

DO FDI AND FOREIGN AID INDUCE ECONOMIC GROWTH? EMPIRICAL EVIDENCE FROM SUB-SAHARAN AFRICA

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ABSTRACT

While most of the sub-Saharan African countries have been receiving a significant amount of foreign direct investment (FDI) and foreign aid for the last couple of decades, there is no consensus among the researchers about the contribution of FDI and foreign aid to the economic growth of African economy. This study, therefore, examines how FDI and Foreign aid induce the economic growth in sub-Saharan African economies by using panel data from a cross section of 40 sub-Saharan African countries with similar economic structure, background, stage of development, institutional arrangements, and culture. The identical characteristics of these countries are expected to make the inferences derived from the empirical results more valid. This study considers labor force, gross fixed capital, life expectancy, literacy rate, arable land and subscribers of mobile cellular as control variables. The empirical results provide an evidence of strong positive relationship between economic growth and FDI while foreign aid and economic growth turn out to be unrelated.

Keywords: FDI, Foreign aid, Gross fixed capital, Arable land, Labor force and Economic growth.

INTRODUCTION

The contribution of foreign direct investment (FDI) and foreign aid to economic growth in Africa has in various ways been examined by researchers. Economic growth is the persistence increase in the capacity of the economy to produce goods and services over a certain period of time. This growth is induced by a number of factors, among which FDI and foreign aid are very striking factors for developing countries. Some researchers such as Naudé and Krugell (2003) claimed FDI actually induce economic growth. Li and Liu (2005) also found that the interaction of FDI with human capital exerts a strong positive effect on economic growth in developing countries. Moreover, Asiedu (2004); Karras (2006) also agreed to the notion that FDI has positive relation with economic growth. However, Kosack and Tobin (2006) challenged the basis with his findings that only FDI never accelerates the economic growth. They argued there are some other important factors than the FDI to induce economic growth. Therefore, it is inconclusive that FDI indeed induces economic growth. Foreign aid, on the other hand, is the external transfer of revenue from developed countries to the developing one, and usually takes the form of government to government basis. Using annual Panel data from 1960 to 1997 for a sample of 71 aid-receiving developing countries, Karras (2006) and kasuga (2007) found that the effect of foreign aid on economic growth is positive, permanent, statistically significant, and sizable. Moreover, Selaya and Sunesen (2008) also concluded that aid may raise the marginal productivity of capital by financing complementary inputs such as public works, human capital and infrastructure development or by crowding out foreign and domestic private investment. However, Easterly (2007) argued that over the past 42 years, Africa has benefited to the tune of \$ 568 billion of aid, but no meaningful development has been achieved in terms of poverty reduction. Djankov *et al.* (2006) also found that a very low ratio of grants to loans is conducive for economic growth, whereas a higher ratio retards growth. Thus, loans with strict repayment schedules can act as a mechanism to ensure investment rather than consumption. Since there is no consensus found among the above mentioned literature, it facilitates further scope to research whether FDI and Foreign Aid induce Economic Growth in African countries. To determine whether FDI and foreign aid induce economic growth in Africa, the research will attempt to structure a framework in order to assess the role of FDI and foreign aid in the economic growth Sub-Saharan Africa. The paper is organized as follows. Theoretical framework and scope of the study give a brief about the theory used in this study. This is followed in research methodology by including econometric model which explains how this paper

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has been carried out. Empirical results present the empirical findings derived from econometric analysis. The last section analyzes the empirical results and concludes the paper.

Theoretical Framework

The theory adopted for this research is the neoclassical (Cobb-Douglas) aggregate production function: The aggregate production function: $Y = A * K^a N^{1-a}$, where A- level of technology, K- capital, N- labour and a is parameter that gives the relative weight to capital and labor in the economy for the model specification.

METHODOLOGY

In attempting to answer the questions posted in this research, this study has followed the methodology what have been used by the previous studies. Based on Ericsson and Irandoust (2005); Kosack and Tobin (2006); Selaya and Sunesen (2008) and neoclassical (Cobb-Douglas) aggregate production theory, this study focused on collecting data from a cross section of 40 Sub-Saharan African countries particularly the variables that have been contributing to the economic development for different country. Therefore, this study uses panel analysis from 1990- 2010 through regression on the basis of variables: i) FDI inflow, ii) Life expectancy, iii) Arable land, iv) Mobile user (represents infrastructure) v) Gross fixed savings, vi) Labor force viii) Net ODA, viii) Gross capital information, ix) Inflation, x) Population, xi) GDP per capita and xii) Gross domestic savings.

Selection of variable for the specification of the model: The criteria used in the specification of the model are based on the literature review, neoclassical (Cobb-Douglas) aggregate production and the preliminary test of all the variables and their relationship with GDP growth. Table-1 is the preliminary regression conducted in the selection of the variable for the model specification. Again, the table also shows individual variable and their relationship with economic growth for the model specification

Table 1. Coefficients, t-statistics and p-value for selected variables.

Variables	Coefficients	t-Statistic	P>[t]
Fdi Inflow	.0007393	3.65	0.000
Oil min dummy	.1994142	0.30	0.764
Arable Land	.0668484	3.10	0.002
GDP per capita	-.0000655	-0.66	0.509
Gross Domes	.1011092	1.10	0.273
Gross Fixed	.1498324	1.61	0.107
Inflation	-.0007127	-0.74	0.461
Labor force	5.75e-08	.32	.748
Life expect	-.164203	-4.39	0.000
Mobile cel	-.0440028	-2.60	0.009
Net office	1.14e-09	1.62	0.105
Population	-1.78e-08	-0.25	0.804
Constant	5.840479	3.02	0.003
Prob > F	0.0000		
R squared	0.2775		
Adj R- square	0.2610		

From the regression, we set out two models- restricted and unrestricted models, which are given in the following specifications.

Restricted Model: The restricted model is the specification model whereby restrictions have been imposed to establish the relation between FDI and Foreign Aid on one hand and economic growth on the other hand. Therefore, we construct our restricted model: $GDP\ growth = \beta_0 + \beta_1 fdiinflow + \beta_2 netodaofficial + u$ Where β_0 means intercept; $\beta_1, \beta_2 =$ perimeters and $u =$ error term. The regression output is presented in table 2.

Unrestricted Model: On the other hand, the unrestricted model contains all the variables that are found significant in the preliminary regression (Table 1) in relation to economic growth for the model. Therefore, FDI inflow, Life expectancy, arable land, mobile, gross fixed capital information, labor force and ODA are selected for unrestricted model. Hence, the unrestricted model is depicted as below:

The unrestricted model is specify as:

$$\text{GDP growth} = \beta_0 + \beta_1 \text{fdi} + \beta_2 \text{lifeexp} + \beta_3 \text{arable} + \beta_4 \text{mobile} + \beta_5 \text{grossfix} + \beta_6 \text{netoda} + \beta_7 \text{laborfor} + u$$

Where $\beta_0 =$ intercept; $\beta_1, \beta_2, \beta_3, \dots, \beta_7 =$ perimeters. The regression output is shown in table 3.

Table 2. Coefficients, t-statistics and p-value for restricted variables.

Variables	Coefficients	t-Statistic	P>[t]
FDI inflow	.0004375	2.75	.006
Net oda	-8.29e-11	0.21	.836
Constant	4.578269	13.82	0.000
Prob > F	0.0108		
R squared	0.0151		
Adj R- square	0.0118		

Table 3. Coefficients, t-statistics and P-value for unrestricted variables.

Variables	Coefficients	t-Statistic	P>[t]
FDI inflow	.0005263	3.23	0.001
Life Expects	-.1127476	-3.44	0.001
Arable land	.0102692	0.54	0.587
Mobile cel	-.01136	-0.73	0.469
Gross fixed	.2555818	11.12	0.000
Net oda	8.12e-11	0.19	0.846
Labor force	2.18e-08	0.59	0.558
Constant	5.155048	2.86	.004
Prob > F	0.0000		
R squared	0.1945		
Adj R- square	0.1849		

After constructing both restricted and unrestricted model, the selection of particular model depends on F-Value. If the F- value is greater than the critical value of accepted significance level, then unrestricted model is selected and vice versa. Therefore, the F-value is calculated in the following way.

$$F = \frac{(0.1945 - 0.0151) / 8}{(1 - 0.1945) / (500 - 9)} = \frac{0.0598}{0.0014} = 42.71$$

Here, F-value is found 42.71 which is greater than the critical value (1.81) of 5% level.

Therefore, we select unrestricted model for the regression analysis of this study. Based on this unrestricted model, a number of specification and diagnostics tests such as multicollinearity test, omitted variable test, autocorrelation test and heteroskedasticity test have been conducted in order to verify the validity of this study findings.

Multicollinearity test: This study has conducted Variance Inflation Factor (VIF) test in order to identify whether the variables have multicollinearity problem or not. Under the VIF test, it is suggested that if any variables contains more than 10 VIF value, then the variable is considered to have multicollinearity problem. The VIF test with all the independent variables of this model shows that there is no multicollinearity problem among variables. Result of multicollenearity test is depicted in table 4.

Omitted variable test: After multicollenarity test, it is very necessary to examine whether the selected variables express the model perfectly or not. In this thesis, the omitted variable (OV) test has been conducted in order to find the existence of any irrelevant variables or the exclusion of any important variables that can be important to express the model better. According to OV test if the P value is less than 0.05 at 5% significance level, the model is said to have omitted variable problem and vice versa. In this study, we found P Value 0.1827 which is greater than 0.05 at 5% significance level.

Autocorrelation: This test is undertaken to determine the presence of autocorrelation amongst the variables. In this study, we have conducted ‘Wooldridge Autocorrelation test’. According to this test,

the model is considered not to have any autocorrelation problem if the P value greater than selected significance level. The stata output for autocorrelation test is presented in table 5.

Table 4. VIF test for multicollinearity.

Variable	VIF	1/VIF
FDI	9.87	0.101317
Life expectancy	9.32	0.107296
Arable land	8.61	0.116144
Mobile Cellular	6.51	0.153609
Gross capital formation	1.97	0.507614
Net ODA	1.87	0.534759
Labor force	1.73	0.578034
Mean VIF	5.70	

Table 5. Autocorrelation test.

Prob > F	0.3833
F(1, 39)	0.777

As table 5 shows, the P value (0.3833) is greater than the 5% significance level, it can be concluded that there is no autocorrelation between the error terms.

Heteroscedasticity test: This test aims to judge whether the independent variables are homogenous to dependent variables. If the p-value is significant, then it is considered that regression has heteroscedasticity problem.

Table 6. Heteroscedasticity test.

Prob > F	5.e-246
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Since table 6 presents that the p-value is significant, there is heteroscedasticity. Now we can rectify it through robust. After conducting all of these diagnostic and specific tests, this research runs the regression and finalizes the following OLS regression results which are depicted at table 7.

Table 7. Final regresión result.

Variables	Coefficients	t-Statistic	P>[t]
FDI inflow	0.0005263	2.18	0.048
Life expectancy	-0.1127476	2.03	0.043
Arable land	0.0102692	0.188	0.095
Mobile cellular	-.01136	2.08	0.067
Gross fixed capital	0.2555818	4.38	0.000
Net ODA	8.12e-11	0.21	0.838
Labor force	2.18e-08	1.35	0.252
Constant	5.155048	1.74	
R squared	0.6658		
Adj R- square	0.6312		

RESULTS

Empirical results

The following results can be derived from the regression analysis:

- Gross fixed capital show positive and highly significant at 1% level with economic growth in Africa
- FDI inflows shows positive correlation with GDP growth at 5% significant level
- Foreign aid and labor force show positive correlation with GDP growth and but not significance even at 10% level
- Life expectancy shows negative correlation with GDP growth and significance at 5% level
- Arable land shows positive coefficient with economic growth and significance at 10%
- Mobile cellular shows negative correlation with economic growth at 5% significant level

Analysis of the results

This study has found empirical evidence that gross fixed capital is the most significant factor that has been contribution Sub-Saharan African countries economy's growth. To support this finding, authors argue that gross fixed capital could be the most significant factor for economic growth because it accelerates technological progress, capital accumulation, and investment in R&D which are mainly essential to stimulate the economic growth. Panic (2007) has found the similar findings in case of Germany and United Kingdom. On the other hand, mobile cellular which represents for infrastructure shows negative correlation with economic growth at 5% level. This finding means that African countries economic growth has been frustrating for the last several decades due to its poor infrastructure. As most of the African countries are very poor, they don't have enough allocation of budget to develop their infrastructure, the most preconditioned factor of economic development. Moreover, life expectancy also found negatively correlated with economic growth in Africa and the reason of such finding is very clear that most of the African countries are suffering very low life expectancy. Low life expectancy can be attributed for the low productivity that has been frustrating to the economic growth. In addition, Arable land is somewhat significance for African countries economic growth as most of African countries have vast land for agriculture. Finally, the most striking finding of this research is that FDI is found significant for African countries economic growth but net ODA has not been contributing for the economic growth of African economy. The possible explanation of this finding could be corruption, as the governance of Africa is very poor; the ODA somehow goes to bad politicians rather to general people.

CONCLUSION

In concluding remarks, Africa governments should focus on the gross fixed capital formation, utilization of abundance arable land, strive to improve life expectancy rate as well as, upgrading the local technology to improve productivity whilst making effort to attract FDI as Singapore has done, rather than bouncing their hope on foreign aid for economic growth which this study proves that foreign aid has no effect on economic growth.

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