Impact of Food Security on Economic Growth in Africa: A Dynamic Panel Data Analysis

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Achieving sustained economic growth in Sub-Saharan Africa is often identified as the most crucial obstacle to global economic development, it is therefore important to have a full knowledge of the determinants of economic growth particularly within Sub-Saharan African countries. In recent times there is a general consensus that food security is important for not just physical wellbeing but also mental wellbeing of any society and food insecurity has been a major problem within Africa countries. Since Africa has the second largest population after Asia, it is important that this continent become food secured and food self-sufficient if possible in order to reduce the burden on the developing countries that give food donations to these African countries.

This study analyzed the long run impact of food security using food availability as a proxy on economic growth within 124 countries with a five year average data from 1970/74-2000/09; investigating the difference in the impact of food availability on economic growth between food secured countries and food insecure African countries. Furthermore, using a bare bone Solow growth model on these five year average panel data from the studied countries the important determinants of economic growth and if the impact of these determinants differs between food secured countries and food insecure African countries was examined.

The findings from this study posit that food security, school enrolments (measure of human capital), life expectancy, and initial investment rate (measure of physical capital), all have a positive significant impact on economic growth for all countries that were included in the study while initial output (GDP), inflation rate, and population growth rate all have a negative impact on economic growth rate. Also, when the countries where classified into food insecure African countries and the rest of the world countries, the impact of food availability on economic growth is negative in the long run for food insecure African countries and still positive for the rest of the world countries. The result posits that for food insecure African countries increasing food availability in the long run is detrimental to growth while for the rest of the world countries food availability spurs economic growth in the short run. One of the major reasons for this outcome in is that the source of food for these food insecure African countries has been identified as donation from developed countries; these food donations at times lead to disruption of food market within these countries leading to discouraging of farmers in the production of these crops; thereby making these countries even more food insecure instead of ensuring food security in the long run.

Introduction

Generating sustained growth in Sub-Saharan Africa is often cited as the most pressing challenge in global development; yet, in the voluminous empirical literature on economic growth, Sub-Saharan Africa exists primarily as a dummy variable in a single reduced-form growth regression. This paper seeks to address that problem by examining in greater detail several mechanisms of economic growth, asking in particular whether those mechanisms operate differently in Africa.

Several recent studies have explicitly asserted that Africa is not different from other regions with regard to the factors contributing to growth. These studies explain Africa's slower growth entirely as a function of the region's different mean levels with respect to given explanatory variables, often assuming that the magnitude of the marginal impacts of those variables is the same in Africa as elsewhere. For present purposes, that approach is unsatisfactory for two reasons: the forced equality between African and non-African slope coefficients, and the lack of consideration of the channels of transmission through which the reduced form variables affect growth. It is particularly interesting to ask even for those variables for which the marginal growth impacts are no different in Africa than elsewhere whether the determinants of those variables are the same in Africa as elsewhere. For instance, population growth rate is found in the initial growth regression to be negatively. Therefore, this study aims to investigate the impact of food security on economic growth using a dynamic model approach with data from 124 countries.

Empirical framework and Data

Empirical Framework

This paper follow the Barro-style reduced form growth model to analyze the determinants of economic growth within 124 countries of which 20 of these countries are food insecure African countries. The data used in the study is a panel data with 5 years average for 1970/74-2000/09. Since this study tried to answer to basic questions: does food availability have any impact on economic growth, if yes, does its impact differ between food insecure countries in Africa and the rest of the world countries. To address these questions each equations is estimated in two forms: partially unrestricted, and fully unrestricted. In the generic case, the fully unrestricted regression takes the form:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 D_i + \beta_{3-n} D_i * X_{it} + u_{it} \qquad (1)$$

Where D is a vector of dummy variables; it is equal to one for food insecure African countries and 0 otherwise, X is a matrix for explanatory variables which include measures of human capital (life expectancy, primary school enrolment, and secondary school enrolment), measure of physical capital (investment), population growth rate, initial gross domestic growth rate, inflation rate, and food availability a proxy for food security in the study. The fully unrestricted specification serves as a single equation through which the study's hypothesis can be tested instead of running a separate regression for the African countries. Through the interaction term ($D_i * X_{it}$) the second question of this study can easily be answered, thus a finding that the interaction term is insignificant indicates that the fully unrestricted model fails to

account for any growth differences between the food insecure African countries and the rest of the world countries. Eviews 7 statistical software was use for the regression analysis in this study.

Data and Expectation

The data used in this study was obtained mainly from World Bank data base, while data on food availability was obtained from Food agriculture organization (FAO). For this study it is expected that initial GDP growth rate will have a negative impact on economic growth, this prior expectation is in line with Solow's growth model that countries with high level starting point tend to grow slower compared with countries with low level starting point. Also, return to investment is expected to be higher in less developed countries compared with developed countries with low return to investment hence the convergence is dependent on other factors aside from initial conditions. Findings of Sala-I Martin (1997); Burger and Plessis, 2002 reveals that convergence impact has the highest effect on economic growth of all determinants of economic growth, hence the reason for our inclusion of this variable in the model. Population growth rate is expected to have a negative impact on economic growth, it is expected that the higher the population growth rate the lower the economic growth rate in line with Solow's prediction as well. Capital is expected to have a positive impact on economic growth; hence both physical and human capital measures are expected to increase economic growth, findings of webber, 2002 and Glewwe et al, 2007 posits a positive relationship between human capital and economic growth. And lastly, for all countries food availability a proxy for food security is expected to have a positive impact on economic growth and this is the major contribution of this study to the ongoing growth studies.

Result and Discussion

The regression results obtained from this study is reported on table 1. The first column of table 1 shows the fully restricted model with life expectancy as a measure of human capital. The result on column 1 posits that all variables are significant at 5% with expected signs except for population growth rate; initial GDP growth rate is negative and significant suggesting that long run convergence is a function of all other variables apart from GDP growth rate. Result on column 2 suggests that all variables have expected signs; the African dummy is negative and significant in explaining economic growth. This result posits that food insecure African countries tend to lag behind in terms of growth when compared with the rest of the world countries; this result is similar to findings of several authors such as Levine and Renelt (1992), Collier and Gunning (1999), Easterly and Levine (1997) just to mention a few.

Results on Column 3 suggest that inflation, population growth rate and measure of food availability are responsible for the growth difference between food insecure African countries and rest of the world countries. Results from columns 4, 5 and 6 using primary school enrolment as a proxy for human capita, suggests that inflation alongside with food availability are the reason for growth differential between rest of the world countries and African countries with food insecurity that were included in this study. Primary school enrolment in the three columns was positive and

significant; suggesting that higher school enrolment leads to increase in economic growth rate within all the 124 countries that were included in this study. Similarly, Columns 7, 8, and 9 presents result using secondary school enrolment as a proxy for human capita. The results from these columns posits that initial investment, inflation rates, secondary school enrolment and measure of food availability are important determinants of growth difference between rest of the world countries and African countries with food insecurity countries that were included within this study. Secondary school enrolment was significant and has a positive impact on economic growth just like primary school enrolment except that it is also a growth difference factor between rest of the world countries and food insecure African countries, therefore implying that investing in secondary school has a significant higher return to economic growth within food insecure African countries when compared to the rest of the world countries.

Generally, the result on table 1 suggests that food availability (a proxy for food security), inflation rate and secondary school enrolment are the important reasons for long run growth differential between food insecure African countries and rest of the world. For these food insecure countries high inflation has higher negative impact on economic growth when compared with rest of the world countries; on the other hand, increase in secondary school enrolment enhances economic growth within the food insecure countries suggesting that the return on secondary school enrolment is higher within these countries when compared to the rest of the world countries. Increasing food within these food insecure countries has a negative long run impact on economic growth; although the increase in food availability has a positive impact on economic growth within the rest of the world countries the impact is reverse for food insecure countries. The only explanation for this reverse relationship between food availability and economic growth in the long run for food insecure African countries might be due to the source of food within these countries, since most of these countries are food insecure, the major source of food is through food aid and support from donor countries and organizations. Hence, this result suggests that the long run impact of food aid to these food insecure countries is more detrimental to economic growth.

Table 1: Determinants of economic growth. Explanatory variable: Economic growth

Var	Coefficients								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
y_o	-0.031788 (0.0000)	-0.035480 (0.0000)	-0.036459 (0.0000)	-0.020720 (0.0001)	-0.026527 (0.0000)	-0.025072 (0.0000)	-0.026032 (0.0001)	-0.029230 (0.0000)	-0.025010 (0.0010)
K_0	0.039572 (0.0026)	0.037330 (0.0043)	0.033960 (0.0318)	0.031709 (0.0182)	0.030317 (0.0232)	0.033836 (0.0344)	0.027713 (0.0455)	0.027357 (0.0473)	0.034327 (0.0346)
fav	0.008014 (0.0036)	0.007466 (0.0064)	0.008447 (0.0026)	0.009386 (0.0008)	0.008704 (0.0018)	0.009850 (0.0006)	0.009343 (0.0009)	0.008855 (0.0017)	0.010135 (0.0004)
n	-0.005764 (0.3814)	-0.007234 (0.2703)	-0.012150 (0.0791)	-0.017194 (0.0109)	-0.017454 (0.0094)	-0.016532 (0.0159)	-0.009809 (0.1563)	-0.011038 (0.1098)	-0.011826 (0.0939)
p				0.067861 (0.0000)	0.056207 (0.0009)	0.062203 (0.0108)			
s							0.032947 (0.0009)	0.025934 (0.0105)	0.017886 (0.1635)
e_o	0.217185 (0.0000)	0.181512 (0.0003)	0.178398 (0.0014)						
i	-0.018678 (0.0000)	-0.019213 (0.0000)	-0.015288 (0.0008)	-0.022643 (0.0000)	-0.022599 (0.0000)	-0.017570 (0.0002)	-0.021715 (0.0000)	-0.021603 (0.0000)	-0.015785 (0.0010)
D		-0.022328 (0.0011)	0.200755 (0.3208)		-0.021965 (0.0015)	0.319456 (0.0304)		-0.020211 (0.0047)	0.431656 (0.0081)
β_0	-0.363954 (0.0000)	-0.273839 (0.0003)	-0.273205 (0.0012)	-0.144997 (0.0003)	-0.088964 (0.0409	-0.127572 (0.0138)	-0.042393 (0.2514)	-0.010832 (0.7780)	-0.040436 (0.3092)
D* y_o			0.010978 (0.6195)			-0.008137 (0.7086)			-0.006333 (0.7890)
D* k_0			-0.030006 (0.3310)			-0.034505 (0.2629)			-0.065287 (0.0463)
D* n			0.067635 (0.0062)			-0.016055 (0.7000)			0.003086 (0.9454)
D* fav			-0.031196 (0.0220)			-0.023384 (0.0822)			-0.036820 (0.0134)
D* p						0.001242 (0.9707)			
D* s									0.048824 (0.0249)
D* e_0			0.055647 (0.6670)						
D*i			-0.022336 (0.0529)			-0.030630 (0.0090)			-0.035875 (0.0027)
R^2	0.089357	0.101228	0.118924	0.085448	0.097144	0.112491	0.078834	0.088504	0.111269

Source: Author's compilation
Note: P-value in parenthesis, all variables are in log form

Conclusion

This study investigates the determinants of economic growth and if these determinants differ between African countries with food insecurity and rest of the world countries by using data set from 124 countries. The study revealed that food availability is an important determinant of economic growth within all countries and that in fact it is also one of the factors that cause growth difference between the rest of the world countries and food insecure African countries. Although the impact food availability as a source of growth difference turned out to be negative; suggesting that the source of the food within these African countries is of huge concern. One of the major reasons for this outcome in is that the source of food for these food insecure African countries has been identified as donation from developed countries; these food donations at times lead to disruption of food market within these countries leading to discouraging of farmers in the production of these crops; thereby making

these countries even more food insecure instead of ensuring food security in the long run. Therefore, Policy makers within these countries and food Aid donors should strive to achieve domestic food security particularly in the long run as this is the only way these African countries can benefit from security.

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Appendix

Rest of the world Countries

Albania
Antigua
&Barbados
Argentina
Australia
Austria
Bahamas
Bangladesh
Barbados
Belgium
Belize
Bermuda
Bolivia
Botswana
Brazil
Brunei
Cambodia
Canada
Chile
China
Colombia
Comoros
Costa Rica
Cuba
Cyprus
Denmark
Dominican Rep
Ecuador
El Salvador
Fiji
Finland
France
Germany
Greece
Grenada
Guatemala
Guyana
Haiti
Honduras
India
Indonesia
Iran
Ireland
Israel
Italy
Jamaica
Japan
Jordan
Korea, Rep.
Laos
Lebanon
Malaysia
Maldives
Malta
Mexico
Mongolia
Morocco
Nepal
Netherland
New Zealand
Nicaragua
Norway
Pakistan
Panama
Paraguay
Peru
Philippine
Poland
Portugal
Romania
Solomon Island
Spain
Sri Lanka
Suriname
Sweden
Switzerland
Syria
Thailand
Trinidad
&Tobago
Tunisia
Turkey
United Kingdom
United States
Uruguay
Venezuela
Vietnam

Food insecure African Countries

Angola	Congo, Dem. Rep	Lesotho	Sierra lone
Burkina Faso	Congo, Rep	Liberia	Uganda
Burundi	Cote d`Ivoire	Madagascar	Zimbabwe
Central African Rep.	Guinea	Mali	
	Guinea-Bissau	Mauritania	
Chad	Kenya	Niger	

Table 2: Definitions of variables

Variables	Definition
y_o	Initial GDP growth rate
K_o	Initial investment rate
fav	Food availability
n	Population growth rate
p	Primary school enrolment
s	Secondary school enrolment
e_o	Initial life expectancy
i	Inflation rate
d	Dummy {=1 for food insecure African countries, 0 otherwise}
β_o	Constant
D* X	Interaction term