

## **AID-MACROECONOMIC POLICY ENVIRONMENT AND GROWTH: Evidence from Sub-Saharan Africa**

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This paper is a contribution to the growing debate on aid-growth nexus. It examines the role of macroeconomic policy environment in aid-growth nexus an area which has received less attention in Sub-Saharan Africa (SSA). In a panel regression model covering twenty Sub-Saharan African countries, estimated with the use of OLS and 2SLS over the period 1970 to 2001 (in nine-four year sub-periods), the study finds that a sound macroeconomic environment is fundamental for the effective contribution of aid to sustainable growth. The results also show that macroeconomic policy environment is an important determinant of growth. Overall, the paper concludes that the macroeconomic instability and poor institutional framework have crippled the growth of aid recipients in SSA.

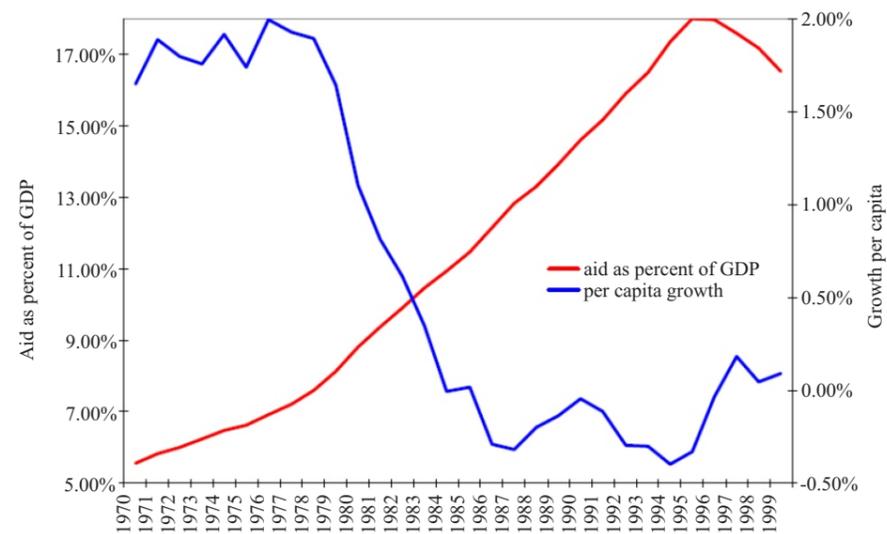
### **I. Introduction**

Developing countries are characterized by low level of income, high level of unemployment, very low industrial capacity utilization, and high poverty level, just to mention a few. The increasing prevalence of these economic problems has been ostensibly blamed on the low revenue base of most developing countries depriving them from meeting basic development goals. Sequel to this view, the provision of foreign aid has been suggested as a variable option for augmenting meagre domestic resources. While some countries that have benefited from foreign assistance at one time or another have grown such that today they have become aid donors (e.g., South Korea), a majority of countries in Africa remain backward. The Sub-Saharan African countries (SSAs) have continued to benefit from all sorts of foreign assistance and, in fact still collect at least as much as the amount collected in the early 1980s, yet their socio-economic indicators remain dismal (see Figure 1).

This, therefore, suggests that there is more to the economic problems prevalent in Africa than the low revenue base and suggest that there may be a disconnect between aid and growth in SSA. While there could be many qualitative and quantitative factors explaining these unfavourable trends, the incessant socio-political crisis, policy inconsistencies, macroeconomic instability and bad governance prevalent in many SSAs are all indicators of poor macroeconomic policy and institutional environment. To this end, therefore, this study seeks to answer the following questions:

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- What is the relationship between aid and growth in Sub-Saharan Africa?
- To what extent state of macroeconomic policy environment in SSA has affected the aid-growth relationship?



Source: Easterly et al. (2003).

**FIGURE 1**  
Aid and Growth in Africa  
(10-year moving averages)

Evidence in the literature on aid-macroeconomic policy environment-growth have remained inconclusive. On one side of the arguments are those who believe that aid is effective only in a stable macroeconomic environment.<sup>1</sup> On the other side are those who conclude that macroeconomic environment has no significant influence on the link between aid and growth.<sup>2</sup> However, this growing debate on aid-macroeconomic environment-growth nexus seems to have received less serious attention in Africa. Most studies often focus on the direct impact of aid on growth in Africa. The present study, therefore, intends to fill this research gap by looking at the role of macroeconomic environment on the aid-growth nexus in Sub-Saharan Africa.

The paper is structured as follows: Section II provides a review of relevant empirical literature, Section III sets out the methodology and data, Section IV presents the analysis of results and Section V concludes the paper.

<sup>1</sup> Prominent among them include, Burnside and Dollar [(1997), (2000), (2004)].

<sup>2</sup> Prominent among them include Easterly, Levine, and Roodman (2003), and Dalgaard, Hansen and Tarp (2004).

## II. Aid-Macroeconomic Policy Environment-growth Nexus

Burnside and Dollar's (2000) work was the first notable paper to have generated debate on the aid-policy-growth relationship. The study utilized a new data base on foreign aid to examine the relationships among foreign aid, economic policies and growth of per capita GDP. In panel growth regressions for 56 developing countries and six four-year periods (1970-93), the authors argued that the policies that have significant effect on growth are fiscal surplus, inflation and trade openness. The study constructed an index of these three policies and determined their relationship with foreign aid. They found that aid has a positive impact on growth in developing countries with good fiscal, monetary and trade policies. On the contrary, aid has no effect on growth in the presence of poor policies. These results were robust in a variety of specifications that included or excluded middle-income countries, included or excluded outliers, and treated policies as exogenous or endogenous. The study also examined the determinants of policy and found no evidence that aid has systematically affected policies. The study also estimated an aid allocation equation and showed that any tendency for aid to reward good policies has often been overwhelmed by donors' pursuit of their own strategic interests. In a counterfactual manner, the study reallocated the aid, reducing the role of donor interests and increasing the importance of policy and found that such a reallocation would have a large, positive effect on developing countries growth rates.

Since Burnside and Dollar's (2000) work, many researchers have reacted to their results including Hansen et al. (2001), Dalgaard and Hansen (2001), Guillaumont and Chauvet (2001), Collier and Dehn (2001), Lensink and White (2001), Easterly et al. (2003), Harms and Lutz (2004), and Murphy and Tresp (2006). Some of these authenticated the evidence of the study that aid only works in a good policy environment,<sup>3</sup> while some others found that when particular variables are added, the coefficient on the interaction between aid and policy becomes almost zero and/or statistically insignificant.<sup>4</sup> For example, Collier and Dehn (2001) incorporated export price shocks into the Burnside and Dollar framework and showed a significant and negative relation between these shocks and economic growth. They argued that the adverse effects of negative shocks on growth can be mitigated by offsetting increases in aid. Therefore, they suggested that targeting aid towards negative shock depressing countries could be more effective than towards countries with good policies. Using a 2.5 per cent cut off in their sample size of 113 countries, they found 179 positive shocks and 99 negative shock episodes. They indicated that the change in aid interacted with positive shocks is insignificant at the one percent level. Additionally, incorporating shocks into Alesina-Dollar's (1998) regression, they showed that donors have not taken shocks into account in aid allocation. Finally, they claimed that aid effectiveness may increase significantly if both policy and adverse export price shocks are considered in determining aid allocation.

<sup>3</sup> Prominent among them are Hansen and Tarp (2001), Lensink and white (2001), Collier and Dehn (2001), Dalgaard and Hansen (2001), and Harms and Lutz (2004).

<sup>4</sup> Prominent among them include Easterly et al. (2003), and Murphy and Tresp (2006).

Dalgaard et al. (2004), provided a critical analysis of the growth regressions in Burnside and Dollar paper. First, they analyzed aid and government expenditure in a modified neoclassical growth model. They found that while good policies spur growth, they may at the same time lead to decreasing effectiveness of foreign aid. Second, they showed that the econometric results emphasizing the crucial role of interactions between aid and good policies in the growth process, are fragile and extremely data dependent. Dalgaard, et al. (2004) examined the empirical evidence of foreign aid and growth. They found that aid is generally effective in bad environments. They, however, admitted that the degree to which aid enhances growth depends on climate-related circumstances. In contrast, Easterly, et al. (2003) conducting a new test on the previous work of Burnside and Dollar with a larger sample size from 1970 to 1997 compared to 1970-1993 and found that the role of policy in determining the effectiveness of foreign aid disappears when additional countries are added to the sample.

Burnside and Dollar (2004) revisited the relationship between aid and growth using new data set focusing on the 1990s. Their evidence supports the view that the impact of aid depends on the quality of state institutions and policies. They employed an overall measure of institutions and policies popular in the empirical growth literature. The interaction of aid and institutional quality has a robust positive relationship with growth. However, there is no support for the hypothesis that aid has the same positive effect everywhere as observed by Dalgaard et al. (2004). Burnside and Dollar also found that in the 1990s, the allocation of aid to low income countries favoured ones with better institutional qualities. Their cross-country evidence on the aid effectiveness is supported by other types of information as well. Case studies, project level evidence, and opinion polls, support the view that corrupt institutions and weak policies limit the impact of financial assistance for development. Alvi et al. (2008), addressed nonlinearity in the aid, policy and growth relationship. By applying commonly used aid and policy variables, they revisited the relationship from a new perspective. Their semi-parametric estimation shows that aid positively affects growth in an economically meaningful range, although with diminishing returns. These findings suggest that nonlinearities if not appropriately addressed may hide some key details, providing only indistinct information about aid-policy-growth nexus.

Murphy and Tresp (2006) reconsidered the role of economic policy in determining the effectiveness of foreign aid for generating economic growth in developing countries. They updated and modified the data set originally used by Burnside and Dollar (2000) in order to more fully understand the critique presented by Easterly et al. (2003). Their findings suggest that the relationship among foreign aid, government policy, and economic growth is tenuous and depends on the subset of countries included in the analysis. Good policy enhances the effectiveness of foreign aid in spurring growth when the original set of countries included in Burnside and Dollar is used, but this relationship disappears for an expanded set of countries. Because the relationship among aid, policy, and growth is likely to be nonlinear, they presented an alternative probit model emphasizing growth thresholds. Their results from this alternative analysis confirmed the conclusions of Easterly et al. (2003) finding little

support for the view that good policy increases the probability that foreign aid contributes to growth. Evidently, this review is a strong indication that the empirical relation among aid, policy and growth has remained inconclusive and has, therefore, left open a vacuum for further studies to fill (see Table 1).

**TABLE 1**

A Summary of Empirical Evidence on  
Aid-Macroeconomic Policy Environment-Growth Nexus

Empirical Evidence	Description of Empirical Evidence	Authors
Macroeconomic environment affects aid-growth nexus.	Foreign aid does have some positive impact on growth, conditional on a stable macroeconomic policy environment. In addition, when country size is included the growth model, the effect of aid is positive, larger and significant.	Burnside and Dollar [(1997), (2000),(2004)], Collier and Dehn (2001), Lensink and Morrissey (2000), Alvi et al. (2008).
Macroeconomic environment has no significant influence on aid-growth nexus.	Aid-growth nexus is sensitive to changes in data set. If the data set of studies suggesting positive and significant role of policy in aid-growth nexus is expanded, the role of policy disappears.	Easterly et. al. (2003), Dalgaard and Hansen (2001). Dalgaard et al. (2004). Murphy and Tresp (2006).
Mixed Evidence.	The effect of foreign aid on growth depends on the nature of development of recipient nations. Foreign aid significantly and negatively correlates with growth in developing countries. However, foreign aid to Inland countries as well as South Asian countries significantly and positively correlates with growth.	Chenery and Carter (1973). Vu Munh Duc (2006).
Other Salient Issues.	Higher aid levels erode the quality of governance and economic freedom of recipient nations.	Knack (2000).

Source: Compiled by the authors.

### III. Methodology and Data

The empirical model for this study is based on the neoclassical growth model. The standard neoclassical growth model has been modified to incorporate the following: it expresses the growth rate of per capita real GDP as a function of the initial level of income, the level of aid as a fraction of GDP, measures of macroeconomic environment (policy index) and some exogenous variables. Also incorporated in the model is a variable which enables aid to interact with the policy variable.

$$g_{it} = B_{go} + y_{it}B_{gy} + a_{it}B_{ga} + P_{it}B_{gp} + a_{it}P_{it}B_{gap} + x_{it}B_{gx} + \varepsilon_{it}^g \quad (1)$$

where:

- $g_{it}$  represents the per capita real GDP,
- $y_{it}$  is an initial level of income,
- $a_{it}$  is foreign aid (real effective development assistance) as a percentage of real GDP,
- $P_{it}$  is the policy index,
- $x_{it}$  is a set of exogenous variables,
- $a_{it}P_{it}$  represents aid-policy interactions,
- $\varepsilon_{it}^g$  is the growth regression error term, and
- $B$  is a vector of regression coefficients.

The set of exogenous variables in the growth model ( $x_{it}$ ) are a measure of institutional quality that captures security of property rights and efficiency of the government bureaucracy,<sup>5</sup> ethno-linguistic fractionalization variable (Ethnl),<sup>6</sup> assassinations variable to capture civil unrest (Assass); and the institutional variable (which is broad Money Supply over GDP) as a proxy for distortions in the financial system.<sup>7</sup>

Although, aid and policy are exogenous in the growth model (1), they also affect each other. This implies that these variables also depend on a set of exogenous variables.<sup>8</sup> Thus:

$$a_{it} = B_{ao} + y_{it}B_{ay} + P_{it}B_{ap} + x_{it}B_{ax} + \varepsilon_{it}^a \quad (2)$$

$$P_{it} = B_{po} + y_{it}B_{py} + a_{it}B_{pa} + x_{it}B_{px} + \varepsilon_{it}^p \quad (3)$$

The policy index created by Burnside and Dollar (2004) has been employed. This policy index is a combination of fiscal policy (using budget surplus as a proxy), monetary policy (using inflation as a proxy) and trade policy (using trade openness as a proxy). In addition to the above policy index, an alternative measure of policy as suggested by Easterly et al. (2003) is considered which involves substituting broad money supply as a percentage of GDP for trade openness.

<sup>5</sup> The institutional quality was developed by Knack and Keefer (1995).

<sup>6</sup> This was developed by Easterly and Levine (1996).

<sup>7</sup> King and Levine (1993).

<sup>8</sup> See Burnside and Dollar (2000).

In the estimation of the model, both the Ordinary Least Square (OLS) and the Two Stage Least Square (2SLS) are employed based on the fact the former does not consider the endogeneity of aid as expressed in equation (2). Applying OLS in the presence of endogeneity yields inconsistent results in view of the potential correlation between the stochastic explanatory variable (aid/GDP) and the growth regression error  $\varepsilon_{it}^g$ . The set of exogenous variables  $x_{it}$  in the aid specification include a number of variables that do not belong in the growth regression notably population and specific donor interest variable such as arms imports as a share of total imports. Boone (1995) has shown that these variables mentioned are good instruments to address the endogeneity problems. Consequently, these instruments are used in the 2SLS estimation.

Data used for estimation cover twenty SSA countries spanning the period 1970 to 2001. Burnside and Dollar data is updated using World Bank data, International Financial Statistics, National archives and moving average in situations where data are not readily available. In Burnside and Dollar's work, data used were computed over successive six four-year periods i.e., 1970-73, 1974-77, 1990-93. This helps to lessen the influence of short-term fluctuations in growth that are not related to longer-term forces as shown in Murphy and Tresp (2006). Easterly et al. (2003), however, argues that six four-year period may capture business-cycle fluctuations and may not be long enough for a period of "good policy" to setup beneficial effects of aid. Based on this the sample period is lengthened to nine four-year periods.

### IV. Analysis of Results and Policy Implications

The results of growth regressions carried out (using both OLS and 2SLS) are presented in Tables 2 and 3. The OLS regression results show that foreign aid and policy are positively related to growth. Even when aid was interacted with policy, a positive impact was found. The results are in fact more robust when the 2SLS was considered. The findings on the policy index of Burnside and Dollar [(1997), (2000), (2004)] are further validated by the empirical evidence that macroeconomic policy environment is an important determinant of aid effectiveness based on 2SLS results.

When M2GDP is incorporated into the policy index as a substitute for Sach's-Warner trade openness – an alternative measure of economic policy as suggested by Easterly et al. (2003), the interaction between policy and aid was still significant and positive (see Table 3). The overall results do not differ significantly from those obtained when the Burnside and Dollar policy index was used. This confirms the evidence of Easterly that the alternative policy index can still capture some real effects.

In previous findings it was argued that an expanded data set (drawing evidence from Sub-Saharan Africa) did not seem to affect aid-policy interaction effect on growth. Invariably, the findings of this paper do not support the argument raised by Easterly et al. (2003) and Murphy and Tresp (2006) that if the data set is expanded, the significant effect of aid-policy interaction disappears.

**TABLE 2**

## Panel Data Regressions

(Dependent variable: Growth)

Variables	OLS Regressions			2 SLS Regressions		
Policy	0.0215 (2.635)**	0.0216 (2.637)**	–	0.0215 (2.635)***	0.027 (2.402)**	–
Aid	–	0.0064 (0.207)	–	–	0.316 (1.525)	–
Aid × Policy	–	–	0.001 (1.178)	–	–	0.003 (2.358)**
Ethnf	-0.002 (-0.131)	-0.001 (-0.065)	-0.007 (-0.452)	-0.002 (-0.131)	0.044 (1.228)	-0.018 (-1.047)
Assassin	-7.096 (-0.674)	-7.167 (-0.678)	-1.435 (-0.137)	-7.096 (-0.674)	-10.643 (-0.756)	-3.151 (-0.289)
Ethnl × Assassin	0.083 (0.500)	0.086 (0.514)	-0.038 (-0.232)	0.084 (0.500)	0.230 (0.957)	-0.023 (-0.136)
Icrge	0.613 (2.053)**	0.611 (2.037)**	0.791 (2.687)***	0.613 (2.053)***	0.508 (1.271)	0.669 (2.151)**
M <sub>2</sub> GDP	-0.018 (-0.415)	-0.020 (-0.439)	0.003 (0.064)	-0.018 (-0.415)	-0.083 (-1.149)	0.025 (0.515)
Lgdppc	0.545 (1.729)*	0.571 (1.679)*	0.486 (1.479)	0.545 (1.729)*	1.821 (1.950)*	0.261 (0.729)
No. of Observations	148	148	148	148	148	148
R <sup>2</sup>	0.47	0.47	0.44	0.47	0.43	0.37
Adj R <sup>2</sup>	0.43	0.42	0.39	0.43	0.39	0.32

Computed by the authors. Figures in parentheses are the t-test statistics. \*, \*\*, \*\*\* Significant at the 10%, 5% and 1% levels of significance, respectively.

In terms of statistical significance, economic policy appears significant in all the regressions while the statistical significance of policy and aid-policy interaction estimates are increased when the 2SLS regression was computed. Other explanatory variables are not statistically significant except institutional quality - a measure of the nature of governance, and had the expected positive sign in all the estimated regressions. The implication of this finding is that institutional quality is a good determinant of growth in SSA.

By and large, evidence obtained from these analyses indicates that economic policy is a good determinant of aid effectiveness and growth. Also, foreign aid is expected to enhance the realisation of sustainable growth and development in a country with a sound macroeconomic policy environment. With the increasing incidence of slow growth rates in many SSA countries, the positive association among aid macroeconomic policy environment and growth may suggest that poor and inconsistent economic policies evident in many of these countries are responsible for the sluggish and weak contribution of aid to growth.

**TABLE 3**Panel Data Regressions  
(Using Alternative Policy Definition by Easterly et al. (2003))

(Dependent variable: Growth)

Variables	OLS Regressions			2 SLS Regressions		
Policy	0.016 (2.255)**	0.016 (2.247)**	–	0.016 (2.255)**	0.017 (2.181)**	–
Aid	–	0.001 (0.016)	–	–	0.101 (0.781)	–
Aid × Policy	–	–	0.001 (1.374)	–	–	0.003 (2.401)**
Ethnf	0.006 (0.433)	-0.006 (-0.412)	-0.005 (0.362)	-0.006 (0.433)	0.007 (0.303)	-0.009 (-0.575)
Assassin	-6.390 (-0.605)	-6.394 (-0.603)	-1.509 (-0.145)	-6.390 (-0.605)	-7.300 (-0.660)	-2.687 (-0.252)
Ethnl × Assassin	0.061 (0.366)	0.061 (0.365)	-0.027 (-0.168)	0.061 (0.366)	0.100 (0.554)	0.001 (0.008)
Icrge	0.608 (2.635)**	0.608 (2.026)**	0.729 (2.474)**	0.608 (2.035)**	0.569 (1.804)*	0.539 (1.705)*
Lgdppc	0.579 (1.840)*	0.581 (1.706)*	0.668 (2.050)**	0.579 (1.840)*	1.002 (1.583)	0.850 (2.459)**
No. of Observations	148	148	148	148	148	148
R <sup>2</sup>	0.46	0.46	0.44	0.46	0.39	0.39
Adj R <sup>2</sup>	0.42	0.41	0.40	0.42	0.35	0.35

Computed by the authors. Figures in parentheses are the t-test statistics. \*, \*\* Significant at the 10% and 5% levels of significance, respectively.

## V. Conclusions

Aid in itself is not all bad, however, its effectiveness can be affected by the nature of policy and institutional environment of the recipient nation. The empirical evidence obtained in this study is an indication that effectiveness of aid flows into Sub-Saharan Africa was conditional on a stable macroeconomic policy environment. In other words, the increasing flows of aid into Africa had not promoted meaningful development due to the unstable macroeconomic environment and poor institutional framework. In the midst of current efforts to achieve Millennium Development Goals (MDGs) in Sub-Saharan Africa, the need for foreign assistance is inevitable. However, no amount of foreign assistance will promote sustainable growth and development in SSA if the problem of unstable macroeconomic environment persists. It is, therefore, crucial for respective governments in SSA to pursue economic policies that at least reflect low inflation rate, productive budgetary balance, competitive and unimpaired exchange rate, and sound institutional quality.

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**APPENDIX**

List of Countries Examined  
(Angola, Botswana, Cameroon, Gabon, Gambia, Ghana,  
Ivory Coast, Kenya, Mali, Mozambique, Namibia, Niger, Nigeria,  
Senegal, Somalia, Togo, Uganda, Tanzania, Zambia Zimbabwe).

## Description of Variables

Variable Name	Description	Source(s) of Data
Growth	Average growth rate of real GDP per capita.	WDI, 2001
Lgdppc	Initial level of real GDP per capita	WDI, 2001
Aid	Official development assistance as a share of GDP	OECD-DAC (2001)
Ethnf	Index of ethnolinguistic fractionalization, 1960	Easterly and Levine (1997)
Assassin	Number of assassinations per 100,000 population	Easterly and Levine (1997)
Icrge	Institutional quality; security of property rights and efficiency of the government bureaucracy	Knack and Keefer (1995)
Policy	Policy Index = 1.28 + 6.85 Budget surplus - 1.4 Inflation + 2.16 Openness	Burnside and Dollar (2000)