Agriculture in Developing Countries and the Role of Government: Economic Perspectives

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Abstract

This paper investigates the factors that affect government's assistance to agriculture by specifically focusing on African rural sector. Price support scheme has become an important element in the agricultural strategies of African countries. Through policy indicators such as the relative rate of assistance to agriculture, the cash food bias index and the trade bias index of the World Bank National and Global Estimates of Distortions to Agricultural Incentive from 1955 to 2011, a fixed effect model is carried out in order to determine how a country's GDP, rural population share, arable land share and the fact that a country is a resource rich, and landlocked affect the assistance government provides to agriculture. The empirical results reveal a negative correlation between a country's rural population share and government level of assistance to agriculture. However, when considering resource rich country, government tends to adopt policies that favor agriculture the more rural dwellers.

Keywords: relative rate of assistance, cash food bias index, trade bias index.

Introduction

Agriculture has been a critical driver of well-being for centuries, ensuring food security and catalyzing productivity needed for economic prosperity (Robin, 2011). Sixty-five percent of Africans rely on agriculture as a primary source of livelihood, where small-scale famers are responsible for ninety percent of agricultural production (IFPRI, 2009). Across the African continent, there has been a renewed commitment from governments, non-governmental organizations and the private sector to move agriculture from a development challenge to a business opportunity. As a result, countries such as Nigeria are moving to once again become a net exporter rather than importer of agricultural commodities (Robin, 2011). Agriculture is among the most powerful engines for Africa's economies, many of which have experienced rapid growth over the last decade (Robin, 2011). The growth rate of agriculture in Africa has increased from 2.4 per cent in 1980-89 to 2.7 per cent in 1990-99 and 3.3 per cent since 2000 (Diao et al., 2007).

However, despite these developments, many smallholder farmers, who form the backbone of Africa's agriculture sector, remain trapped in poverty without access to financing and other tools to increase their productivity and profitability (Robin, 2011). As Binswanger-Mkhize et al.(2009), and Nwachukwu et al. (2007) point out, over 70 per cent of Africa's poor people live in rural areas and depend on agriculture for a large share of their income, yet, the level of assistance to agriculture is diminishing. Indeed, compared to developing countries, African governments' budget allocation to agriculture is small. African spending on agriculture represented 6 to 7 per cent of the total national budget for 1980-05, while in Asia the corresponding number was 6-15 per cent (IFPRI, 2009). According to the World Bank (2010), 48 per cent of the population in Africa live in extreme poverty with $ 1.25 a day, therefore it is

necessary to implement a comprehensive, economic and social development program in the continent, however as Nwachukwe et al. (2007) note for such program to be successful it needs to emphasize poverty alleviation in rural areas since African rural population share accounts for 62.7 % of the total population , and land, natural resources as well as mineral resources in most part are located in rural areas (World Bank, 2010).

This research attempts to answer questions regarding how government assistance to African farmers varies taking into account factors such as rural population share, real GDP per capita, arable land share etc. The research considers price support approach as one of the pragmatic steps to addressing rural poverty and improving African rural dwellers' wellbeing. Specifically, we are looking into how factors such as the share of rural population affects government supports to agriculture. Does government become more inclined to support rural population as mechanization occurs in agriculture? Does this support tend to be influenced by farmers producing cash crops or food crops?

The paper particularly investigates how rural population share, real GDP per capita, arable land share, natural resource endowment, and geographical location affect the assistance farmers receive from government.

1. Literature Review

Research on the interaction between government and agriculture is well documented. Some researchers argue that political institutions determine the level of governmental assistance to farmers; their argument is based on the logic of collective action (Olson, 1971) which suggests that compared to small groups, large groups will face high costs when trying to organize and

therefore the incentive for group action diminishes as group size increases in a sense that large groups are less capable of acting in their common interest than small groups.

Following the same direction, Bates and Block (2009) in their investigation of political economy of agricultural trade protection in Sub-Saharan Africa note that there is a tendency for the government in countries with considerable farmers and where agriculture is the main economic activity to enact policies that do not benefit famers instead government in these countries tend to impose a heavy tax on farmers. They argue that government policies toward agriculture will tend to be detrimental to farmers the greater "the rural dwellers share of population" depending upon the nature of the party system.

In their investigation toward what causes some nations to prosper and others to fail, Acemoglu and Robinson (2012) simply state that it is a matter of institutions. We may find answers to African rural poverty by looking at the nature of political institutions in place. Whether a country has extractive political institutions or inclusive economic institutions will play a central role in bringing a country out of poverty and shape the road for prosperity. Inclusive economic institutions as they argue are more conducive to economic growth than extractive economic institutions by enforcing property rights, creating a level playing field, and encouraging investments in new technologies and skills. They suggest:" Nations thrive when they develop inclusive political and economic institutions, and they fail when those institutions become extractive and concentrate power and opportunity in the hands of only a few" (Acemoglu and Robinson, 2012).

When taking into account geographical location, Ndulu et al. (2007) conclude that landlocked countries are more likely to show least bias against agriculture trade than coastal

states which tend to display the greatest bias. The evidence of natural resource endowment on government agricultural policies has been mixed. Bourguignon and Verdier (2000) suggest that governments of resource rich countries will tend to exhibit less support for agriculture since the existence of natural resources may prevent redistribution of political power towards the middle classes and thus prevent adoption of growth-promoting policies; and Isham et al (2003) to add that resource wealth worsens quality of institution because it allows governments to avoid accountability and resist modernization. In fact agricultural support can be growth promoting if it enables African small producers to become more competitive, specifically against cheap food imports from abroad (OECD, 2006).

However, Bates and Block (2009) contend that governments of resource rich countries have a tendency to enact policies that favor producers of both food and cash crops. They argue that Governments of resource rich countries specifically in Africa have tended to protect food crops, raising the level of domestic prices above those prevailing in world markets, while taxing cash crops (Bates and Block, 2009). When using arable land share as a proxy for the overall importance of agriculture, Bates and Block (2009) find that it is positively related to policy orientation of governments towards agriculture.

The contribution of this study lies on the fact that it is based on a cross-regional analysis of government level of assistance to farmers in Asian and Latin American developing countries, which will enable us to compare government support for agriculture in the three regions while focusing primarily on Africa. Previous research has either considered one region or a part for this type of investigation on the role of government in agriculture.

2. Theory

In this research we are primarily concerned with the role government can play in lifting rural farmers from subsistence agriculture to a mass production type of agriculture drawing from the example of Asian countries with the Green Revolution, as it has been shown that strong public support and public interventions through the development of technologies, the building of adequate infrastructures were crucial in ensuring modernization of agriculture and rural farmers poverty alleviation (Diao et al., 2007). Taking a price support approach this investigation ties the development of the agricultural sectors and African small farmers' wellbeing to the ability of African government to provide assistance to rural sector. Price supports to agriculture can take a form of subsidies such as direct input distribution, universal input subsidies and targeted market-smart subsidies that help cash-constrained farmers to find a solution to issues regarding risk, uncertainty and lack of well-functioning markets (FAO, Policy Brief N03, 2008). Market-smart subsidies tend to be friendly to private markets, they stimulate demand in private markets, boost entrants, and are targeted at small holders and poor farmers (Banful, 2010).

African countries have tended to adopt policies that favor the interests of urban dwellers by lowering the cost of food, thus providing protection to urban dwellers that in large part are poor and spend a large portion of their incomes on food (Bates and Block, 2009). African agricultural production is dependent on small producers scattered throughout the countryside, and as individual producers are unable to influence government policy because organizing so large and diverse a population is expensive consequently in countries with large agricultural populations, agriculture represents an ineffective interest group. On the other hand when agricultural population is large, urban population would tend to be small and spatially

concentrated. Consequently, consumers should hold a relative advantage as lobbyists in countries with large agricultural population (Bates and Block, 2009).

While the logic of collective action (Olson, 1971, Bates and Block, 2009) is coherent at explaining the lack of adequate food production systems, poverty and hunger in rural Africa, we are hypothesizing that the levels of assistance farmers receive from government depend mainly on the rural population share and the percentage share of agriculture in the economy. If agriculture represents the main economic activity the government level of assistance to farmers will tend to be mitigated by the taxes that government collects from farmers. As the economy becomes diversified government level of assistance to farmers will indirectly improve as government will collect more tax revenues from other sectors and the transfer of agriculture labor from farming to industry or service will imply that more income or sales taxes also will be collected. At the end as the number of farmers decreases per farm size following mechanization of agriculture, the government proclivity to assist farmers will increase.

3. Data

The data for this research will be based on a new World Bank dataset of indicators of distortions to domestic price of agriculture and non-agriculture commodities drawn from a sample of 40 countries of which 20 are from Sub-Saharan Africa, 12 from Asian developing and 8 from Latin American developing countries. Those indicators compiled by Anderson and Valenzuela (2008) from 1955 to 2011 contain the nominal rates of assistance to agricultural tradables relative to non-agricultural tradables and the nominal rates of assistance to agricultural importables and agricultural exportables (Bates and Block, 2009). In addition, another indicator

"cash-food bias index" shows how producers of cash crops are treated relative to producers of food crops will also be incorporated.

4. Procedure

Three policy indicators will be considered as variables depicting the level of assistance to farmers namely the relative rate of assistance to agriculture, the trade bias index and the cash food bias index. For this purpose three regressions will be estimated. In the first regression government level of assistance to farmers will be measured by the relative rate of assistance which captures the relative support given to agriculture versus non-agriculture tradables, and it is found as follows: (Anderson et al. 2008, Bates and Block, 2009)

$$(1) \quad RRA = \frac{1+NRA_{ag^t}}{1+NRA_{nonag^t}} - 1,$$

where $NRA_{ag^t}$the nominal is rate of assistance to agricultural tradables, and NRA_{nonag^t} is the nominal rate of assistance to non-agricultural tradables

. The second regression will have the trade bias index as a measure of government level of assistance to farmers, it determines the relative assistance of government to exportables versus importable. It is found as follows: (Anderson et al. 2008, Bates and Block 2009)

$$(2) \quad TBI = \frac{1+NRAag_x}{1+NRAag_m} - 1,$$

where $NRAag_x$ is the nominal rate of assistance to agricultural exportables and $NRAag_m$is the nominal rate of assistance to agricultural importable.

The third regression seeks to determine whether producers of cash crops compared to producers of food crops benefit the most from government policies. The "cash-food bias" can be found as follows: (Anderson et al. 2008, Bates and Block 2009)

$$(3)\quad CFBI = \frac{1+NRAcashcrops}{1+NRAfoodcrops} - 1,$$

where $NRAcashcrops$ refers to the nominal rate of assistance to cash crops and $NRAfoodcrops$ is the nominal rate of assistance to food crops.

Our generic model is:

$$(4)\quad y_{it} = \alpha + \delta_1 Resource\ rich + \delta_2 Landlocked\ + \delta_3 Rural\ population\ share$$
$$+ \delta_4 (Resource\ rich * Rural\ population\ share)_{it} + X_{it}\beta + U_i + \varepsilon_{it}\ ,$$

where y_{it} is our dependent variable depicting government level of assistance to farmers for country i in year t through the policy indicators defined above, $Resource\ rich$ is a dummy variable for resource rich-countries, $Landlocked$ is a dummy variable for landlocked contries, $Rural\ population\ share$ is the share of a country's population living in rural areas, X stands for the control variables such as real GDP per capita, arable land share in country i in year t, U_i the random disturbance that captures unobserved time invariant country-specific effects, and ε_{it} is the error term associated with country i in year t. The parameters of our models will be estimated using the fixed effects model following Greene (2010). The fixed effect is specified as:

$$(5)\quad y_{it} = X'_{it}\beta + \alpha_i + \varepsilon_{it}\ ,$$

where $\alpha_i = Z'_i\alpha$, embodies all the observable effects and specifies an estimable conditional mean. It implies that Z_i is unobserved, but correlated withX_{it}. Then, misspecification tests for all the three government policy indicators will be conducted: the normality using K^2 and Bera-Jarque tests, the joint conditional mean, and the joint conditional variance using static and dynamic heteroskedasticity, and finally the individual conditional mean and conditional variance.

Using these outcomes as the background of their decision making process policy makers in developing countries particularly in Africa may advocate for a transformation of the agricultural sector with an emphasis on improving farmers' wellbeing.

<<TABLE 1>>

<<TABLE 2>>

<<TABLE 3>>

4. Empirical Results

Table 2 provides the descriptive statistics of the variables of our study. The sample data collected from 1955 to 2011 of 20 sub-Saharan African countries contains 1020 observations. On average, African countries have adopted policies that could be viewed as detrimental to farming or agriculture in general, with a negative relative rate of assistance to agriculture. When looking at the cash food bias index, it shows that African countries' governments on average have implemented policies that favor producers of food crops over producers of cash crops. This outcome tends to confirm the logic of collective action (Bates and Block, 2009) which sees urban dwellers influencing government policies in their favor by lowering the cost of food. However, such bias for food crops is good news for African rural population since there is still exist excellent growth potential for small producers in the food staples sector (Cereals, roots, and tubers and traditional livestock products). For Africa as a whole, the consumption of these foods accounts for a large part of agricultural output and is projected to double by 2025 with USD 50 billion added to demand (OECD, 2006). In addition, much of this added demand will be translated into market transaction, thus providing growth potential to reach a tremendous number of Africa's rural poor (OECD, 2006)**.** The Trade bias index is negative implying that on average African governments have adopted policies that can be viewed as favoring agricultural importables over agricultural

exportables. Out of 1020 observations compiled 17 per cent of them relate to countries that are resource rich while approximately 36 percent of them relate to countries that are landlocked. Out of 920 observations with information about the rural population share it shows that on average 75.64 per cent of the African population live in rural area. When looking at the gross domestic product per capita on average out of 841 observations, our sample of African countries has a GDP per capita of 1203.5 dollars. When looking at the arable land share our data indicate that out of 862 observations on average the proportion of arable land represents 11.05% in the sample of African countries considered.

Table 3 presents the results of the fixed effect model where three regressions were performed model 1 examines the relative rate of assistance to agriculture, model 2 looks at the cash food bias index and model 3 focuses on the trade bias index. The finding of model 1 indicates that being a resource rich country negatively affects the assistance famers receive from government. The point estimate of resource rich dummy variable is equal to -0.91 and it is statistically significant at 99% confidence level reflecting a tendency for government to favor non-agricultural sectors over agricultural sectors. When examining a country geographical location results find that governments in landlocked countries enact policies that benefit the agricultural sectors when compared to non-agricultural sectors. Indeed, landlocked dummy variable enters positively in the RRA estimation with a coefficient equal 0.01 implying a government policies that tend to be supportive of the agricultural sector and biased toward non-agricultural sector, but it is not statistically significant. The share of a country‘s population living in rural areas has a negative effect on the government relative rate of assistance to agriculture, suggesting that for every percentage increase in the rural population share government assistance to agriculture decrease by 0.0041%, implying that in countries with a large proportion of rural population government tends

to show more bias toward agriculture. However its coefficient estimate turns out to be statistically not significant. The interaction variable between resource rich country and rural population share shows that rural population has a positive impact on government implementing policies that favor agriculture in resource rich countries. With a coefficient estimate of 0.015 statistically significant at 99% confidence level meaning that for every percentage increase in the proportion of people living in rural area the relative rate of assistance to agriculture increases by 0.015% in countries with abundant natural resources. A country's gross domestic product (GDP) positively affects government assistance to the agricultural sector, with a coefficient estimate equals to 0.12 and statistically significant at 95% confidence level. For every percentage increase in the GDP, the government level of assistance to agriculture increases by 0.12%, reflecting on the ability for the government to provide assistance to agriculture the wealthier a country becomes. Surprisingly, the size of a county's arable land negatively affects the ability for government to provide assistance to agriculture, in fact for every percentage increase in the proportion of arable land government assistance to agriculture decreases by 0.004%, however the parameter estimate was not statistically significant.

Model 2 presents the results of cash food bias index which determines whether producers of cash crops compared to producers of food crops benefit the most from government policies. When looking at resource rich countries results indicate that government policies favor producers of cash crops over producers of food crops. With a positive parameter estimate equals to 0.76 statistically significant at 99% confidence level, government in resource rich countries tends the show the most bias toward producers of food crops.

Geographical location also impacts government's ability to provide assistance to agriculture. Governments in landlocked countries have a tendency to enact policies viewed as

biased toward producers of cash crops by enacting policies that favor producers of food crops. The parameter estimate of landlocked enters negatively in the model; however it is not statistically significant. When examining proportion of people living in rural area results indicate that governments enact policies that favor producers of cash crops over producers of food crops the more rural dwellers in a country. The parameters estimate is positive reflecting a policy that is a more biased toward producers of food crops, however it is not statistically significant.

The interaction variable of resource rich country and rural population share enters the model negatively, and it is statistically significant at 90% confidence level ; reflecting government policies to enact policies that favor the wellbeing of producers of food crops in resource rich countries with a large proportion of rural population.

A country's gross domestic product also has an influence on government's support to agriculture. The parameter estimate of the GDP enters positively in the model and it is statistically significant at 90% confidence level reflecting that for every percentage increase in GDP the cash food bias index increases by 0.099%. Government tends to implement policies that favor producers of cash crops over producers of food crops as the economy grows. When looking at the proportion of land area arable results indicate that its parameter estimate enters the model positively and it is statistically significant at 99% confidence level which implies that for every percentage increase in arable land share government level of assistance to producers of cash crops increase by 0.025%. There is a bias toward producers of food crops in countries with abundant arable land share which may seem surprising.

The third model reports the Trade bias index (TBI) which compares government assistance to producers of agricultural exportables relative to producers of agricultural

importables. Government in resource rich countries tends to enact policies that promote the wellbeing of producers of agricultural exportables over producers of agricultural importable goods. The parameter estimate of resource rich dummy enters negatively in the model and it is statistically significant at 99% confident level indicating a bias against producers of agricultural exportable goods. Governments in landlocked countries have a tendency to enact policies that favor producers of agricultural exportables over producers of agricultural importables. The parameter estimate of landlocked dummy enters positively in the model and it is statistically at 90% confidence level.

When examining the share of the population living in rural area, it enters positively in the model reflecting a policy that favor producers of agricultural exportables over producers of agricultural importable the more rural dwellers in a country. For every percentage increase in the proportion of the population living in rural area government assistance to producers of agricultural exportables increases by 0.002%, but it is not statistically significant. Then taking into account the interaction between resource rich country and the rural population share, the parameter estimate is negative and statistically significant at 99% confident level. It indicates that government in resource rich countries tends to enact policies that favor producers of agricultural importable the more rural dwellers in a country.

A country's gross domestic product positively impact influences the assistance government provides to agriculture. The parameter estimate of GDP enters positively in the model but not statistically significant. It shows that government tends to enact policies that favor producers of agricultural exportables over producers of agricultural importables as the higher a country's gdp. The results show that countries with abundant arable land share have policies that

favor producers of agricultural exportables over producers of agricultural importables, and the parameter estimate is positive and not statistically significant.

5. Summary and Conclusions

This research has focused on the factors that affect government assistance to agriculture in sub-Saharan African countries. The policies that African countries implement are dependent on a variety of parameters such as whether it is resource rich, landlocked or has a sizable arable land share. Government policy indicators were measured by the relative rate of assistance to agriculture, the cash food bias, and the trade bias index. The models were estimated using a fixed effect regression and results indicate that government in resource rich countries has a tendency to favor non-agricultural sectors over agriculture and the parameter negatively enters the model at 99% degree of significance. The proportion of country's population living in rural area is associated with government enacting policies that does not favor agriculture; though statistically not significant it confirms our hypothesis of a negative correlation between a country's rural population share and government level of assistance to agriculture. Surprisingly, when using an interaction variable between rural population share and resource rich dummy the results show that African governments have a tendency to adopt policies that favor agriculture in countries described as resource rich the parameter estimate of the interaction positively enters the model and it is statistically significant at 99% confidence level. A country's GDP tends to be associated with a government enacting policies that favor agriculture with a positive parameter estimate statistically significant at 95% confidence level. Such findings seem plausible and logic as it reflects that a nation that is economically successful is more likely to allocate some of its resources to develop its agricultural sector.

The cash food bias index depicted in the second model shows that government in resource rich countries tends to favor producers of cash crops over producers of food crops with a positive parameter estimate that is statistically significant at 99% confidence level. The proportion of people living in rural area tend to be associated with governmental policies favoring producers of cash crops over producers of food crops this may explain why some African countries experience issues such as food scarcity, hunger or malnutrition. Then, when using the interaction variable between rural population share and resource rich dummy, the results indicate that government policies in African countries tend to favor producers of food crops the more rural dwellers in the country provided that such country is resource rich. The parameter estimate enters negatively and it is statistically significant at 90% confidence level. The findings from the regression model reveal that the size of the economy tends to be associated with government enacting policies that favor producers of cash crops over producers of food crops and the parameter estimate was significant at 90 % confidence level.

The last policy indicator measured through the trade bias index revealed that government in resource rich countries tends to enact policies that favor agricultural exportables over agricultural importables and such coefficient was positive and statistically significant at 99% confidence level. Then, when looking at landlocked countries the parameter estimate shows that government in those countries tend to implement policies that favor producer of agricultural exportables over producers of agricultural importables and the coefficient was statistically significant at 90% confidence level. The trade bias index is negatively affected by the proportion of people living in rural area provided that such country is a resource rich country. Government in resource rich countries tend to enact policies that favor agricultural importable the more rural

dwellers, the parameter estimate of that interaction variable was negative and statistically significant at 99% confidence level.

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Table 1. Definitions of Dependent and Independent Variables Used for Regression Estimation

Dependent Variable	Definition
RRA	Relative Rate of Assistance
CFBI	Cash Food Bias Index
TBI	Trade Bias Index
Independent Variable	**Definition**
Resource Rich Country	If Yes=1, if No=0
Landlocked Country	If Yes=1, if No=0
Rural Population Share	Share of a country's population living in rural areas
GDP	Real Gross Domestic Product per capita
Arable Land Share	Share of land area that is arable under permanent crops, and under permanent pastures (World Bank)
Country	Sub-Saharan African countries
Year	1955 to 2011

Table 2. Sample Descriptive Statistics

Variables	Definition	N	Mean	Std. Dev.	Min.	Max.
RRA	Relative Rate of Assistance	642	-0.280	0.299	-0.946	1.295
CFBI	Cash Food Bias Index	825	-0.205	0.417	-0.942	2.295
TBI	Trade Bias Index	758	-0.226	0.371	-0.971	2.788
Resource Rich Country	If Yes=1, if No=0	1020	0.176	0.381	0	1.000
Landlocked Country	If Yes=1, if No=0	1020	0.361	0.481	0	1.000
Rural Population Share	Share of a country's population living in rural areas	920	75.643	12.645	40.700	96.300
GDP	Real Gross Domestic Product per capita	841	7.093	0.610	5.805	9.121
Arable Land Share	Share of land area that is arable under permanent crops, and under permanent pastures (World Bank)	862	11.046	9.225	1.342	46.148
Country	Sub-Saharan African countries 1955 to 2011	1020				
Year		1020				

Table 3. Fixed effect models of Government Assistance to Agriculture

	Model 1 (RRA)		Model 2 (CFBI)		Model 3 (TBI)	
Variable	Parameter Estimate	S.E.	Parameter Estimate	S.E.	Parameter Estimate	S.E.
Intercept	-0.550	0.510	-1.420**	0.640	-1.220*	0.780
Resource Rich Country	-0.910***	0.200	0.760***	0.270	1.370***	0.330
Landlocked Country	0.010	0.080	-0.060	0.110	0.230*	0.160
Rural Population Share	-0.004	0.003	0.003	0.004	0.002	0.005
Resource Rich Country*Rural Population Share	0.016***	0.003	-0.008**	0.004	-0.02***	0.004
GDP	0.125**	0.050	0.099*	0.060	0.080	0.070
Arable Land Share	-0.004	0.007	0.025***	0.007	0.008	0.007

Notes: ***=significant at 1% level, **=significant at 5% level, *=significant at 10% level