust Standard Error	t	P-value
Constant	-14.25547	5.20185	-2.74	0.009
Ln(Agricultural Sector Productivity(-1))	-8.13598	6.15962	-1.32	0.193
Ln(Manufacturing Sector Productivity(-1))	-1.97946	5.30761	-0.37	0.711
Ln(Service Sector Productivity(-1))	-9.57349	4.88815	-1.96	0.056
Ln(GDP per capita(-1))	30.10014	13.08934	2.3	0.026
inflation	0.00055	0.01753	0.03	0.975
Ln(openness)	3.16371	1.12504	2.81	0.007
Ln(External Debt Stock)	1.41734	0.58093	2.44	0.019
oil	-0.22160	1.56673	-0.14	0.888
Ln(Net Forest Depletion)	-3.39367	1.45886	-2.33	0.025
Observation				55.00
F(9, 45)				7.78
P-value				0.0000
R-squared				0.4703
Adj. R-squared				0.3644

The results also showed that agricultural productivity, manufacturing sector productivity and service sector productivity, inflation and oil production did not significantly influence GDP growth rate at the 5 percent level of significance. Hence, the null hypothesis that agricultural sector productivity has no significant influence on GDP growth rate in Ghana is accepted.

Relating the results to the theoretical proposition, it is observable that Ghana's economy exhibits a negative link between agricultural productivity and economic growth rate. Thus the agricultural sector squeezes out the manufacturing sector, a feature predicting that the economy could de-industrialize over time, if the business-as-usual approach is maintained. Further investigation leads to additional information on the nature of agricultural productivity as shown in the following sub-section.

Annual growth of agricultural productivity

Based on a one sample t-test, the relative annual change in agricultural productivity was compared to a benchmark value of 1 (Table 6).

Table 6: One sample t-test of the relative annual change in agricultural productivity

Variable	Mean	T	df	P-value
Agric. Productivity Growth rate	0.0642	-39.6538	51	0.000

The results show that at the 5 percent level of significance, the average annual relative change in agriculture productivity was statistically far less than 1. The results also showed that the change was significant, except that it was too small to produce a significant effect on GDP growth rate, as the regression results showed. Thus while the efforts being made to improve agricultural productivity are recognizable and significant, they are not strong enough to generate meaningful sustained GDP growth. The results confirm Baah-Nuakoh's (1997) prediction of a stagnant agricultural sector serving as a drag on GDP growth.

DISCUSSION OF RESULTS AND POLICY IMPLICATIONS

The results for the study present a very complex situation for Ghana's agricultural sector. First, a significant association exists between agricultural productivity and economic growth rate. This has been largely misinterpreted to mean policy makers could commit scarce state resources to agricultural productivity improvements. However, the fact that there is no significant causal relationship between agricultural productivity and economic growth rate makes every effort to invest scarce state resources in agricultural productivity largely inefficient, since that means a fruitless competition between the agricultural sector and the manufacturing sector for state

resources. Following the results, due diligence for state resource allocation for economic growth will necessarily have to involve a consideration of the specific roles of comparative advantage and openness of the economy.

Comparative advantage

Table 1 showed that agricultural productivity in Ghana had been lower than the rest of the world and was slowing down over time (that is, $A < A^*$). This finding was confirmed by ISSER (2016), citing the continued wide yield gap between Ghana and some African countries, not to mention the world's best performers. An example was the Ghana-Mauritius mean maize yield gap over the last half-decade, which had been about 76 percent, meaning that Ghana achieved only 24 percent of maize yields in Mauritius. Also, Cote d'Ivoire Ghana's neighbor, showed a mean gap of 10 percent above Ghana that continued to rise rather than narrow. Ghana's Ministry of Food and Agriculture (MOFA, 2017) also confirms the fact that yield per hectare of main crops had reduced from about 44% in the 1980s to about 36.6% in recent times. This state of affairs supports the evidence from the regression analysis, indicating that Ghana does not have a comparative advantage in the agricultural sector over the rest of the world. Thus investing scarce state resources in agricultural productivity improvement would render Ghana relatively worse off than the rest of the World.

Openness of the Ghanaian economy

The significance of the openness of Ghana's economy provides the opportunity for Ghanaian authorities to reconsider the law of comparative advantage, which has been ignored by policy makers. It would pay for Ghana to de-emphasize its drive to continue to assign increasing state resources to agricultural productivity improvements to achieve improved GDP growth rates. Ghana would rather need to assign these resources to the manufacturing sector, while importing the needed agricultural goods. Ghana's huge food import bill indicates that some of this is taking place behind the scenes, not in a well-organized way. There is the need to better organize it to efficiently deliver the benefits thereof.

This will mean a restructuring of the direction for the medium term development plan;"An Agenda for Jobs: Creating Prosperity and Equal Opportunity for All (2018-2021)", which emphasizes the allocation of increasing state resources to agricultural productivity improvement. For sub-Saharan African countries in Ghana's situation, the prescription of the CAADP would need to be restructured, if state resources have to be efficiently allocated for the realization of sustained GDP growth.

This is not to suggest that even subsistence farmers should cease production to feed themselves. Africa and by extension Ghana would definitely have to produce food to feed its ever growing populations. As long as subsistence farming would not squeeze out resources from the manufacturing sector, it could continue since its opportunity cost would be insignificant. This is due to the relatively negligible opportunity costs of the labor and inputs (non-tradable) for current subsistence farming in most parts of sub-Saharan Africa. It is in the light of this explanation that the current government of Ghana initiative of planting for food and jobs project (NDPC, 2017) is to some extent commendable. While this project can provide sufficient local foods to feed Ghanaians (non-tradable goods sector), it will not be efficient to target international markets for the sake of comparative disadvantage and openness of the economy. Thus, Ghana's ambitious planting for food and jobs project will not be strong enough to translate into real increases in economic growth rates. The target here should be the reassignment of competitive state investment resources to the manufacturing sector.

Low agricultural sector productivity

The results for agricultural sector productivity aligns very well with the Lewis (1955) three sector model. Lewis argued that stagnation of any one of the sectors was going to retard the growth of the others. The current failings of agricultural sector productivity in Ghana has implications for overall growth of the economy in a number of ways. First, due to the prominence of the contribution of the agricultural sector to total output, it would serve as a drag on total economic growth. For example, in 1979, the share of agriculture in total output was 66% while the sector's annual growth rate was -0.2%. This translated into a negative product contribution of -13.2%, implying that other sectors had to contribute positive output to offset agriculture's deficit, eventually giving the economy a -0.1% GDP growth rate.

Secondly, agricultural sector productivity failure has adversely affected the manufacturing and services sectors through its inability to provide the inputs required by the industries processing agricultural products adequately and reliably. Industries that could have relied on domestic inputs from the agricultural sector had to depend on imports with a negative effect on the balance of payments and economic growth rates.

The results also showed that manufacturing sector productivity does not significantly influence GDP growth rate, indicating how unfavorable the emphasis on agricultural productivity had been for the manufacturing sector. This is again supported by the Lewis (1955) three sector model explanation, where stagnation of the agricultural sector retards the growth of the manufacturing sector. In addition, the agricultural sector's dominance over labor and resources

due to the priority it received, over and above manufacturing, created a natural tendency for manufacturing sector productivity to lag behind agricultural productivity.

In addition, the inability of agricultural initiatives to satisfy domestic demand for food meant that large sums of foreign exchange had to be allocated to food imports to the detriment of demand for foreign currencies of competing sectors to meet their essential equipment needs. A recent appeal by the Executive Director of the Peasant Farmers Association of Ghana (PFAG) indicated that over 80% of seeds used for the Planting for Food and Jobs programme were imported due to the inability of local seed producers to meet demand. She also added that 60% of yam produced in Ghana is lost through post-harvest losses (Bruce, 2018). To support the assertion, the Africa post-harvest loss information system also revealed that losses in maize, rice and sorghum are sometimes up to 70%, 27% and 15% respectively. Tomato, watermelon, cabbage and garden eggs could suffer up to 100% post-harvest losses in some areas on some occasions (Bruce, 2018).

Furthermore, the inflation of food prices that resulted from agricultural productivity failure also affected industrial expansion through its effects on the overall price index sending up manufacturing production costs. ISSER (2018) found that regarding food inflation, prices of fish and sea food, meat and meat products, mineral water, soft drinks and fruits persistently rose throughout the year. The high manufacturing costs partly makes Ghana's manufacturing sector uncompetitive as far as the export market is concerned. The inflation also impoverished a substantial portion of the population, thus leading to a reduction in the size and purchasing power of the market needed for industrial growth.

Environmental degradation

The results showed that net forest depletion had a significant and negative relationship with GDP growth rate. Thus increases in GDP growth rate have a significant effect on the natural environment in Ghana. Environmental, water and land conditions constitute a major component in the structural make up of agricultural productivity in most of sub-Saharan Africa, which depends to a large extent on favorable natural conditions. Currently, Ghana loses at least 10% of GDP annually due to environmental degradation (NDPC, 2014), while climate change continues to have its toll, further compounding the loss of GDP. Pollution of major water bodies, deforestation and land-use change particularly through small-scale mining activities have become a danger to modernized agriculture, since they affect irrigation development. To stick to the CAADP requirement of 6% GDP growth means that Ghana's net growth adjusted for environmental degradation would be -4% per annum. Thus, the role of government appears

enormous in setting the right stage for agricultural productivity improvement from the environmental sphere.

Another major setback of current attempts to increase agricultural productivity in sub-Saharan Africa is the environmental effects of the use of chemical fertilizers, which the CAADP upholds as a relevant yardstick for success. These fertilizers serve as major pollutants to water bodies which are the sources of drinking water in sub-Saharan Africa and also tend to have devastating effects on tropical soils and greenhouse gas emissions, thus compounding the environmental setback. The African initiative for agricultural sector productivity growth does not come with a solution to these environmental challenges, making it unsustainable.

Eliminating these limitations will have to be a central issue for agricultural sector productivity improvement, and the earlier this is done, the better it will be for growth rates in sub-Saharan Africa. There will however still remain one major condition to be fulfilled, due to the lack of comparative advantage in agriculture – the openness of the economy. Closing up the economy would attract adverse repercussions, which will exacerbate the technological deficit to aid in improving productivity, hence that appears to be no option. This dilemma appears to create a low level agricultural productivity trap for Ghana, limiting its capacity to achieve sustained economic growth through the agricultural sector.

CONCLUSION

Measures for the reform of agriculture and the achievement of agricultural productivity improvements have recurred in sub-Saharan Africa's development agenda for the past five decades, with no practical attention to comparative advantage by authorities. In Ghana, as at 2016, about 90% of the achievable agricultural productivity targets for the 1987-1996 period had still not been attained, with all the improvements in technological possibilities available by virtue of open economy benefits.

The paper empirically assessed Africa's prospects of achieving economic growth on a sustained basis through agricultural productivity improvements. This was against the background that the openness of sub-Sahara African economies as well as their comparative advantage in agriculture had been ignored in policy planning and economic growth rate projections.

Data analyzed was obtained from the World Development Indicators of 2017 covering 1960 to 2016, based on the Ghanaian experience. The results showed that agricultural productivity improvement as a national policy for which scarce state resources are allocated, had a perverse welfare implication.

This calls for a restructuring of the African Union initiative CAADP for sub-Saharan Africa, as well as Ghana's own priority policy on agricultural productivity improvement, to rather emphasize manufacturing sector productivity improvement. African economies need to be guided by the effect of the openness of their economies as well as their comparative advantages in agriculture, if efficient resource allocation toward sustained economic growth is to be achieved.

RECOMMENDATIONS FOR POLICY

Since sub-Saharan Africa countries do not have comparative advantage over the rest of the world in Agriculture, direct state investments in agriculture should be discontinued. Such investments amount to economically inefficient use of scarce resources. Sub-Saharan Africa will be better-off if it imports food to augment what local producers out of their own mostly home-based and non-traded resources produce. Thus for sub-Saharan Africa countries, the state investment prescription of the CAADP would need to be restructured, if state resources have to be efficiently allocated for the realization of sustained GDP growth.

Stagnation of Sub-Saharan Africa's agricultural sector has retarded the growth of the manufacturing sector. Also, the agricultural sector being excessively prioritized over and above manufacturing, created a natural tendency for manufacturing sector productivity to lag behind agricultural productivity. State resources should be invested in the manufacturing sector, where the advantage of learning-by-doing, learning by observing and copying provide a major avenue for progress due to the openness of the economies.

The environmental effects of the use of chemical fertilizers, which the CAADP upholds as a relevant yardstick for success must be recognized and mitigated by sub-Saharan Africa. These fertilizers serve as major pollutants to water bodies which are the sources of drinking water in sub-Saharan Africa and also tend to have devastating effects on tropical soils and greenhouse gas emissions, thus compounding the environmental setback. The African initiative for agricultural sector productivity growth does not come with a solution to these environmental challenges, making it unsustainable. Eliminating these limitations will have to be a central issue for agricultural sector productivity improvement, and the earlier this is done, the better it will be for sustained growth in sub-Saharan Africa.

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