Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.3, No.13, 2012

Foreign Aid Targeting, Policy Conditionality and Human Development Outcomes in Sub-Saharan Africa: A Panel Data Evidence

Yidnekachew Wondimu Zewde[1]* Hussien Hamda Komicha[2]

1. Department of Finance and Development Economics, Addis Ababa University P.O.Box: 3131, Addis Ababa, Ethiopia
2. Department of Entrepreneurship, Training and Trade, Government of Manitoba, 1130-259 Portage Avenue, Winnipeg, Manitoba, Canada, R3B 3P4.

* E-mail of the corresponding author: yewond2005@yahoo.com or yidnekachew.wondimu@aau.edu.et

Abstract
This paper examines the question of aid effectiveness in Sub-Saharan Africa (SSA) by analyzing the effect of foreign aid on selected components of human development indicators including economic growth, adult literacy and under-five mortality rates. Panel data evidence from 44 SSA countries shows that SSA's share of aid inflows to developing world during the period under study was significant. However, following the global financial and economic crisis, total foreign aid and SSA's share is expected to decline. This requires better use of limited aid resources by recipient countries, and searching for ways to use the aid in an efficient manner and spending the money in economically more responsive sectors is imperative. Dynamic Panel Data estimation employing panel data covering the period 1973 - 2007 indicate that aggregate aid had statistically insignificant effect on economic growth unless matched with good domestic macro policies. However, aid targeted to the education and health sectors was unconditionally effective for desired sectoral outcomes. Robustness of such results was checked using different measurements of foreign aid, and results remained unchanged. The results suggest that devising conducive macro polices and working towards appropriate institutional setup in the region is advisable for an effective use of foreign aid. In a situation where foreign aid is considered for a country without conducive macro policies, it should better target more responsive sectors, education and health in this case, which are being targeted by the UN Millennium Development Goals.
Keywords: Foreign Aid, Macro Policies, Sub Saharan Africa, MDGs, Dynamic Panel Data Models.

1. Introduction

According to the various aid-related reports of the OECD and the World Bank, substantial amount of aid as a percentage of GDP and total expenditure has been given to different countries in Sub-Saharan Africa (SSA) for various purposes. For instance, net Official Development Assistance (ODA) from all donors as a percentage of recipient's GDP has increased from 4.1% in 1980 to 5.6% in 2003 (World Bank, 2005). Moss and Subramanian (2005) identified 22 low-income countries, 16 of which were in SSA, where ODA inflows were equivalent to at least half of total government expenditure. Furthermore in 12 poor countries, of which ten are in SSA, the ratios of ODA to government expenditures were 75% or more. Particularly, aid to education and health sectors increased substantially over the past decades. For example, over the period 1993-96 to 2002-2004, aid in education as a share of total aid increased from about 1.1% to 9.3% (Elizabeth and Nandwa, 2006).

A critical review of the findings of previous studies concerning the reliability of foreign aid to development in LDCs has led to the development of three broad lines of arguments. These are: *aid pessimistic view* (e.g., Filmer and Pritchitt, 1999; Easterly, 2003 and Rajan and Subramanian, 2005); *aid optimistic view* (e.g., Kimura et al., 2012; Bruckner, 2011; Radelet et al., 2004; Gupta et al., 1999 and Collier, 2006) and *aid conditionality view*. According to the aid conditionality view, aid can be effective to reduce the different indicators of underdevelopment if it is 'managed efficiently' and 'coupled with good macro-policies' (e.g., Burnside and Dollar, 2000). Although various studies have been done in the area of foreign aid, most of the works conducted so far are either on the effectiveness of aggregate aid on growth or on other indicators of human development such as infant mortality and adult literacy rates. Thus, the efforts which have been made to analyze the issue with disaggregation of aid and the resulting development indicators are limited. Moreover, majority of the aid effectiveness studies narrowly defined human development and considered economic growth (as measured by GDP per capita growth rate) as proxy. For example, Masud and Yontcheva (2005), Gomanee et al. (2004) and Bermopong and Elizabeth (2008) criticize earlier studies which evaluated the effectiveness of foreign aid using

growth in per capita GDP. They argue that the very objective of foreign aid is poverty reduction, which could be measured by other development indicators than by the growth in per capita GDP. The pool of empirical studies on the impact of foreign aid on selected components of Human Development Indicators (HDI) in SSA brings mixed and inconclusive results into the front. For instance, Easterly (2003) and Burnside and Dollar (2000) pointed out that aid has been less effective in SSA. However, Loxley and Sackey (2008) found a positive and statistically significant effect of aid on growth. For such non-robust outcomes, the problem of excessive aggregation of the aid and its outcome variables however attracted more attention in the current research arena. The debate on such issues is still hot and on-going (e.g., Kimura et al., 2012; Bjerg et al., 2011; Bruckner, 2011). Thus, the area invites attention especially in the current period of sizable aid inflows to SSA with the objective of attaining different domestic macroeconomic goals and internationally agreed targets such as MDGs. Therefore, SSA deserves to be a focus for studies on aid-related issues and as argued by Collier (2006) and Fundagna (2008), SSA is the region where the issues of aid and aid effectiveness remain unsettled yet and it is the future playfield of aid.

In this paper, the aid-generated outcomes are widened and disaggregated into economic growth, adult literacy and under-five mortality rates. We also show the effect of different forms of foreign aids (aggregate, education and health aid) on three elements of HDI – economic growth, under-five mortality and literacy rates. It is intended to explain the macroeconomic effects of aid and thus its effectiveness to influence HDI, which is the main issue in SSA, by estimating econometric models using panel data analysis for the period 1973-2007. The estimated results indicate that aggregate net aid transfer is conditionally effective, i.e. its effectiveness is limited by the goodness of domestic macro-policies. However, aids to the education and health sectors are unconditionally effective to improve adult literacy and reduce under-five mortality rates. Thus, such result patronizes the approach of aid disaggregation while conducting aid effectiveness studies.

2. Review of Literature

2.1 *Theoretical Literature*

The widely used theoretical model in the literature to examine the relationship between aid and growth has been the *two-gap* model of Chenery and Strout (1966). The gaps referred to in the model are the differences between: (i) domestic savings and the necessary level of investment to achieve a certain rate of growth; and (ii) foreign exchange receipts and the level of imports required to achieve a certain level of production. This has been extended into *three-gap* model by Bacha (1990) to include government's fiscal position as another possible gap. The gap-models are based on the premise that foreign aid actually finances investment rather than consumption (Mehmet, 2008). According to a meta-analysis by Doucouliagos and Paldam (2006), a third of aid effectiveness literature analyzes conditional models where aid effectiveness depends upon a set of variables. Therefore, conditional model studies are based on the idea that aid is conditionally effective. They focused on three conditions, leading to three models. These are: (i) the *Good Policy Model*, (ii) the *Medicine Model*, and (iii) *Institution Model*. For instance, Burnside and Dollar (2000) (hereafter shortened as BD (2000)) found that aid has a positive impact on growth only in the presence of good economic policy. Their finding refuels the debate on conditional and unconditional aid effectiveness and encourages so many studies to emerge. For example, using different specification and data, Collier and Dollar (2002) and Collier and Dehn (2001) have supported the BD's conclusion. However, Easterly et al. (2003), using the same specification as in BD (2000) fail to support BD's conclusion when they expand the dataset to include more countries and more years. Hansen and Tarp (2001) included squared aid (aid^2) term in their specification where they found that squared aid drives out the significance of the (aid*policy) interaction term and concluded that aid, on average, works although with diminishing returns. Furthermore, Roodman (2003, 2007) performed a series of robustness checks and most of his findings support Hansen and Tarp (2001), as opposed to BD (2000). In fact, the debate on the existing empirical literature is concentrated more on two major hypotheses: (1) Policy Hypothesis and (2) Diminishing Returns Hypothesis. As a third variant, some models condition aid effectiveness on the existence and well-functioning of domestic institutions.

2.2 *Empirical Literature*

Empirical studies on the subject of aid effectiveness have come up with a range of answers for the relationship between aid and components of HDI. Boone (1996) found a negative relationship between aid and growth and concluded that foreign aid seems to finance consumption rather than boosting growth. Hansen and Tarp (2001), Dalgaard and Hansen (2005), Roodman (2007), Mehmet (2008) and Eskander et al. (2008), to name a few, however, challenge BD's results more on statistical grounds and provide evidence in support of the hypothesis that aid raises growth regardless of the quality of the policy environment. In another attempt to test the robustness of the BD's result, Baliamoune and Mavrotas (2008) examined the impact of institutional quality and social capital on aid effectiveness and found strong evidence that social capital and institutions enhance aid

effectiveness. Once they accounted for the role of social capital and institutions, the impact of policies tend to disappear-implying that conditioning aid allocation on good policies may not lead to an optimal allocation of aid. After correcting for the possible problem of endogeneity, Rajan et al. (2005, 2007) examined the effects of aid on growth, and found little evidence of a positive (or negative) relationship between aid inflows into a country and its economic growth. BD's conclusion that aid can do better when policies are good has elicited comments from researchers – their results have been challenged as being "extremely data dependent" and "too fragile" (see, Dalgaard and Hansen, 2001; Clemens et al., 2004 and Easterly et al., 2004). On other hand, Eskander et al. (2006) confirm the BD's result and reached a conclusion which partly supports their conclusion. In nutshell, many researchers who were dissatisfied with the use of aggregate aid suggest that the ambiguity on aid effectiveness literature could be the result of ignoring different types/forms of aid (Ouattara and Strobl, 2000; Asiedu and Nandwa, 2007; Reddy and Minoiu, 2006; Feeny and Ouattara, 2000; Masud and Yontcheva, 2005; Dreher et al., 2006; Michaelova and Weber, 2006; Gomanee et al., 2004; and Bermopong and Elizabeth, 2008)

3. Methodology

3.1 Model Specification

Modeling the macroeconomic link between foreign aid and economic performance (especially economic growth) has been the major area of controversy in different studies. In fact, most of the scholars in the field base their discussions and arguments on different growth models. Earlier studies considered the Harrod-Domar and neoclassical growth models. However, the recently emerging studies on growth (e.g., Hansen and Trap, 2001; Easterly, 2003; Easterly et al., 2004; Alemayehu and Befekadu, 2005 and Hassen, 2008) incorporate other determinants of growth such as location and geography, institutional quality, governance issues, colonial history, human capital and political economy aspects. To start with, the *fundamental growth equation* of the neoclassical growth model is considered and it is given by[1]

$$g_{\frac{\square}{k}} = s\left[\frac{Y}{K}\right] - \left(\delta + g_L + g_T\right) \quad (1)$$

Equation (1) is the fundamental dynamic growth equation, which indicates that the growth rate of effective capital is determined by saving rate (s), output-to-capital ratio (Y/K), rate of depreciation (δ), labor force growth rate (g_L) and technological improvement (g_T). At steady state per capita capital, output, capital and consumption per unit labor should grow at the rate of exogenous technological progress (g_T) and are therefore independent of parameters of production , rates of saving, depreciation and labor force growth (anything else, including politics, policies and institutional arrangements).[2] In macroeconomics literature, the variable which attracts more attention is the output per capita (Y/L= y): it is a variable used frequently by researchers to measure aid effectiveness (e.g., Easterly et al., 2004; Hassen, 2008 and Daniel et al., 2005). Following Hibbs (2004), the growth rate of output per capita (g_y) can be obtained as:

$$g_y = \alpha\left[\frac{I}{K} - \delta - g_L\right] + (1-\alpha)g_T \quad (2)$$

To express the investment variable (I) in per output terms, equation (2) needs to be converted into one that expresses investment per GDP on the right hand-side (see; equation 3).

$$g_y = \alpha\left\{\left[\frac{I}{Y}\frac{Y}{K}\right] - \left[\delta + g_L + g_T\right]\right\} + g_T \quad (3)$$

In equation (3), investment could be disaggregated into investment by private (*Ip*) and government (*Ig*). Furthermore, assume that a fraction '*m*' of aid is invested by the government, with the rest (1-*m*) representing consumption or waste. And private investment (I_p) can be decomposed into investment from domestic sources (which is assumed to be equal to domestic savings, S_d) and investment from foreign sources (I_f). The latter component (I_f), mainly reflects the net FDI inflows. Therefore, equation (3) can be refined further as;

$$g_y = f\left(\left(\frac{Y}{K}\right),\left(\frac{mAID}{Y}\right),\left[\frac{FDI}{Y}\right],\left[\frac{Sd}{Y}\right],\delta,g_L,\alpha,g_T\ldots\right) \quad (4)$$

In equation (4), when we use a panel data model framework and represent all the right-hand-side variables (the variables of interest and control variables) by a vector X, the model can be written parsimoniously as,

$$\left(g_y\right)_{it} = B_0 + BX_{it} + \theta_i + \theta_t + V_{it} \quad (5)$$

where, θ_i, θ_t and V_{it} denote country-specific effect, time-specific effect and idiosyncratic error term, respectively. Furthermore, i and t indexes country and time, respectively. The neoclassical framework considered so far focuses on some basic determinants of growth. However, it overlooked some other key determinants such as the effect of institutional quality, good governance, human capital, policies, geographic factors and other qualitative covariates of growth. This gap, however, motivated researchers in the past to study the issue of aid effectiveness in different angel and estimated varieties of Aid-Growth regressions. In fact, their research outcomes were in support of the inclusion of the above sets of variables. In this paper, attempt has been made to consider those key determinants of growth which have been missing in the barebones neoclassical growth model. Such effort of extending and augmenting the Neoclassical model has got support from previous studies such as Easterly (2003), Roodman (2007), Bremopong and Elizabeth (2008), Mankiw et al. (1992), Baro (1991), Baro and Martin (1995), Agenor (2004), Hibbs (2001, 2004), Olson et al. (2000), Hall and Jones (1999), Acemoglu et al. (2000) and Hassen (2008).

3.2 The Models

In addition to the above extensions on the basic neoclassical model, in earlier papers the benefit obtained from aid is more confined to the growth rate of output per capita. However, so far as the concept of development is concerned, it is important to broaden the expected outcomes of aid to poverty reduction and improvement of HDI. To this end, attempt has been made to widen the benefits obtained from aid and test whether aid is effective enough to affect those outcomes. Thus, based on the theoretical framework developed earlier and the set research objectives, the following general regression model is specified.

$$\left(y_{it}\right)_j = B_0 + BX_{it} + B'X'_{it} + \theta_i + \theta_t + V_{it} \quad (6)$$

where, j = gy, L , M. Furthermore, y represents the vector of benefits realized from receiving aid such as GDP growth rate (gy), reduction of infant mortality rate (M), and improvement in literacy rate (L). And X' represents a vector of control variables which are absent from the neoclassical growth framework but considered in this paper. Therefore, methodologically, this study extends the horizon of the neoclassical aid-growth nexus by broadening the outcomes of aid and incorporating other important variables from the newly emerging literature on aid and HDI. As a result, there are three empirically estimable models, namely, Growth equation (gy), Mortality equation (M) and Literacy equation (L). As to what X and X' constitute in the three models, there are some common variables which can affect all the dependent variables but the remaining variables are model-specific. In each equation, interaction terms (e.g., aid*policy, aid*aid and aid*institution) and square of some variables (e.g., aid2 and policy2) are included to check conditionality, diminishing returns and non-linearity. To be specific, the three models are specified as in Equations (7) to (9).

$$\left(g_y\right)_{it} = \alpha + B_1 Aid_{it} + B_2 Aidsqu_{it} + B_3 policy_{it} + B_4\left(aid * policy\right)_{it} + BX_{it} + \varepsilon_{it} \quad (7)$$

where, *Aid* is Net Aid Transfer (NAT)[3], *Aidsqu* is Squared Aid and *policy* is a variable indicating the 'goodness' of macro-policies. The variable *Aid*policy* is an interaction term between aid and policy, and it essentially shows whether the effectiveness of aid in boosting economic growth is conditioned on the existence of good macro-policies. Following the approach used by Burnside and Dollar (2000), Easterly et al. (2003), Hansen and

Trap (2001) and Hassen (2008), the policy variable is generated from the auxiliary regression of GDP growth rate on all control variables including indicators of macro policy (annual inflation rate, budget surplus and openness to foreign trade), but it excludes *Aid*. The term ε_{it} is a composite error comprised of (V_{it}), (θ_i) and (θ_t). In the estimable model specified in equation (7), the vector X constitutes other control variables, which can possibly affect economic growth (variables that have been used in the literature to explain growth). It includes level of savings, the net flow of capital (FDI is considered as proxy), initial condition, quality of institutions, geographical factors, number of people assassinated (a proxy for political instability), ethnic fractionalization index (proxy for social conflicts), human capital, labor force growth rate and life expectancy. The proxy considered for institutional quality is Freedom House's Political Right and Civil Liberty Index. The choice of such proxy is guided by previous studies and data availability. Because of mixed results from previous studies, signing the coefficient of aid (β_1) in (7) a priori is not easy, and remains an empirical issue. The other two regression equations (8 and 9), which capture the effects of sector-level aid and other control variables on adult literacy and infant mortality rates, are specified below. Most of the control variables which are included in these models are consistent with studies by Bremopong and Elizabeth (2008), Gomanee et al. (2004a, 2004b), and Masud and Yontcheva (2005).

$$(\mathrm{L})_{it} = \theta_0 + \theta_1 (\mathrm{EA})_{it} + \theta_2 (\mathrm{EA}_{it})^2 + \theta_3 \mathrm{IQ}_{it} + \theta_4 \left(\mathrm{IQ}_{it}\right)^2 + \theta_5 (\mathrm{EA*IQ})_{it} + \theta_6 \mathrm{RGPG}_{it} + \theta_7 \mathrm{Eexp}_{it} + \theta_8 (\mathrm{TtS})_{it} + \varepsilon_{it} \qquad (8)$$

where, '*L*' indicates adult literacy rate[4], 'EA' is education sector aid, *IQ* is an index for good institutional setup, 'Eexp' is domestic expenditure on education, 'RGPG' is the growth rate of real GDP percapita and 'TtS' is a variable representing the teacher-to- student ratio. As to the expected signs of the parameter estimates of equation (8), for the coefficient of aid variable, the results from previous studies are mixed. For example, Dreheret al. (2006) and Michaelova and Weber (2006) came up with a result that aid works to improve literacy rate ($\theta_1 > 0$) while other studies concluded that aid is ineffective to improve the rate of literacy, ceteris paribus. Moreover, good institutions and policies are expected to improve rate of literacy i.e. a positive coefficient for the interaction term (EA*IQ) is hypothesized. In addition, the Mortality regression equation is specified as:

$$(\mathrm{M})_{it} = \alpha_0 + \alpha_1 \mathrm{HA}_{it} + \alpha_2 (\mathrm{HA})_{it}^2 + \alpha_3 \mathrm{IQ}_{it} + \alpha_4 (HA*\mathrm{IQ})_{it} + \alpha_5 \mathrm{GPGR}_{it} + \alpha_6 \mathrm{Social}_{it} + \alpha_7 (\mathrm{DtP})_{it} + \varepsilon_{it} \qquad (9)$$

where, *M*[5], *HA*, *DtP* and *social* are variables representing under-five mortality rate, health sector aid, doctor-to-patient ratio and public spending, respectively. The results of previous studies indicate that the sign of the coefficient of aid can be negative: Gomanee et al. (2004a) found that aid improves human welfare and decreases infant mortality. However, the other strand of literature believes that it does not reduce mortality.

3.3 Data and Estimation Issues

The data used in this study are obtained from different sources including the World Development Indicators (WDI) and Global Development Finance (GDF) databases of the World Bank, Organization for Economic Co-operation and Development (OECD) database, Freedom House's online databases, Roodman (2007) aid data file and regional reports. The aggregated aid (NAT) variable, which is considered for the growth equation (7), is obtained from Roodman (2007) data file. The data covers a period from 1960-2007 and nets out all the repayments and cancelations of loans. The sector-level aid data used in the mortality and literacy equations are obtained from the Aid Activity (AA) database (Creditor Reporting System-CRS). The aid in CRS comes from donors, including the 22 member countries of the OECD's Development Assistance Committee (DAC), the European Commission and other international organizations. The database covers DAC donors' bilateral aid (including projects executed by non-governmental organizations and multilateral institutions on behalf of the donor), and projects by the World Bank, the regional development banks and some UN agencies. The health and education sector aid data for the period 1973 to 2007 is used for empirical analysis. The choice of this period is dictated by the availability of data. Thus, the econometric analysis is based on seven four-year periods, one three-year and one two-year periods. The data for each variable is averaged over four years to (1) reduce the shake or noise observed in the annual data and (2) be able to analyze those macro variables in terms of average than individual year basis. However, the criterion considered to include a country[6] in the econometric analysis is the availability of data on crucial variables (those countries which have missing data for crucial variables for more than 5 periods are dropped from the regression analysis).

One of the challenges in the process of estimation, which is common to most macroeconomic variables, is endogeneity. This makes the OLS, Least Squares Dummy Variable (LSDV), the within and GLS estimators

biased and inconsistent. To correct this problem, this study chooses to adopt the Generalized Methods of Moments (GMM) methods of estimation. It is chosen because the GMM estimator consistently estimates Dynamic Panel Data (DPD) model, produces substantial efficiency gains and performs better in small samples. Arellano and Bond (1991) argue that valid instruments can be obtained in a DPD model if one utilizes the orthogonality condition that exists between lagged values of the dependent variable and the disturbance term. Later, Arellano and Bover (1995) and Blundell and Bond (1998) unified the GMM framework for looking at Instrumental Variable estimator for DPD models. This method eliminates individual and time effects by computing orthogonal forward deviation. Thus, to better handle the endogeneity problem and to have a wider choice of instruments, the Arellano and Bover (also called system-GMM) estimation technique is found to be more appropriate.

4. Results and Discussion

4.1 *Descriptive Results*

4.1.1 Human Development Indicators Profile of SSA Countries

The Human Development Index of the region in 2008, which is calculated based on data on life expectancy from UN (2007), on adult literacy rates from UNESCO Institute for Statistics (2003, 2008a), on combined gross enrolment ratios from UNESCO (1999, 2008b), and on GDP per capita (2006 PPP US$) from World Bank (2008c) indicates that out of those countries which have been identified as low HDI, 24 of them are in SSA. In recent periods, even though the region is showing some remarkable performance in terms of GDP growth, the human development index rank of the region is still lower than other regions of the world, i.e., other components of HDI such as life expectancy, adult literacy rate, and infant mortality rate are still low. The region's per capita GDP growth rate has shown improvements over the period 1992-2007. It implies that the recent GDP growth record of the region is somehow promising and encouraging one. A data from the OECD-DAC and WDI (2008) databases on literacy rate strengthen the argument that adult literacy rate is improving over time. The average literacy rate for SSA region over the period 1972-2007 is found to be 46, which is less than the average literacy rate of 62 over the period 1999-2006. In fact, this literacy rate of 62 is quite higher and better than what has been in earlier periods but it signals the need for further efforts to realize one of the Millennium Development Goals of attaining universal education targeted by member states of the United Nations. The other component of human development indicator considered is mortality rate. According to the harmonized estimates of the World Health Organization, UNICEF, and World Bank, on average, mortality rate in SSA has declined over time. A four year average data on infant mortality rate from the WDI (2008) pointed out that, for the region, under-five mortality rate has declined from 239 in period 1964-67 to 141 in period 2004-2007. In fact, the average over the period 1964-2007 is 179, which is still high in both absolute and relative terms. Overall, the region is characterized by low HDI as indicated by low literacy rate, gross enrollment and life expectancy.

4.1.2 Foreign Aid in SSA: Size, Trends and Composition

The net ODA per capita from all donors of SSA and North Africa has shown a converging trend in the period 1996 to 2001. However, from 2001 onwards, there has been some degree of divergence. The reliance on aid in North Africa has been declining over the period 1980-2003. The period's average aid-to-GDP ratio in SSA of 4.9 is higher than both the continental (3.7) and North Africa region (1.6) averages. On average, multilateral aid as percent of GDP exhibits a declining trend over time for both SSA and North Africa. It reached a maximum of 2.8 and 0.5 for SSA and North Africa in 1994, and the period average of such aid for SSA, North Africa and Africa was 1.8, 0.33 and 1.3, respectively. Thus, all the above aggregate measures and indicators of indebtedness imply that SSA is more addicted to aid than North Africa does. Looking at the indebtedness history of African counties in the period 1970-79, Egypt, Tanzania, Sudan, Morocco and Congo Democratic Republic were in the list of 'top 5 aid recipients in Africa'. However, this sign of indebtedness has changed a bit in the latter periods. For example, in the ten years period of 1980-89, Egypt, Tanzania, Sudan, Morocco and Kenya were taking the lead in their respective order. Recently, in 2000-04, Congo Democratic Republic, Tanzania, Ethiopia, Mozambique and Egypt were taking a rank of first to fifth aid recipients of the continent.

In addition, asking questions such as "to which sector the aid is disbursed?" and "which activities within the sector were funded?" are also quite natural. A data from OECD (2007) reveals that total education aid disbursed to different regions has shown increasing trend. In general, Asia and Africa are the two major recipients of education aid. SSA takes the lion's share of education aid committed and disbursed to the continent, with this share highly pronounced in the period 1982-1995. North Africa's share of aid to the education sector is

relatively small but showing a weak upward trend since 1990. A long time series data on education aid, obtained from the OECD (2003) and averaged over ten year periods, indicate that most of the countries in Eastern Africa (such as Tanzania, Ethiopia and Kenya) have received a dozen. So far as the regional distribution of health and population related aid is concerned, the Africa's share got momentum and took away the lead from Asia after 1987. From the donors' side, in 2004, Australia, France, Portugal, Greece and Italy were the top-five donors for the development of the education sector in Africa. The health sector had been more assisted by Iceland, Italy, Luxembourg, Netherlands, Spain and Denmark. However, in the same year, 2004, US, UK and New Zealand were intensively funding SSA's population programme. Over the period under study, the percentage increase of ODA to the health and education sectors is substantial, which actually ensures the attention given to the outcomes of the two sectors in the recent era of achieving the MDGs, among others, reducing infant mortality and increasing literacy rates. The origins of such aids imply that more shares are from bilateral donors (especially from DAC donors) with a rising share.

4.2 *Econometric Results and Discussion*

Firstly, the extended and augmented neoclassical growth equation (7) is estimated using GMM estimation technique. The policy variable is generated based on the arguments presented in the methodology part and the index is obtained by considering the significant regressors from the variables in X (control variable) and policy. Moreover, to determine the threshold policy level, the significant variables chosen from X are valued at their arithmetic mean. As shown in Table-1, the basic variables which are essential to the formulation of the policy variable are significant and with the expected sign. Though the coefficient of inflation rate is statistically significant, the economic significance seems to be very low. The other variables which are significant in this auxiliary regression (not reported in Table-1) include net national saving, assassinations variable, landlockedness dummy and foreign direct investment. The AR(2) test of zero second degree autocorrelation in first-differenced errors shows that the null hypothesis of no autocorrelation could not be rejected and the Sargan's test of over-identifying restrictions statistic, which tests for the validity of the instrument vector, did not suggest to reject the null hypothesis.

It is known that good policy is not an end by itself, rather it is a means to attain better economic outcomes such as improvement in HDI. Thus, the policy variable generated in this way is used in the basic growth regression. Table-2 reports the results of growth regression using varieties of estimation techniques. One of the most important results is the statistical insignificance of foreign aid and its polynomial term (aid-squared). Despite some variation in the sign of the coefficient, in none of the estimation techniques used the aid variable is significant. However, in the case of GMM estimation technique, the *aid*policy* interaction term is significant with expected positive sign. This result suggests that aid helps economies to grow when it is coupled with good macro-policies. This is in line with BD's (2000) findings, but contrary to the findings of Easterly (2003), Easterly et al. (2004) and Hassen (2008). In sum, the regression results suggest that the question of aid effectiveness in the region is also the issue of re-visiting the macro-policy stance. Thus, to better utilize the short-run blessings of foreign aid, working on the improvement of macro-policies is vital. To better emphasize on the conditionality of aid on good policy, the model is estimated with and without the policy variable: without policy, both aid and its squared term are statistically insignificant. The introduction of the policy variable makes aid effective, but the coefficients of aid and its square are still statistically insignificant. It means that policy matters to make aid effective to augment growth.

The analysis made so far is about the effectiveness of aggregate aid on economic growth, which is one part of the story. However, to come up with an answer to the effectiveness of aid on the other two components of HDI, literacy and mortality rate regression equations are estimated. The first column of Table-3, reports the estimation results of the literacy rate equation when aid is expressed in aid-to-GDP ratio. The coefficient of education aid implies that aid to the sector affects literacy rate positively. Furthermore, the BD's (2000) argument of aid conditionality on policy sheds light on this issue in a sense that aid works to increase literacy rate when it is augmented with good institutional setup. This result provides some indication concerning the enhancement of the relatively poor institutions of SSA. The other diagnostic test statistics –the Sargan test of over-identifying restrictions and the AR test of autocorrelation – signify that the null hypothesis of valid instruments and no autocorrelation could not be rejected.

However, to check for the robustness of the results and show the sensitiveness of the results to the change in the way aid is measured, the other alternative measure of aid (aid per capita) is also tried and presented in column 3 and 5 of Table-3. Therefore, regardless of the use of different aid measurements (aid per capita or aid-to-GDP ratio), education aid significantly improves literacy rate. The result also shows that aid to the sector could be

more effective if augmented with quality institutions. In a nutshell, it suggests that education aid should be provided to the region in moderation and coupled with an effort to strengthen institutional setup. The estimation results using two definitions of health aid are shown in Table-4. It shows that aid to the health sector affects under-five mortality rate negatively. The control variables: lagged mortality rate, number of physicians per 1000 people, economic growth rate and public expenditure are found to help reduce mortality rate. The robustness of the result is checked by taking health aid-to-GDP ratio as alternative measure of aid. However, the use of such measure of aid as alternative does not bring significant change on the critical regression results, implying that the result is not sensitive to how aid is defined, a result in line with the findings of Gomanee et al. (2004a), Brempong and Elizabeth (2008) and Masud and Yontcheva (2005). As another robustness check, the effect of aggregate net aid transfer to the economy (NAT) on literacy and mortality rates has been tested. For this, aid to the education and health sector has been replaced by aggregate aid to the economy (measured as net aid transfer-to-GDP ratio and NAT per capita). However, such aggregation leads to a surprising result, where no statistically significant relationship between aggregate aid to the economy and neither adult literacy rates nor under-five mortality rates were found. Thus, such results patronize the importance of disaggregation in conducting aid effectiveness studies.

5. Conclusions and Policy Implications

This paper examines the question of aid effectiveness in SSA by examining the effects of three types of aid on three components of HDI. It uses a panel data of 44 SSA countries over the period 1973 - 2007[7] and applied a dynamic panel data estimation technique. The estimated results suggest that aggregate aid requires good macro policy stance to affect economic performance, i.e., it is conditionally effective. However, using under-five mortality and adult literacy rates as measures of outcomes in health and education sectors, it was found that health aid significantly reduces mortality and education aid improves literacy rate. These results are robust to the use of alternative measurements of aid. Furthermore, sectoral aid could be effective even without conditionality upon the quality of institutional setup, but such unconditional effectiveness of aid is weak in the health sector. Aggregate net aid transfer was not statistically significant to affect literacy and mortality rates, a result which favors the approach of disaggregation. The implication for future research is that aid effectiveness studies should be extended with disaggregation of aid instead of using aggregate aid, and aggregation can be considered as a good reason for the finding of no significant effects of aid by previous studies. This has got strong support from Bermopong and Elizabeth (2008), Hassen (2008), Thiele and Dreher (2006), and Masud and Yontcheva (2005). Thus, the policy implication of these results is that aggregate aid to the region should be supported by conducive policy environment, and in a situation where foreign aid to a country is considered without conducive macro policies, it should better target more responsive sectors, education and health in this case, which are being targeted by the UN Millennium Development Goals. However, cognizant of the different macroeconomic complications of sustainable and excessive reliance on foreign aid (such as loss of policy ownership, volatility, rent seeking behavior and aid dependency syndrome), this study does not advocate for increased aid inflows to the region, but it simply suggests that the region should make wise use of any aid it receives.

References

Acemoglu, D., S. Johnson, and J. Robinson (2004). “Institutions as the Fundamental Cause of Long-Run Growth.” *NBER Working Paper*. Cambridge, MA: National Bureau of Economic Research. (10481).

Agenor, R. (2004). “Knowledge, Human Capital and Endogenous Growth”. The World Bank. pp. 363-64.

Agenor, R. (2004). “The *Macroeconomics of Adjustment and Growth*”.3rd ed.

Alemayehu, G. and D. Befekadu (2005). “Explaining African Economic Growth Performance: The Case of Ethiopia”. Prepared as a component of the AERC Collaborative Research Project, Explaining Africa’s Growth Performance, Nairobi, Kenya.

Alesina, A. and D. Dollar (1998). “Who Gives Aid to Whom and Why?” Cambridge. *NBER Working Paper*. (6612).

Bacha, E. (1990). “A Three-gap Model of Foreign Transfers and the GDP Growth Rate in Developing Countries” Journal *of Development Economics*: 32. 279-96.

Baldacci, E., B. Clements and S. Gupta (2004). “Social Spending, Human Capital, and Growth in Developing Countries: Implications for Achieving the MDGs”. *IMF Working Paper*: 04 (217).

Baliamoune, M. and G. Mavrotas. (2008). “Aid Effectiveness Looking at the Aid-Social Capital-Growth Nexus”. *UNU-WIDER Research Paper*. United Nations University: (75).

Baltagi, H. (2005). “*Econometric analysis of Panel Data*”. 3rd ed. John Wiley & Sons Ltd, Chichester, West Sussex, England.

Barro, R. and X. Sala-i-Martin (1995). "*Economic Growth*". New York: McGraw-Hill.

Bazoumana, O. and E. Strobl (2006). "Disaggregating the Aid and Growth Relationship Project Vs Programme". *The University of Manchester* Publication.

Bermopong, K. and A. Elizabeth (2008). "Aid and Capital Formation: Some Evidence". Discussion Paper, Tunis, Tunisia: African Development Bank: 1-21.

Bjerg, C. , C. Bjørnskov , A. Holm (2011), "Growth, debt burdens and alleviating effects of foreignaid in least developed countries", *European Journal of Political Economy*, 27(1): 143–153.

Blundell, R. and S. Bond (1998). "Initial Conditions and Moment Restrictions in Dynamic Panel Models", *Journal of Econometrics*: 87, 115-43.

Boone, P. (1994). "The Impact of Foreign Aid on Savings and Growth", Centre for Economic Performance Working Paper: (1265).

_____ . (1995). "Politics and the Effectiveness of Foreign Aid". *NBER Working Paper series*: (5308).

Bourguignon, F. and D. Leipziger (2006). "Aid, Growth, and Poverty Reduction: Toward a New Partnership Model" IMF Paper: 1-21.

Brückner, M. (2011), "On the simultaneity problem in the aid and growth debate", *Journal of Applied Econometrics, 1255-1959*

Burnside, C. and D. Dollar (1998). "Aid, Policies and Growth". *Policy Research Working Paper*. Washington, D.C.: The World Bank, Development Research Group: (1777).

_____. (2000). "Aid, Policies, and Growth". *American Economic Review*: 90 (4) .847-68.

Chenery, H. and M. Strout (1966) "Foreign Assistance and Economic Development". *American Economic Review*: 56. 679–733.

Clemens, M., S. Radelet, and R. Bhavnani (2004). "Counting Chickens When They Hatch: The Short Term Effects of Aid on Growth". *Center for Global Development*. Working Paper: (44).

Collier, P. and D. Dollar (2002) "Aid Allocation and Poverty Reduction" *European Economic Review:* 46.1475–1500.

Collier, P. (2006). "Assisting Africa to Achieve Decisive Change". *Swedish Economic Policy Review*: 13.

Daglaard, C and H. Hansen (2001). "On Aid, Growth and Good Policies", *Journal of Development Studies*: 37 (6) 17-41.

Dalgaard, C., H. Hansen and F. Tarp (2004). "On the Empirics of Foreign Aid and Growth", *Economic Journal*: 114. (496). 191-216.

Daniel, T., M. Amanaja and O. Morrissy (2005). "Fiscal Aggregate, Aid and Growth in Kenya": A Vector Autoregressive (VAR) Analysis. Nottingham University. CREDIT paper 0/7.

Doucouliagos, H. and M. Paldam (2006). "Conditional Aid Effectiveness: A Meta study". Department of Economics, Deakin University, Melbourne, Australia.

Easterly, W. (1997). "The Ghost of Financing Gap: How the Harrod-Domar Growth Model Still Haunts Development Economics". Draft Paper.

_____ . (2003). "Can Foreign Aid Buy Growth?" *Journal of Economic Perspectives*: 17 (3) 26-48.

Easterly, W., R. Levine and D. Roodman (2003). "New Data, New Doubts: Revisiting Aid, Policies, and Growth": (26).

_____. (2004). "Aid, Policies and Growth: A Comment", *American Economic Review*: 94, 774-780.

Economidesa, G., S. Kalyvitisa and A. Philippopoulosa (2004). "Do Foreign Aid Transfers Distort Incentives and Hurt Growth? Theory and Evidence from 75 Aid-Recipient Countries".

Elizabeth, A. and B, Nandwa (2006). "On the Impact of Foreign Aid in Education on Growth: How Relevant is the Heterogeneity of Aid Flows and the Heterogeneity of Aid Recipients?" Department of Economics, University of Kansas.

Eskander, A., D. Mukherjee, and E. Shukralla (2007). "Aid, Policies, and Growth in Developing Countries: A New Look at the Empirics". Preliminary Draft. Department of Economics Western Michigan University.

_____. (2008). "Foreign Aid, Growth, Policy and Reform." Economics Bulletin: 15 (6), 1-9.

Feeny, S. and B. Ouattara (2000). "What Type of Economic Growth Does Foreign Aid Support?" School of Economics, Finance and Marketing, RMIT University, Melbourne, Australia.

Filmer, D. and L. Pritchitt (1999). "The Effects of Household Wealth on Educational Attainment: Evidence from 35 Countries". *Population and Development Review*: 25 (1), 85-120.

Gomanee, K., O. Morrissey, P. Mosley and A. Verschoor (2004a). "Aid, Government Expenditure and Aggregate Welfare" .CREDIT (mimeo).

_____. (2005). "Aid, Government Expenditure and Aggregate Welfare", *World Development*: 33 (3).

Gomanee, K., S. Girma and O.Morrissey (2005). "Aid and Growth in Sub-Saharan Africa Accounting for Transmission". *World Institute for Development Economics Research*: (60).

Gupta, S., M. Verhoeven and E. Tiongson. (1999). "Does Higher Government Spending Buy Better Results in Education and Health Care?" *IMF Working Paper*: (21).

Gwartney, J., R. Holcombe and R.Lawson (2004). "Economic Freedom, Institutional Quality, and Cross-Country Difference in Income and Growth". Cato institute: *Cato Journal*: 24 (3).

Hansen, H. and F. Tarp (2000). "Aid Effectiveness Disputed". *Journal of International Development*: 12. 375-98.

_____. (2001). "Aid and Growth Regressions", *Journal of Development Economics*: 64. 547-70.

Hassen, A. (2008). "Effectiveness of Foreign Aid in Sub-Saharan Africa: A Less Disaggregated Analysis". Addis Ababa University; Unpublished Masters (MSc) Thesis.

Harms and Lutz (2004). "The Macroeconomic Effects of Foreign Aid: A survey". University of St.Gallen, Department of Economics. *Discussion paper*: (11).

Hibbs, D. (2001). "Macroeconomics Lecture". Goteborg University, Department of Economics: 54. 265-86.

International Monetary Fund. (2007). "Fiscal Policy Response to Scaled-Up Aid: Macro-Fiscal and Expenditure Policy Challenges" the Fiscal Affairs Department.

Kaufmann, D., A. Kraay and M. Mastruzzi (2007). "Governance Matters VI: Aggregate and Individual Governance Indicators 1996-2006". Washington D.C.: The World Bank. *World Policy Research* Working Paper: WPS4280.

Kimura, H., Y. Mori, Y. Sawada (2012), "Aid Proliferation and Economic Growth: A Cross-Country Analysis", *World Development, 40(1):* 1–10

Loxley, J. and H. Sackey (2008). "Aid effectiveness in Africa". *African Development Review*: 20 (2).163-91

Mankiw, N., D. Romer and D.Weil (1992). "A Contribution to the Empirics of Economic Growth", *Quarterly Journal of Economics*: 107 .407-437.

Masud, N. and B. Yontcheva (2005). "Does Foreign Aid Reduce Poverty? Empirical Evidence from Non-governmental and Bilateral Aid". IMF Institute. *IMF Working Paper:* (100).

Mehmet, E. (2008). "Foreign Aid and Growth." Economics Bulletin: 15 (14). 1-14

Mishra, P. and D. Newhouse (2007). "Health Aid and Infant Mortality". *IMF Working Paper* Washington DC: (100)

Moss, T., G. Pettersson, and N. Walle (2006). "An Aid-Institutions Paradox: A Review Essay on Aid Dependency and State Building in Sub-Saharan Africa".

Organization for Economic Cooperation and Development (2006). "Development Aid at a Glance": Statistics by Region and Various reports.

Radelet, S., M. Clemens and R. Bhavnani (2004). "Aid and Growth: The Current Debate and Some New Evidence". Center for Global Development.

_____. (2005). "Aid and Growth". Finance and Development: 42 (3). 1-10.

Rajan, R. and A. Subramanian (2005). "What Undermines Aid's Impact on Growth?" *National Bureau of Economic Research* Working Paper: (11657).

_____. (2007). "Aid and Growth: What Does the Cross-Country Evidence Really Show? " *Review of Economics and Statistics*.

Reddy, S. and C. Minoiu (2006). "Development Aid and Economic Growth: A Positive Long-Run Relation".

Roberts, J. (2003). "Poverty Reduction Outcomes in Education and Health: Public Expenditure and Aid". *ODI Working Paper.* Overseas Development Institute, London: (210).

Roodman, D. (2005). "An Index of Donor Performance". Working Paper, Center for Global Development: (67).

_____. (2007). "The Anarchy of Numbers: Aid, Development, and Cross-country Empirics". *Center for Global Development*: (32).

Thiele, R., P. Nunnenkamp and A. Dreher (2006). "Sectoral Aid Priorities: Are Donors Really Doing Their Best to Achieve the Millennium Development Goals?" Kiel Institute for World Economy.

Verschoor, A. and A. Kalwij (2006). "Aid, Social Policies and Pro-Poor Growth", *Journal of International Development*: 18 (4). 519-31.

World Bank (1998). "Assessing Aid: What Works, What Doesn't, and Why" *Oxford University*

Table 1: Estimation Results for Generating the Policy Variable (not all explanatory variables are reported)

Explanatory Variable	Coefficient
Inflation rate	-0.0006465**
Openness to trade	0.0237163**
Fiscal Balance/GDP	0.0988863*
A-B AR(1)	(0.0138)
A-B AR(2)	(0.9075)
Sargan's test statistic	(0.7309)

Table 2: Regression Results of the Growth Equation (not all explanatory variables are reported)

Explanatory Variables	Coefficient Estimates in Estimation Technique			
	System GMM	Difference GMM	Fixed Effect (Within)	Random effect
Aid/GDP	-1.287652	-1.08675	-1.97427	3.90584
Aid squared	-0.792033	-1.18381	2.00690	-0.64630
Policy	0.334243	0.7373**	1.04758	-0.10657
Aid*policy	3.85865**	4.4748**	0.85999	0.149345
AR(1) p-value	0.2459	0.1051	$R^2 = 0.4231$	$R^2 = 0.3449$
AR(2) p-value	0.7670	0.7770		
Sargan test statistic	0.1635	0.3982		

Table 3: Estimation Results using different measures of Education Aid (not all variables are reported)

Explanatory Variable	Coefficient Estimates using different definitions of education aid					
	With institution		Without institution		With institution	
	Using aid-to-GDP	Using aid per capita	Using aid-to-GDP	Using aid per capita	Using aggregate aid-to-GDP	Using aggregate aid per capita
Education aid	0.0128**	0.0114**	0.0097	0.01465***	0.0050	0.0067*
Education aid*institution	30.704*	0.04533**			3.5943	0.0054
AR(1) p-value	(0.0702)	(0.0823)	(0.026)	(0.0223)	(0.0902)	(0.0885)
AR(2) p-value	(0.2945)	(0.2825)	(0.326)	(0.3370)	(0.2832)	(0.2840)
Sargan Test Statistic	0.1419	0.2319	0.1304	0.1810	0.2361	0.2154

Table4: Estimation Results of Mortality Equation Using Two Definitions of Aid (not all variables are reported)

	Coefficients using Two Definitions of Aid	
Explanatory Variables	Health Aid per Capita	Health Aid-to-GDP Ratio
Health Aid	-0.04204**	-0.0482**
Health Aid *Institution	-0.17641**	-0.0117
AR(1) p-value	(0.0378)	(0.0550)
AR(2) p-value	(0.2349)	(0.2457)
Sargan's Test Statistic	0.1351	0.1104

Note: In the above tables, values in parenthesis are p-values. For brevity, the parameter estimates and statistical significances of only the key variables of interest are reported, and ***, ** and * respectively denote statistical significance of the variables at 1%, 5% and 10% levels.

Notes

[1] The whole mathematical deviation applied to attain this result is shown in original version of this paper, which can be obtained upon a request from the authors.

[2] For further comparative statics and discussion, please refer Hibbs (2004).

[3] In this paper, the use of NAT, where there are different measurements of aid such as Gross ODA and Net ODA draws from the extensive criticisms of these alternatives by Roodman (2006a) and later by Hassen (2008).

[4] According to UNESCO's definition, adult literacy rate is the percentage of people age 15 and above who can understand, read and write a short, simple statement on their everyday life.

[5] According to World Bank's (2008) definition, average under-5 mortality rate is the probability that a newborn baby will die before reaching age five and such probability is expressed as a rate per 1000.

[6] The countries which are included in the regression analysis are Angola, Benin, Burundi, Burkina Faso, Botswana, Cameroon, Cape Verde, Central African Rep., Chad, Comoros, Congo, Dem. Rep. (Zaire), Congo, Rep., Cote d'Ivoire, Equatorial Guinea, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe.

[7] For the estimation of the growth equation (9), the sample period has been extended further back to the period 1964-2007. However, the change in coefficient of aid due to such extension is not significant.