Economic Growth and Sub-Saharan Africa Economies: Does External Finance Play A Significant Role?

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Abstract

On the question of whether external finance stimulates GDP growth, the profession offers inconclusive as well as frequent contradictory outcomes. While waiting for a robust consensus, this paper addressed directly the mechanisms through which external finance should influence economic growth. Investment was identify as the most significant transmission mechanism, and as well considers effects via funding regime consumption expenditure and import. By employing the residual generated repressors', we accomplish a measure of the overall influence of external finance on economic growth, accounting for the influence through investment. Based on the pooled panel outcomes, a sample of twenty-five Sub-Saharan Africa economies were examine over the period of 1970-1997; the result indicates that there is a significant and positive effect of overseas assistance on economic growth, ceteris paribus. Based on average, each one percent point upsurge in the aid/GNP ratio contributes one-quarter of one percent point to the growth rate. Therefore, the poor economic growth in Africa should not be attributed to external finance ineffectiveness.

Keywords: Aid; External finance; Growth; Investment; Sub-Saharan Africa

JEL classification: F35, O40, O55

1 Introduction

Sub-Saharan African[1] (SSA) is the world leading beneficiary of overseas assistance since the creation of the post-war financial system at Bretton Woods (Moyo and Ferguson, 2010). Since 1960, international donors has channeled over US$568 billion to the development of Sub-Saharan Africa (SSA), representing approximately 15 percent of the region GDP or proportionally four times the Marshall plan that restarted the European economies after the Second World War (United Nations Economic Commission for Africa, 2010). While some other record states that in aggregate terms over the course of the last 50 years, foreign aid transfers to governments in Sub-Saharan Africa totaled a staggering $1 trillion.[2] With all these amount been poured into Sub-Saharan Africa still the economic growth in the region has not followed the trend of official development assistance (ODA) inflows, but has remained low in spite of the recovery of economic activity in the early 2000s (2.37 percent on average). This incident is partly the reason donor nations argued that foreign aid was not succeeding in accomplishing expected objectives (Lancaster, 2007). For example, donor nations were frustrated with the apparent dearth of relationship between overseas assistance and the strengthening of economic and social institutions in Sub-Saharan Africa (Fengler & Kharas, 2010).

Sub-Saharan Africa economies continue to present vital challenges to international donor community. Although overseas assistance to the region dropped in the 1990s, it has not stopped. Certain nations, Sweden and certain European countries in particular, have become larger external finance donors in current years (Robinson, 2011). India and China, contemplating their increasing significance in the World economy, have as well turns out to be more prominent donors to Sub-Saharan Africa (Noman, Botchwey and Stein, 2012). As anticipated, there is an extensive range of views from numerous experts when it comes to this difficult question: Does foreign aid plays any significant role in attaining its two key goals: stimulating economic growth and reducing poverty? There have been numerous debates to this effect; experts continue to build the case for, or against, overseas assistance to Sub-Saharan Africa, with two broad divisions having emerged: experts who debate that overseas assistance engenders inefficiencies in the recipient nation and so fails in accomplishing its objective of "institution-strengthening" (Van Deer Veen, 2011) and experts who debate that overseas assistance is beneficial.

This paper contributes to an answer by gauging the effectiveness of overseas assistance to Sub-Saharan Africa countries, particularly accounting for the influence on growth through investment. We debate that external finance has been growth-fostering but may possibly not have been adequate to overcome the several growth-retarding factors encountering by Sub-Saharan Africa economies. This proposes that an upsurge in external finance, correctly make use of, could be advantageous to the recipient nations. This paper is different from most past literature in two other aspects. In this paper, we restrict our analysis to a sample of Sub-Saharan Africa economies only. There is substantial proof in the empirical growth literature that Sub-Saharan Africa

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[1] Sub-Saharan Africa: The United Nations defines Sub-Saharan Africa as every country in Africa but Algeria, Egypt, Libya, Morocco, South Sudan, Sudan, Tunisia and Western Sahara; that is as every African country that is not a part of Arab Northern Africa (United Nations, 2011).

[2] Kasper, W. (2006b). "Make poverty history: tackle corruption," The Center for Independent Studies, Vol. 67.

economies differ. It is commonly the situation that in cross-country growth regressions an Africa dummy is negative and significant. The region slow economic growth is therefore to certain extent explicable in terms of specific variables that are globally significant for the growth process but are low in the Africa continent (Collier and Gunning 1999: 65). If Africa is demonstrably dissimilar from other regions, it is legitimate to sample the region only. We as well employ a dissimilar measure of external finance that past surveys, excluding kinds of overseas assistance that are not likely to have any medium-term influence on growth (for example, technical assistance). In a study conducted by Clemens, Radelet and Bhavnani (2004), these authors employ the same measures of foreign aid to survey, as well as interpret these as capturing the short-term influence of overseas assistance on growth. These authors discover that foreign aid has a significant positive short-term influence; this effect is largely independent of policy and is present in Sub-Saharan Africa and developing economies generally. This report main focus is on the treatment of investment; how sensitive are the outcomes to the issue of investment in the aid-growth equation? Most empirical growth surveys focused on reduced form specifications and aid-growth regressions typically omit investment. According to a report from Burnside and Dollar (2000), both authors argue that external finance contributes to investment while policy determines the productivity of investment and so involve an 'aid×policy' interaction term but they exclude investment. On a similar note, Roodman (2004) exclude investment in some of his regressions. The study of Hansen and Tarp (2001) recognize that the implicit growth theory will have investment, not external finance, as an argument. They display some outcomes involving external finance as well as investment. Generally, development assistance is not significant in these regressions, but they do discover that external finance is a significant determining factor of investment.

External finance is envisioned to influence growth through its effect on investment. But, not all development assistance is envisioned for investment, as well as not all investment is funded by foreign aid. Certainly, Dollar and Easterly (1999) argue that there is no evident correlation between investment and external finance in a sample of Sub-Saharan Africa economies, though both authors only report summary outcomes from a simple bivariate regression of gross investment on external finance (this paper complete specification recognizes the influence of external finance on investment, see Appendix B below).

If the method of omitting investment is adopted, there will be a potential omitted variable bias – any influence of investment on growth is credited to the other variables (particularly aid). If investment and assistance are included, there is double counting (as some assistance is employed for investment), and the coefficient are biased. In order to address this problem, the technique of generated repressors was suggested.

The basic debate of this study is that central variables in growth equation are directly, at least in part, funded by external finance and this inherent interrelationship should be addressed in the empirical examination. Despite the fact that one could estimate a set of simultaneous equations, there are also some challenges in relation to the data. So in this paper, we suggested a more parsimonious method; firstly, we test whether external finance is a direct determining factor of the variable in question (which was referred to as the transmission mechanism). Secondly, the removal of the directed impact of external finance by constructing a generated repressor for the variable was initiated. In this fashion, we can estimate the impact of foreign aid on growth accounting for the influence of external finance on mediating variables -- imports, government consumption spending and investment are the variables considered in this study. The basic objective is not to clarify the transmission mechanism but simply to determine if assistance is a significant factor; all these supplementary regressions are reported in the appendix below.

This study is conducted for a sample of twenty-five Sub-Saharan Africa economies over the period of 1970-1997 (the sample consist entirely of nations for which data on all variables was available for the complete period). The selected Sub-Saharan Africa nations in this paper tend to be major aid recipients. In spite of the large aid inflows, these countries experienced on average only 0.6 percent of growth in real per capita GDP per annum over the period of 1970 to 1979, and only six of the sample mention in this paper managed to 'upgrade' to the group of middle-income nations. Based on a priori expectation, this may seem to be the situation of aid ineffectiveness. If external finance has been generally misused and is not effective, we should discover proof of this in a sample consisting of Sub-Saharan Africa nations.

Despite the fact that this paper main focus is on the treatment of investment and aid, it is obvious from the aid effectiveness literature that any effect of external finance on growth is indirect. The remaining part of this paper is organized as follows: part two deals with the literature review on the study of foreign aid and economic growth whereas section three looks at the countless factors that mediate the influence of aid on growth, what the paper refer to as transmission mechanisms. In addition to investment, external finance may influence growth through effects on imports or regime expenditure. The data that was employed as well as the econometric techniques are discussed in part four (with further details in Gomanee, Girma and Morrissey 2002). Appendix A offers information on the data, and Appendix B emphasis on the supplementary regressions for transmission mechanisms. Section five discussed the empirical analysis for aid effectiveness as well as the implications. Part five concludes the paper with some observations.

2 Literature Review

The empirical study of the effectiveness of foreign aid, previously explored in the 1970s, received renewed attention in the early 1990s. As foreign aid encountered a crisis of legitimacy, the survey by Burnside and Dollar (1997) offered an answer to the detractors of foreign aid. The authors displayed that the effectiveness of development assistance is contingent on better governance in the recipient nations. In spite of the reservations promoted by numerous surveys (Easterly, 2003, Boone, 1994; Temple, 2010), Burnside and Dollar (1997) conclusions would be adopted and defended by the World Bank (1998), Dalgaard and Hansen (2001), Lensink and White (2000), with vital implications for economic policy.

From this viewpoint, the central subject for the association between foreign aid and economic growth is whether the distribution of external finance to nations structurally characterized by weak governance can be considered wasteful. Gomanee et al. (2005) provide a tentative answer to this question by emphasizing on the direct and indirect effects of ODA on Sub-Saharan Africa economic growth. They utilize panel data for twenty-five Sub-Saharan Africa nations from the period of 1970-1997. The findings of their regressions display that development assistance has a positive direct and indirect effects on economic growth. Indirectly, aggregate foreign aid affects economic growth in Sub-Saharan Africa through public investments. The finding corroborates the results of Hansen and Tarp (2001). This optimistic vision is similarly shared by Tarp et al. (2003), who discovered that development assistance is effective even when macroeconomic conditions are poor. This assertion is as well in line with the survey by Guillaumont and Chauvet (2001), which discovered that returns on assistance are higher in nations vulnerable to macroeconomic shocks.

However, Rajan and Subramanian (2008, 2001) did not share the same optimistic view as the other authors; they estimated a neoclassical production function to assess the effect of Official Development Assistance (ODA) on growth over a period of thirty years. Both authors identify no significant effect of aid in a sample of developing nations including African nations. According to their 2010 article, they identified that augmented development assistance may lead to appreciation in the exchange rate, thereby producing a negative effect on growth.

Recently, Tarp et al. (2011), in the same vein as Radelet et al. (2004), observed that numerous surveys employ panel data or cross-section data with a short time dimension, indicating only the cyclical effect of foreign aid. Furthermore, in order to offset this limitation, these authors conducted an investigation of a sample of thirty-eight Sub-Saharan African nations over the period of 1960-2007. Their study was distinguished by the methodological choice of the error correction model employed to capture the long-term dynamic of the correlation between foreign aid and economic growth. They concluded that external finance indirectly and directly foster economic growth even in an unfavorable macroeconomic context. Specifically, the observed effect is transmitted via investment in public capital. On a similar note, the study conducted by Hadjimichael et al. (1995), McGillivray and Ouattara (2003), Kene et al. (2008), Brempong and Asiedu (2008), Arndt et al. (2010) and Dietrich and Wright (2012) identified multiple channels via which development assistance is transmitted, notably education, taxes, investment, imports, government expenditure, a policy variable (that is a linear mixture of inflation, openness to trade, budget surplus) and institutions.

In fact, most surveys addressing the indirect relationship between foreign aid and economic growth in Africa arrived at conflicting outcomes. Furthermore, while the microeconomic contexts of several surveys were recognized as a controlling factor for effectiveness, some surveys consider political environment, much less the heterogeneity of channels via which the effect of that environment is transmitted. In light of the foregoing, the contributions of numerous surveys were based on recognizing the macroeconomic effects of foreign aid on economic growth and determining the channels via which those effects happened. These studies continue the line of examination pursued Morrissey (2001), Gomanee et al. (2005) and de Tarp et al. (2011). Unlike those surveys, however, it carries out a comparative analysis between those in a stable setting and Sub-Saharan Africa nations in a post-conflict setting. In this regard, it employs the Oaxaca-Blinder decomposition method to clarify dissimilarities in economic growth. The aim of this survey is to display that Official Development Assistance (ODA), when controlled by governance, contributes directly or indirectly to clarifying economic growth in Sub-Saharan Africa. It endeavors to display that Official Development Assistance (ODA) indirectly impacts economic growth in Sub-Saharan Africa through investment in public capital (infrastructure) and in human capital (education). The channels of transmission differ according to the political setting in the recipient nations.

Recently, Minoiu and Reddy (2010) empirical proof on the effectiveness of development assistance in sustaining economic growth and development' however, remains mixed. Most surveys offered empirical evidence in favor of foreign aid effectiveness, at least in certain macroeconomic settings and under certain circumstances. In another study by Javid and Qayyum (2011), both authors surveyed the effectiveness of foreign aid, centering on the ongoing debate on interactive effect of development assistance and policy on sustainable economic growth. Their result shows that real GDP and foreign aid have negative correlation, while the aid-policy interactive term and real GDP growth have a positive and significant correlation. In a recent study conducted by Fasanya and Onakoya (2012), both authors result displayed that foreign aid flows have significant

influence on economic growth, as upsurge in domestic investments has positive effect on economic growth on the recipient country. On the other hand, Clemens et al. (2012) conclude in their current assessment: "the aid-growth literature does not presently possess a robust and patently valid instrumental variable with which to reliably test the hypothesis that external finance strictly causes growth."

Currently, Galiani et al (2014) developed on the identification of previous studies with a strategy in the vein of a regression discontinuity. The authors concentrated on thirty-five poor nations, some of which crossed an arbitrary per capita income threshold that made these nations ineligible for development assistance from the World Bank's International Development Association (IDA). Under the interpretation that nations above the threshold are similar to those below the threshold except that those above receive less aid. They used whether a nation is above or below the threshold as instrument for development assistance; their result shows that aid upsurges economic growth.

In fact, we can conclude on the review of the above literature on foreign aid effectiveness in developing nations that development assistance has stimulated economic growth on one hand and substituted for domestic savings on the other hand. These actions in a way have caused severe debt serving problems in developing nations. Accordingly, development assistance has a positive influence on economic growth in developing nations with good policies. On the other hand, in the presence of poor polices, foreign aid has no positive effect on economic growth.

3 Transmission Mechanisms

Even though there have been key developments in growth theory, the conceptual underpinning the relationship between external finance and growth remains entrenched (implicitly if not explicitly) in the two-gap model pioneered by Chenery and Strout (1966). The investigative framework is built on Harrod-Domar growth model where savings are required to finance the investment needed to achieve a target growth rate, subject to the productivity capital. The Harrod-Domar growth model was strongly criticized by Easterly (1999) as a basis for a theory of growth, and specifically of their use by multilateral agencies to guide external finance allocation as filling funding gaps. However, the gap method is helpful in recognizing how external finance may influence growth by relaxing particular constraints. In a study by Bacha (1990), the author recognizes the following three constraints: the fiscal constraints on investment, the limit on investment because of low domestic savings and the limited capability to import investment goods if export earnings are low. By means of relaxing these constraints external finance can influence growth through upsurge investment.

Nations that are poor lack enough domestic resources to fund investment and the foreign exchange to import capital goods and technology. External finance to fund investment can directly fill the savings-investment gap and, as it is in the form of hard currency; external finance can indirectly fill the foreign exchange gap. As official aid is channeled to regime, it can as well finance regime expenditure and compensate for a small domestic tax base. In a survey conducted by Bacha (1990), the author demonstrates that regime fiscal response represents a significant channel via which external finance flows can influence growth. Current examinations as well highlight the potential significance of regime policy as a determining factor of the effects of external finance.
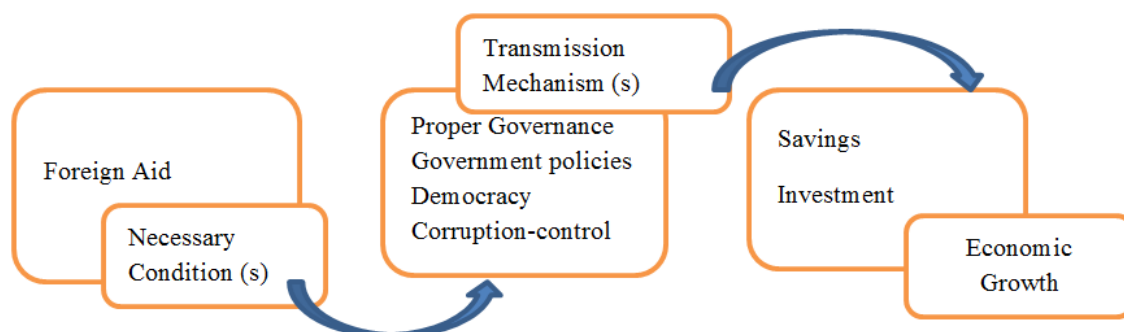

Figure 1: A Stylized Possible Causal Diagram

The above diagram illustrates schematically the likely relationship via which external finance, given corruption-control and democracy, which should ensure that external finance goes into savings and investment, could have a vital and positive influence on economic growth over time. The beginning is one key assumptions of Development Economic which states that because poor nations are poor they have no means to invest and therefore external finance is anticipated to bridge the gap relating to the lack of investment capacity of the recipient nations (Sachs, 2005). Therefore, if this is true, one assumes that overseas assistance to poor nations would indeed add in growing the availability of investment channeled to human and physical capital (Gomanee et al, 2005). But as display by the diagram, even though intuitively one would anticipate that external finance should be channeled into savings and investment, in practice this anticipation is not straight forward. Good and

sound governance, regime policies, generally, corruption-control and democracy, in our situation, constitute a sine qua non condition that guarantee the fact that external finance is directed into investment and savings. Through this procedure, those Sub-Saharan Africa nations with better policies, corruption-control, and those nations which are democratic with good economic management shall thus benefit directly from them. In an environment like this, there is the possibility that overseas assistance should result in augmented economic growth. In corrupt and undemocratic nations, however, external finance is embezzled by the regimes or the elites in power or involved in other unproductive activities and so external finance will be inefficient in such environment (Burnside and Dollar, 2000).

A suitable framework to examine how external finance works should address all of these interactions. The investigation here centers on the influence of overseas assistance on economic growth taking into consideration the transmission mechanisms of investment, fiscal responses (regime expenditure) and trade (imports). If overseas assistance funds investment then, conditional on the productivity of investment (which may possible be connected to policy) external finance adds to economic growth. Low-income nations will require to import intermediate inputs and capital goods (and in most situation fuel), but export earnings are frequently volatile and low. External finance can fund essential imports, particularly investment goods; therefore, this is a potential transmission mechanism. If external finance is treated as fungible, so that finances envisioned for investment are diverted to recurrent expenditure, its effectiveness could be lessened. This is looked into by bearing in mind that regime consumption is a (constraining) transmission mechanism; however, this implies that the goal of external finance is to fund investment. If development assistance is envisioned to fund expenditure on human capital formation and welfare, we would expect certain part to go to consumption expenditure and not influence economic growth, at least not in the short term.[1] The simple technique is to identify if overseas assistance determines the transmission variables. If this technique works, this effect is accounted for estimating the aid-growth connection.

The reason why we do not pursue the transmission mechanism through regime policy in this study is because, firstly, current study on external finance effectiveness incorporates policy indicators as control variables, and we do this rather than involve an aid policy term. Secondly, the conventional opinion, at least in the context of cross-country growth regressions, is that it is hard to establish that external finance affects policy (World Bank 1998; Burnside and Dollar 2000). In simple expressions, the nature of this transmission mechanism and how to model it is not well understood. We would thus anticipate this mechanism to be weak in cross-country regressions.[2] Therefore, so as to base our focus particularly on transmission mechanisms, we account for policy indicators but do not exactly account for aid-policy interactions.

One more matter we do not include is the tendency for Sub-Saharan Africa nations to be subject to economic and political instability. Compared with other regions, Sub-Saharan Africa is particularly susceptible to agricultural and climate risk as well as particularly vulnerable to terms of droughts, political conflict, trade shocks, famines and more currently, floods. According to Guillaumont, Guillaumont-Jeanney and Brun (1999) study, these authors discover that Sub-Saharan Africa has higher levels of primary instabilities (that is terms of trade, climate and political) than other developing-nation regions. This kind of vulnerability is a source of 'economic uncertainty' that may possibly lessen growth rate and assist to clarify external finance ineffectiveness. On the other hand, Lensink and Morrissey (2000) employ aid instability, deviations of external finance from a trend involving adaptive anticipations, as a measure of uncertainty. The authors discover that when one controls for such uncertainty in the aid-growth regression, the coefficient on external finance is positive and significant while the coefficient on the external finance instability measure is negative and significant. The outcome holds for the sample of Sub-Saharan Africa nations. Furthermore, both authors as well discover that the principal (positive) influence of external finance is through its influence on investment, an outcome corroborated by Hansen and Tarp (2001).

There is correlated proof for the significance of uncertainty or instability in Sub-Saharan Africa nations. In a study carried out by Gyimah-Brempong and Traynor (1999), they discover that political instability has a direct negative effect on growth and as well indirect effect through discouraging investment. Furthermore, Guillaumont, Guillaumont-Jeanney and Brun (1999) notice that primary instabilities in Sub-Saharan Africa lessen economic growth by distorting economic policy; the rate of investment is volatile, therefore the growth rate is lowered. As deliberated on in the next part of this paper, by incorporating policy indicators (notably

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[1] Observing that aid-financed consumption does not contribute to growth does not mean that the aid provides no benefits. Gomanee, Girma and Morrissey (2005) show that aid can improve welfare indicators, such as infant mortality, by financing consumption spending on social sectors (health, education and sanitation).
[2] The point is that the way in which aid affects policy is complex and will depend on specific, often immeasurable, features of the recipient (see Morrissey 2004). Furthermore, aid may affect some policies and not others, and may affect policies over varying time spans (often of five and more years). This is a complex research topic in its own right, beyond the scope of this paper.

inflation), investment and political variable in our specification we expect to pick up some of these effects. We can as well attempt to account for these omitted variables effects in the estimation (by testing between random and fixed effects estimators and employing strong regressions). However, our specification might probably omit some factors that clarify the poor economic growth performance in Sub-Saharan Africa nations.

This paper specific objective is to account for the transmission mechanism of external finance on economic growth through investment. Though our concentration is on a sample of Sub-Saharan nations, the study as well relate the outcomes to some contributions on the aid effectiveness (Burnside and Dollar 2000; Hansen and Tarp 2001; Roodman 2004). Consequently, the study selects a specification close to that employed in these surveys. This study is to evaluate the sensitivity of outcomes to alternative treatments of the aid-investment relationship, the survey digress from those surveys in omitting the aid-policy interaction term. It is well identified that there are several variables that might be important in cross-country growth regressions, but degree of freedom considerations and idea constraints need choices to be made. The data employ in this study and the estimation methods are deliberated on in the next part.

4 Data and estimation issues

The estimation for this study is conducted in a panel of seven four-year periods over 1970 to 1997. The study dependent variable (GROWTH) is (period) growth of real per capita GDP (data definitions as well as sources are presented in Appendix A). Whereas *GDPO* is the growth rate of real GDP per capita in the preceding year; it is added to capture the initial nation specific effects.[1] PRIC15 represent the percentage of population aged 15 or above who have completed their primary education. INV represent investment as a share of GDP and it is added as indicators of physical and human capital. Two measures of aid were use; both expressed as a percentage of GNP and were obtained from OECD (1999).[2] Furthermore, GRANTS which represent the total of grant aid while TAID represent the total aid is new ODA exclusive of food aid (which does not directly influence growth),[3] technical cooperation and emergency relief (which may possibly impact growth but with long time lag). Additionally, in rough terms, TAID corresponds to net grants and loans (the original source does not recognize net loans separately). The GRANTSQ and TAIDSQ represent the squared aid terms; they are included to account for diminishing returns, in proportion to most surveys of aid effectiveness that posit a non-linear correlation (for example, Lensink and White 2001).

The study incorporates several indicators of economic and political policy features of the nations. In a study by Alesina et al., the authors construct a democracy index DEM taking values between 1 and 3 based on information on electoral systems.[4] Notably, higher values indicate weaker political rights. Three policy variables are incorporated: INFL which h represent the inflation rate, GCON which represent government consumption as a share of GDP and MDGP which represent imports as a percentage of GDP and as an indicator of openness.[5] Furthermore, the latter two variables as well represent potential transmission mechanisms. The effect of external finance is not mediated by these variables; so, in the regressions, the complete three variables can be interpreted as policy indicators.

The base specification in general terms is thus (suppressing nation and time subscripts, as well as designating the error term as *U*):

$$g = \beta c'c + \beta AA + \beta E'e + \beta P'p + U \qquad (1)$$

Growth (g) is the dependent variable and the measure of foreign aid is designated by *A*. In this study, there are three vectors of other variables. The vector of conditioning variables (c) involves human capital, initial income and investment. Additionally, the political indicator (p) is democracy while the economic policy

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[1] Many studies, such as Burnside and Dollar (2000), use *lnGDP0* rather than *GDP0*, essentially as the log specification is a test for convergence. As our sample is restricted to SSA and initial GDP is used to control for initial country conditions rather than to test for convergence, we use *GDP0*. The transformation *GDP0* to *lnGDP0* reduces the variance of the series. We did include *lnGDP0* in the regressions and the results are similar although significance levels on all variables are reduced.

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[3] As a referee observed, insofar as food aid is delivered as food that the government can sell, it provides revenue that may be used for investment. Nevertheless, we exclude food aid because (i) the donor value reported need not be a good indicator of the value to the recipient, and (ii) any disincentive effects on domestic producers would have an adverse impact.

[4] This takes the value 1 for democratic regimes (countries with free competitive general elections with more than one party running), 2 for mixed democratic and authoritarian features (countries with some form of elections but with severe limits in the competitiveness of such ballots) and 3 for authoritarian regimes (countries in which their leaders are not elected).

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indicators (e) are import/GDP ratio, inflation and government consumption.

Endogeneity and country-specific effects are the two core matters that characterize any empirical survey based on panel data. The first issue narrates the problems which arise from the time series dimension whereas the second issue results from observing numerous nations together. This study considers each briefly before deliberating on the generated regressor method used in the study.

One critical assumption of ordinary least square (OLS) is that there is zero relationship between any explanatory variables and error term. If this is violated, the former is endogenous and OLS estimates will not be consistent. The standard instrumental variables (IV) solution in this study is to carry out a two-stage process whereby instruments are employed for the endogenous variable, and it is commonly the case that results employing the instrumental variables (IV) methods are sensitive to the choices of instruments. In this case, we employ the Hausman test to examine whether aid and investment terms are endogenous. This includes comparing the outcomes of the instrumental variables (IV) and ordinary least square (OLS) regressions (employing the Sargan test for the validity of instruments). The result shows that, the test strongly fails to reject the null hypothesis that error term and regressors are not correlated. So, in this study sample, we discover no proof of the necessity to employ instruments. Additionally, we test and reject the necessity to employ fixed effects of estimators (econometric details are in Gomanee, Girma and Morrissey 2002)[1] .This paper results were reported by employing lagged aid, on the basis that external finance through investment will take time to have influence growth.

Other problem often encountered during the estimation process have to do with outliers, values of the dependent variable that are unusual, particularly the values of the explanatory variables (response outliers), or sometimes unusual values of an explanatory variable (design outliers). The addition or omission of outliers, particularly if the sample size is small, can substantially change the outcome of the regression analysis. If beneficial generalizations are to be drawn, it turn out to be vital to make sure that the outcomes mirror what is going on in the majority of the sample instead of being motivated by few outlying observations only.

Numerous techniques have been employed to address the issue of outliers in the empirical literature. In certain circumstances, the regression model is re-estimated iteratively omitting one observation at a time with the objective of recognizing that which exerts an important impact on the set of estimates. In other circumstances, observations with high residuals are not included from the sample. Both processes can be seen as a part of a sensitivity analysis after the key outcomes have been achieved. It is as well a general thing to omit data points with extreme values of the explanatory variables. In this paper, an alternative techniques was selected – strong regression (Rousseeuw and Leroy 1987), detailed in Gomanee, Girma and Morrissey (2002). One advantage with the strong estimation process is that it reduces the impact of outlying observations on the estimated equation instead of completely omitting them from an already small sample of which they are part

One other problematic issue in panel growth regressions is that one is observing a connection across nations, so there is potential heterogeneity. Sub-Saharan Africa nations have similarity in respect to certain structural characteristics, connecting mostly to their stage of political and economic development as well as climatic situations. But, they include a heterogeneous group of nations in terms of population, resources endowments, size, institutional arrangements, and level of GDP. Whereas we attempt to control for various variables (and certain problems accounts for strong estimation); in this study, we cannot discount the possibility of country-specific effects as a result of omitted variables (though the test for fixed effects does not propose this to be problematic).

Residual generated regressors

It has turn out to be a common practice to estimate regression equation in which constructed variables appear. One of the most popular techniques to generate regressors is to employ predicted residuals or value from a supplementary regression (indeed, instrument variable is one good example of the former), Based on the prevalence models like that, Pagan (1984) offers 'a justly complete treatment' of the econometric matters underlying regressions with generated variables. Based on the fact that this is the technique the paper employ to include transmission mechanism, a brief dialogue is in order. Officially, the technique is a special situation of the subsequent overall model (in matrix form).

$$Y = \mu X^* + \gamma(X - X^*) + U \qquad (2a)$$
$$X = X^* + \eta = \omega Z + \eta \qquad (2b)$$

From equation 2a, the expression (X-X*) signifies that part of X which is clarify by the factors other than Z. Furthermore, equation 2b estimates the correlation between Z and X such that ω provides a measure of the strength of the relationship that exists between them. According to Pagan (1984), the author displays that the

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[1] A popular solution to the problem of fixed effects is to remove the effects by first differencing and then use an instrumental variable technique such as GMM. However, first differencing reduces the sample size and reduces the variation and co-variation in the data (Gomanee, Girma and Morrissey 2002). One reason why fixed effects may not be so important is that our sample comprises SSA countries only (and we use robust regression to account for outliers).

two step process of estimating (2b) and employing the outcomes in (2a), provides asymptotically well-organized estimates and the right values for the standard errors. In this paper, we construct the generated regressor employing only the residuals from a supplementary equation. This indicates that ordinary least square (OLS) provides us the right estimates of variance and efficient coefficient estimates. Meaning, this conclusion is independent of whether equation 2a involves extra regressor or the latter seems to be in the matrix Z – in our situation, aid seems to be in equation 2b. So, the purpose of employing residuals does not invalidate the inferences made and coefficient estimates are efficient.

In this study, we construct the variable signifying that portion of investment that is not attributed to external finance (INVRES) by employing residual from an aid-investment bivariate regression (capturing the transmission from external finance to investment).Furthermore, (INVRES) is the estimate of K_1 from the regression $INV = K_{1+} K_2\ AID$. We then substitute INVRES for INV in the growth regression. In this study, it is worth noticing that this transformation affects only the estimated coefficient on the external finance variables. This fact can be demonstrated in overall terms. Supposing we have an initial regression that looks like this:

$$g = \beta_1 X + \beta_2 A + \beta_z'z + U \tag{3a}$$

where **z** is the vector of other variables, substituting $X = K_1 + K_2\ A$:

$$g = \beta_1 (X - K_2\ A) + \beta_1(K_2\ A) + \beta_2 A + \beta_z'z + U \tag{3b}$$

or

$$g = \beta_1\ K_1 + (\beta_1\ K_2 + \beta_2 \quad A + \beta_z'z + U \tag{3c}$$

Therefore, it is obvious that only the coefficient on the external finance variable is changed. In situation where the 'transmission' variable (X) has a positive influence on growth and external finance has a positive influence on the variable, this technique will offer for a larger coefficient of external finance. On the other hand, if the variable has a negative influence on growth and external finance is a positive determining factor of the variable, the coefficient on external finance is lessened. If it transpires that external finance is not the determining factor of the variable, there is no effect and the techniques is not employed.

5 Results and discussion

Based on the above discussion, three potential transmission variables are involved (INV, GCON and MGDP). Initially, we test if these are really transmission mechanisms for the effect of external finance and the outcomes are reported in Appendix B. The initial step is simply to determine if the coefficient on the external finance is important in a multivariate regression of impacts on the specific transmission variable. It emerges that external finance is only an important determining factor of investment and imports among these variables, but only investment is an important determining factor of economic growth. Though external finance is not found to be an important determining factor of regime consumption expenditure in the sample (likely whys and wherefores are deliberated in Appendix B), we as well involve outcomes below with a generated regressor for GCONS.

Our basic specification is:

$$GROWTH_{it} = \delta_0 + \delta_1\ GDP0_{t,t-1} + \delta_2\ PRIC15_{it} + \delta_3 + INV_{it} + \delta_4\ DEM_{it} + \delta_5\ INFL_{it} + \delta_6\ GCON_{it}$$
$$+ \delta_7\ MGDP_{it} + \delta_8\ AID_{it} + \delta_8\ AIDSQ_{it} + u_{it}$$

For ease of comparison with past surveys, which take on a specification that has similarity with (4) without investment, and based on the fact that the treatment of investment plays a significant role in this paper analysis, we start by presenting outcomes from estimating (3) with INV not included. Table 1 shows the outcomes of this general reduced form of regression. The entire control variables except MGDP and GCON are significant and of the anticipated sign. Inflation has a negative correlation with growth while education has a positive correlation. Democracy has a positive correlation with growth (we can recall that higher values indicate less democratic governments) as its initial GDP (that is to say, nations with more favourable initial conditions have a tendency to perform better). Notably, the coefficients on both external finance measures are positive and significant, whether recent or lagged values are employed. These outcomes are compare with our other estimates below.

Based on the fact that investment is omitted from the reduced form in Table 1, a usual inference would be that the coefficient on external finance is capturing the investment outcome. However, it is possible, that when investment is omitted it will influence certain coefficient estimates for other variables. To the degree that variables capturing the policy surroundings impact the productivity of investment, this is a separate possibility. Furthermore, the study explores this by including directly the effect of external finance via funding investment by generating a distinct variable for investment not funded by external finance directly.

Table 1
Robust aid-growth regressions excluding investment

	Effect of Current Aid		Effect of lagged Aid	
GDPO	0.001	0.001	0.001	0.001
	(2.93)***	(2.84)***	(3.26)***	(3.14)***
PRICE15	0.273	0.264	0.268	0.259
	(3.87)***	(3.76)***	(3.41)***	(3.26)***
DEM	-1.129	-1.188	-1.033	-0.962
	(2.99)***	(3.14)***	(2.61)**	(2.40)**
INFL	-0.004	-0.004	-0.004	-0.004
	(2.84)***	(2.89)***	(2.76)***	(2.94)***
GCON	-0.073	-0.062	-0.085	-0.056
	(1.31)	(1.13)	(1.49)	(0.99)
MGDP	0.004	0.004	-0.002	-0.001
	(0.38)	(0.40)	(0.22)	(0.10)
GRANTS	0.203		0.499	
	(2.26)**		(3.49)***	
GRANTSQ	-0.004		-0.016	
	(2.05)**		(2.66)***	
TAID		0.207		0.497
		(2.10)**		(3.28)***
TAIDSQ		-0.004		-0.016
		(1.97)*		(2.63)***
Constant	0.225	0.386	-0.894	-1.370
	(0.13)	(0.22)	(0.50)	(0.71)
Observations	149	149	134	134
R-squared	0.37	0.37	0.39	0.37

Notes: Time dummies included in all regressions. Absolute t-statistics reported as a weighting system is used for the robust regression. Significance levels indicated as ***, ** and * for 1%, 5% and 10% levels respectively.

Table 2

Robust aid-growth regressions with INVRES

	Effect of current aid		Effect of lagged aid	
Constant	0.525	0.655	0.477	0.310
	(0.32)	(0.39)	(0.28)	(0.17)
GDPO	0.001	0.001	0.001	0.001
	(2.38)**	(2.35)	(2.22)**	(2.07)**
PRIC15	0.212	0.205	0.182	0.177
	(3.09)***	(2.99)***	(2.34)**	(2.27)**
INVRES	0.109	0111	0.105	0.106
	(4.42)***	(4.49)***	(4.01)***	(4.02)***
DEM	-1.261	-1.328	-1.287	-1.231
	(3.52)***	(3.69)***	(3.34)***	(3.19)***
INFL	-0.004	-0.004	-0.004	-0.004
	(2.50)**	(2.50)**	(2.55)**	(2.68)***
GCON	-0.149	-0.143	-0.151	-0.134
	(2.64)***	(2.58)**	(2.59)**	(2.33)**
MGDP	0.002	0.002	-0.001	0.000
	(0.22)	(0.21)	(0.12)	(0.02)
GRANTS	0.306		0.431	
	(3.46)***		(4.08)***	
GRANTSQ	-0.003		-0.006	
	(1.65)		(2.22)**	
TAID		0.319		0.402
		(3.31)***		(3.66)***
TAIDSQ		-0.004		-0.006
		(1.69)*		(1.99)**
Coefficient on aid with INV				
GRANTS	0.161		0.265	
	(1.89)*		(2.59)**	
GRANTSSQ	-0.003		-0.006	
	(1.65)		(2.22)**	
TAID		0.174		0.242
		(1.85)*		(2.25)**
TAIDSQ		-0.004		-0.006
		(1.69)*		(1.99)**
Observations	149	149	135	135
R-squared	0.46	0.46	0.44	0.43

Notes: See Table 1.

In appendix B, the 'transmission regression' display that external finance is an important factor in clarifying variations in imports and investment. In this study, the import variable is on no occasion important in the growth regressions; investment is the mechanism the study address.

From this study, Table 2 display the estimation outcomes of the growth model as stated by equation (3) with the generated regressor INVRES.[1] The entire control variables are important, apart from MGDP, and have the anticipated sign (for instance, if GDPO were to pick up convergence, the sign should be negative but here it is controlling for initial conditions). In contrast to Table 1, the coefficient on regime expenditure is presently found to be significant and negative. Both measures of external finance have positive as well as significant coefficients that are remarkably alike, 0.3 on the recent value (average over the period) and 0.5 on the lagged value (past period average), proposing that loans and grants have nearly the same influence on growth (on average). So, this negatively signed aid squared terms are consistent with the proposition of an external finance Laffer curve (Lensink and White 2001), or more commonly diminishing returns to external finance.

According to the specification, the coefficient estimates for aid variables do differ. In the entire specification, the lagged effect of aid on growth is greater than the recent effect. When investment is not

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[1] *INVRES* is estimated from (t-ratios in parentheses):

INV = 1.33 GRANTS $R^2 = 0.41$;   INV = 1.58 GRANTS_1 $R^2 = 0.46$

     (12.78)   (13.20)

INV =   1.30 TAID $R^2 = 0.39$;   INV = 1.51 TAID_1 $R^2 = 0.42$

     (12.17)   (12.16)

included (Table 1), the coefficient on recent aid of 0.2 is lower than when INVRES is employed, but the coefficient of 0.5 on lagged aid is higher. When INV is incorporated (distinct outcomes in Table 2), the coefficient on recent aid is only weakly significant while that on lagged aid is significant but, at 0.25, lower than in other estimates. This give backing to this study hypothesis that aid coefficient in a regression involving investment term will undervalue (underestimate) the right influence of aid on growth.

Bearing in mind only the estimates on lagged aid, as influences of external finance on growth should happen over time, we discover proof of a significant positive influence of external finance in the entire specifications. In this study, we find that the treatment of investment does not change the result of significance, but it does influence the value of the estimated coefficient, ranging from about 0.25 to 0.5. It is reassuring for our method that not including investment entirely provides the highest estimate (the entire investment effect may possibly be credited to external finance) while incorporating INV with external finance yields the lowest estimate (by way of under-valuing the influence of external finance through investment). Based on this, by employing the generated regressor may provide a 'better' estimate.

Though we discover no proof that external finance clarifies variations in regime expenditure (Appendix B), we do discover that spending like that has a negative influence on growth but only when investment is not included as well. As a strong check, in Table 3 we permit for the fact that certain aid does directly fund expenditure and construct a generated regressor GCONRES. As would be anticipated, this lessens the estimated coefficient on the aid variables (but again the outcomes are not sensitive to the measure of external finance employed). Certainly, the coefficient on current external finance is no longer significant; an outcome consistent with Burnside and Dollar (2000), nevertheless that the lagged aid is significant with a coefficient of 0.23. One fact that need to be given emphasis to is that while external finance earmarked to consumption expenditure may not have an influence on growth does not essentially mean that such aid does not benefit the recipient (financing education or health may well contribute to human development).[1]

This study outcomes display that aid is related with higher growth in Sub-Saharan Africa economies. This statement applies once diminishing returns are accounted for, as the only two nations in the sample received external finance beyond the threshold level.[2] Based on the point estimates obtained in the past part of this study, Table 4 reports the marginal external finance effects by bringing together the entire estimates of the derivative of growth with regard to external finance.

When evaluated at mean external finance level, we again discover that once the indirect influences via investment are incorporated, the influence of external finance on growth is positive and significant. We identify the fact that these influences are observed on average. In spite of the focus on a sample restricted to Sub-Saharan Africa nations only, it is sensible to be certain of the fact that estimates on average mask both within and across-country variance in external finance effects. Based on practical purpose, one fact that is more appealing is the degree to which this study estimates are beneficial in offering information on distinct economies experiences.

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[1] For evidence that aid-financed current spending may be beneficial see Gomanee, Girma and Morrissey (2005) and Gomanee *et al.* (2005).
[2] Based on Regression 1 and 2 from Table 5, GRANTS and TAID would have to surpass 51 per cent and 40 per cent for diminishing returns to set in. Only Rwanda (in 1994-97) and Gambia (in 1986-89) received aid in excess of this optimal level.

Table 3

Robust aid-growth regressions with INVRES and GCONRES

	Effect of current aid		Effect of lagged aid	
GDPO	0.001	0.001	0.001	0.001
	(2.38)**	(2.35)**	(2.22)**	(2.07)
PRIC15	0.212	0.205	0.182	0.177
	(3.09)***	(2.99)***	(2.34)**	(2.27)**
INVRES	0.109	0.111	0.105	0.106
	(4.42)***	(4.49)***	(4.01)***	(4.02)***
DEM	-1.261	-1.328	-1.287	-1.231
	(3.52)***	(3.69)***	(3.34)***	(3.19)***
INFL	-0.004	-0.004	-0.004	-0.004
	(2.50)**	(2.50)**	(2.55)**	(2.68)***
GCONRES	-0.149	-0.143	-0.151	-0.134
	(2.64)***	(2.58)**	(2.59)**	(2.33)**
MGDP	0.002	0.002	-0.001	-0.000
	(0.22)	(0.21)	(0.12)	(0.02)
GRANTS	0.138		0.236	
	(1.51)		(2.15)**	
GRANTSQ	-0.003		-0.006	
	(1.65)		(2.22)	
TAID		0.160		0.234
		(1.56)		(1.99)**
TAIDSQ		-0.004		-0.006
		(1.69)*		(1.99)**
Constant	0.525	0.655	0.477	0.310
	(0.32)	(0.39)	(0.28)	(0.17)
Observations	149	149	135	135
R-squared	0.46	0.46	0.44	0.43

Notes: As for Table 1. *GCONRES* is estimated from (t-stats in parentheses):

GCON = 1.13 GRANTS (16.26) R^2 = 0.54; GCON = 1.29 GRANTS _1 (15.72) R^2 = 0.56

GCON = 1.11 TAID (15.60) R^2 = 0.52;   GCON = 1.25 TAID_1 (14.58) R^2 = 0.52

Table 4

Marginal effect of aid on growth

	At GRANTS = 8.16	At TAID = 7.96
In model with INV	0.112	0.110
	(1.02)	(0.87)
In model with INVRES	0.257	0.255
	(2.34)**	(1.96)*

Note: t-ratios in parentheses

Table 5a
Regressions with GRANTS

Country	Time period	Unexplained growth	GRANTS	Growth	Contribution of aid (δ_8 AID-δ_9 AID^2
10 lowest absolute values of unexplained GROWTH					
South Africa	1994-1997	0.07	0.29	1.20	0.09
Gambia	1978-1981	0.10	15.71	0.60	4.07
Zimbabwe	1990-1993	0.12	6.75	-1.47	1.93
Congo Dem.	1990-1993	0.13	4.41	-12.62	1.29
Zimbabwe	1994-1997	0.13	5.26	1.98	1.53
Senegal	1982-1985	0.14	7.97	1.43	2.25
Congo Dem.	1970-1973	0.16	2.47	0.75	0.74
Mauritius	1994-1997	0.17	0.97	3.62	0.29
Togo	1974-1977	0.19	6.00	0.44	1.73
Togo	1970-1973	0.25	6.56	0.53	1.88
10 highest absolute values of unexplained GROWTH					
Botswana	1970-1973	10.99	9.82	18.51	2.72
Togo	1994-1997	6.81	9.19	6.29	2.56
Cameroon	1986-1989	6.38	1.90	-3.99	0.57
Sierra Leone	1994- 1997	6.23	12.20	-7.78	3.29
Niger	1970-1973	6.01	5.69	-5.78	1.64
Congo Rep	1994 -1997	5.87	13.66	-2.07	3.62
Senegal	1978-1981	5.84	7.25	-3.14	2.06
Swaziland	1986-1989	5.77	6.61	7.29	1.89
Cameroon	1990-1993	5.62	3.28	-6.69	0.97
Mauritius	1978-1981	5.52	2.05	-0.73	0.61

Note: Residuals are from Regression 1 of Table 2.

Bearing this in mind, we calculate the expected contribution of external finance to growth, δ_8AID-δ_9AID^2, where *GRANTS* and *TAID* are the significant external finance definitions (Table 5a and 5b, respectively). Clearly, as we are employing the estimated coefficient from the panel regressions, external finance is anticipated to have a positive influence on growth (as well as the magnitude will rely on the amount of aid received). In this study we cannot estimate the real influence of aid for each nation. However, we can liken cases where the regression performed well (ranging from the lowest residuals to the top panel in each table) with those where it performed poorly (the lower panel in each table). So, the presumption would be that the results of external finance efficacy is more reliable in the former, while omitted variables played a more significant role in the latter circumstances (thus that the 'anticipated' growth was not attained).

From the above panel of every single table, ten observations are listed for which unexplained growth is lowest in absolute term. The study selected set of explanatory variables clarifies reasonably well the growth experience of those nations in that specific period. From the bottom panel of every table, the ten observations with the largest residual (unexplained growth) are listed. These listed nations are the ones that mostly experienced negative growth.

Let's deliberate on the two panels in Table 5a. Notably, the upper panel signifies growth (not including Congo) is 1 percent while external finance is estimated to contribute 1.6 percent to growth as a simple mean. On the part of the bottom panel, signify that growth (not including Botswana) is -1.8 percent while the mean contribution of external finance to growth is 1.9 percent. The anticipated input of external finance to growth is not very dissimilar in both panels, but growth performance is dramatically dissimilar. Based on this, we can interpret this by saying that aid was really not effective in the bottom panel group of nations (by assuming that the result would have been no worse in the absence of external finance). Furthermore, another interpretation is that other factors undermined the efficacy of development assistance in the poor performing nations. One factor responsible for this might be exogenous shocks; in a study by Guillaumont and Chauvet (2001) and Lensink and Morrissey (2000), these authors display that external shocks and external finance instability are growth-lessening though external finance remains a positive factor. This study analysis cannot recognize these (growth-retarding) factors, but it can propose nations (and periods) that may deserve more study. However, such a case study complement is further than the scope of this paper.

Table 5b
Regressions with TAID

Country	Time period	Unexplained growth	GRANTS	Growth	Contribution of aid (δ_8 AID-δ_9 AID^2
10 lowest absolute values of unexplained GROWTH					
Senegal	1982-1985	0.01	8.36	1.43	2.39
Zimbabwe	1994-1997	0.02	5.02	1.98	1.50
South Africa	1994-1993	0.03	0.14	1.20	0.05
Togo	1970-1973	0.10	3.44	0.53	1.05
Congo Dem	1990-1993	0.12	4.42	-12.62	1.33
Lesotho	1978-1981	0.13	9.05	2.22	2.56
Togo	1974-1977	0.14	4.88	0.44	1.46
Mauritius	1994-1997	0.17	0.02	3.62	0.01
Congo Dem.	1970-1973	0.19	1.36	0.75	0.43
Mali	1982-1985	0.26	18.70	-0.89	4.57
10 highest absolute values of unexplained GROWTH					
Botswana	1970-1973	10.00	16.47	18.51	4.17
Sierra Leone	1994-1997	6.74	20.90	-7.78	4.92
Togo	1994-1997	6.67	10.10	6.29	2.81
Swaziland	1986- 1989	6.44	2.29	7.29	0.71
Cameroon	1986-1989	6.31	1.73	-3.99	0.54
Niger	1970 -1973	6.14	4.87	-5.78	1.46
Congo Rep.	1994-1997	6.12	15.09	-2.07	3.90
Senegal	1978-1981	5.96	7.56	-3.14	2.18
Cameroon	1990-1993	5.82	4.09	-6.69	1.24
Rwanda	1978-1981	5.60	8.46	5.35	2.41

Note: Residuals are from regression 2 of Table 2.

6 Conclusion

External Finance effectiveness is a very critical and unsettled matter at the empirical and theoretical level. For that reason, our concern has been to address the question of aid effectiveness in Sub-Saharan Africa. Empirical surveys of the influence of external finance on growth fail to identify explicitly in the regression specification that external finance does not have direct effect; it operates through transmission mechanisms, such as regime expenditure and investment. One significant contribution of this paper is its input to the existing empirical literature on the effects of overseas assistance on the economic growth of developing economies by throwing some light on this aspect that need more research.

In most aid regression, investment which is the most significant transmission mechanism is frequently omitted. For that reason, estimated aid coefficients in typical growth regressions may suffer from omitted variable bias. However, simply incorporating an investment term in the regression would lead to identification difficulties as certain external finance funds investment. In addressing this problem in this paper, we employ the method of generated regressors. This allows us to recognize that part of the effect on growth of the relevant transmission mechanism that is not owing to external finance, with the purpose of avoiding the omitted variable and double counting problems pertaining to investment. On a similar note, we recognize and account for the part of external finance that directly funds regime consumption expenditure, as well as which may not contribute to growth.

In this study, we apply the technique to investigate the correlation between external finance and growth employing a panel of twenty-five Sub-Saharan Africa nations over the period of 1970 to 1997. In spite of the large aid inflows, Sub-Saharan Africa nations on average experienced merely 0.6 percent growth in real per capita GDP per annum over the period. Actually, this may seem to be the situation of aid ineffectiveness. Our econometric outcomes, which are strong regarding outliers and endogeneity, display that external finance has had positive influence on growth, largely via aid funded investment. Additionally, on average (by employing the marginal effect estimates), a one percentage point upsurge in the aid/GNP ratio adds one-quarter of one percentage point to the growth rate. Based on the fact that diverse measures and specification were employ to other surveys, our estimates are not directly comparable. However, the extensive result that external finance has positive and significant influence on growth is in line with Lensink and Morrissey (2000) and Clemens, Radelet and Bhavnani (2004), two other surveys that recognize Sub-Saharan Africa sample.

In this study, inflation is included as a (macroeconomic) policy control, as have the anticipated negative sign. In addition, government consumption expenditure as well has a negative correlation with growth. More democratic governments seem to have higher growth performance. The variables with positive influence

on growth are initial GDP, education, aid and investment (that is to say, divergence in the sample as nations with higher incomes at the beginning of the period have a tendency to have higher subsequent growth rates). The outcomes, in demonstrating the advantages of external finance, education and investment and identifying the effects of macroeconomic policy and governance, give backing to the arguments of the Commission for Africa (2005).

One limitation of cross-country panel regressions is that one estimates the average value of a coefficient, and this is not an estimate valid for any specific nation. However, what one is looking for is empirical regularities or patterns. In this case, we recognize a tendency for external finance to contribute to growth via investment; however, this does not indicate that external finance ensures growth. Certainly, several Sub-Saharan Africa nations have had a very poor growth performance; this is the reason why Sub-Saharan Africa nations continue to be large recipients of external finance. In most cases, this is to a certain extent as a result of bad policy, but that is not the complete clarification and our outcomes propose that external finance can be effective even if policies are bad (this study incorporates variables to capture policy). The variables in this paper was able to reveal that the aid-growth model capture sources of positive growth better than clarifying the forces behind negative growth performance. On a different note, the negative growth in Sub-Saharan Africa nations seems to be as a result of factors other than those represented in this study regression. This gives backing to the fact that the observed combination of generous aid flows and slow growth in Sub-Saharan Africa does not essentially indicate external finance ineffectiveness.

One cannot take no notice of the possibility that had Sub-Saharan Africa nations not received aid, the region might have experienced even slower, or in certain situation more severe negative, growth. The effectiveness of external finance lower than could otherwise be possible in the absence of shocks (or other omitted variables) would appear to be a more plausible clarification. With that been said, this is not to claim that external finance channel to Africa has been a success – clearly it has not, as observed growth performance has not matched aid receipts. However, there is more than a pedantic difference between claiming that this indicates external finance is not effective and claiming that external finance has been effective though its potential contribution to growth has not been completely actualized. So, while recognizing and addressing the factors that clarify Africa poor growth performance, the latter lay emphasis on, implicitly at last, the desirability of maintaining external finance. The region poor growth record should not thus be attributed to external finance ineffectiveness. This study conclusion is that external finance has been useful to nations in Africa, but more needs to be done to make sure that these benefits lead to sustained economic growth.

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Appendix A: Definitions and Sources of Data

GROWTH = Growth of real GDP per capita

GDPO = Real GDP per capita (in the year preceding the period)

PRIC15 = Population aged 15 or above having completed primary education (per cent), at beginning of each period. Source: Barro and Lee Data Set, Updated April 2000 (Harvard CID, downloaded from www.cid.harvard.edu/ciddata/)

INV = Gross domestic investment (per cent of GDP)

DEM = Democracy index, in 1970 and 1982; values between 1 and 3 with lower values being more democratic. Source: Alesina *et al.* (1992)

INFL = Inflation rate

GCON = Government consumption (per cent of GDP)

MGDP = imports (per cent of GDP)

XGDP = Exports (per cent of GDP)

TOT = Terms of trade

RER = Real exchange rate, calculated from the nominal exchange rate figures

BMP = Black market premium. Source: downloaded from the Global Development Network Growth Database, accessed October 2000 (no longer on the World Bank web site)

CFA = Dummy takes value of 1 for CFA franc zone member countries and 0 otherwise

CRED = Credit available to private sector (per cent of total domestic credit)

GASTILS = Gastils Political Rights index. Source: Freedom House (downloaded March 2001, www.freedomhouse.org/)

GRANTS = ODA grants (per cent of GNP). Source: OECD (1999)

TAID = Total net ODA less technical cooperation, food aid and emergency relief (per cent of GNP). Source: OECD (1999)

TRGDP = Total tax revenue (per cent of GDP)

EXTDEBT = External debt (per cent of GDP)

STATE = Dummy takes value of 1 for legitimate countries and 0 otherwise. Source: Englebert (2000)

Unless otherwise specified, the source for the entire variables in this paper is gotten from World Bank Africa

Database (2000). The entire variables refer to period averages 1970-73, 1974-77, 1978-81, 1982-85, 1986-89, 1990-93 and 1994-97 apart from GDPO and the time invariant regressors.

Table A1: Twenty-five countries in the sample for regressions

Benin	Botswana	Cameroon
Central Africa	Congo Republic	Congo Democratic Republic
Gambia	Ghana	Kenya
Lesotho	Madagascar	Malawi
Mali	Mauritius	Niger
Rwanda	Senegal	Sierra Leone
South Africa	Swaziland	Tanzania
Togo	Uganda	Zambia
Uganda		

Table A2
Summary statistics

Variable	N	Mean	Std dev.	Min	Max	Std dev. First difference
GROWTH	34	0.660	3.750	-12.618	18.510	4.572
GDPO	34	1242.382	1096.644	247	6409.000	330.913
INV	34	19.547	10.518	3.268	84.551	6.662
PRIC15	25	7.257	3.710	1	19.900	1.560
DEM	32	2.656	0.644	1	3	0
GRANTS	34	8.161	6.992	0.044	57.317	5.158
TAID	34	7.960	7.188	-0.009	50.712	5.286
INFL	34	50.631	428.068	-3.574	6287.344	325.801
GCON	34	15.461	5.749	5.859	43.938	3.855
MGDP	34	38.317	22.411	8.333	142.697	7.984

Note: Summary statistics reported for the variables in levels, unless stated otherwise.

Appendix B: Transmission mechanisms

Notably, the goal is simply to determine if the coefficient on the aid variable is significant in a multivariate regression based on the impact on the specific transmission variable. Though we are not attempting to 'clarify' the transmission variables, we try to find a parsimonious specification that mirrors the pertinent literature. It is significant to lay emphasis on the fact that we are not actually concerned with estimating the behavioral correlation, but rather with a funding association. However, we want to know if the external finance is an important determining factor of cross-country variations in the level of the transmission variables under consideration.

B1 Determinants of investment

In this study, we used total investment as the explanatory variable, in large part public (which is typically aid funded) but incorporating private (which in a behavioural association, will be influenced by external finance and public investment). Most of the literatures centers on private investment (for example, Greene and Villanueva 1991; Dollar and Easterly 1999), and the fact is that is not directly relevant. So, our specification is envisioned to involve major factors affecting both public and private investment. This will assist to account for the dependence of the recent investment levels on physical and human capital stock, and one lagged investment and a measure of human capital were included (PRIC15). Furthermore, the real interest rate data was not included because we did not have data on it, and the use of two policy variables to capture this impact was utilized; in addition to this, the inflation rate (INFL) as well as the logarithm of credit obtainable to the private sector, measures in relation to the overall domestic credit (LNCRED). The Gastils index of rights is the political indicator used (GASTILS); the values that it take ranges between 1 and 7, where the higher values is an indication of less freedom. So to see if they are significant two measures of external finance are tested.

$$INV_{it} = \beta_0 + \beta_1 INV_{i,t-1} + \beta_2 PRIC15_{it} + \beta_3 INFL_{it} + \beta_4 GASTILS_{it} + \beta_5 LNCRED_{it} + \beta_6 AID_{it} + \beta_7 AIDSQ_{it} + \varepsilon_{it}$$
(B1)

On the part of Table B1 we present the set of estimates that generate the coefficient estimates with the anticipated signs. The study obtains proof of a highly significant positive effect of external finance on investment. Looking at the signs, on average, and upsurge in GRANTS and TAID by one percent, increases the investment share in GDP by around 0.33 and 0.53 percent respectively. As anticipated, TAID is more significant both in terms of importance and magnitude. The findings propose that investment is an important transmission

mechanism and so it is essential to think through the 'double-counting' problem.

The finding is not in line with Dollar and Easterly (1999), who discover no proof that external finance was a significant determining factor of investment. However, both authors merely report summary outcomes of a sample bivariate ordinary least square (OLS) regression for individual nation.

Table B1

Pooled OLS investment regressions

	INV	INV
INV_{it}	0.785 (5.51)***	0.799 (5.69)***
GASTILS	-0.902 (2.59)***	-0.984 (2.94)***
PRIC15	0.275 (1.80)*	0.290 (1.94)*
LNCRED	1.773 (2.79)***	2.005 (3.04)***
INFL	-0.003 (2.43)**	-0.002 (1.69)*
GRANTS	0.333 (2.09)**	
GRANTSQ	-0.007 (2.77)***	
TAID		0.528 (3.04)***
TAIDSQ		-0.012 (3.56)***
Constant	-2.074 (0.54)	-4.341 (1.06)
Observations	126	126
R-squared	0.65	0.66
F-Stat	27.17	22.91
Prob> F-Stat	0.00	0.00

Notes: All regressions run in a panel of seven four-year periods over 1970-97. Time dummies included in all regressions. Absolute t-values based on White heteroscedasticity-consistent standard errors are reported in brackets.

* Significant at 10% level; ** 5% level; *** 1% level. F-Stat tests the joint significance of all coefficients.

B2 Financing imports

Despite the fact that the literature on trade and growth tend to center on trade volume or export (that is the export plus import as a measure of openness), there are reasons why imports may possibly contribute to economic growth. In a study conducted by Thirlwall (2003), the author debates that a major advantage of exports is that they generate the foreign exchange needed to purchase the import need for economic growth. Clearly on our context is imported investment goods; the possibility is that imports may possibly proxy technology transfer. However, the concern we are having is to clarify the level of imports in terms of how they are funded. So we decided to employ *MGDP* as the dependent variable. In addition, we introduced export and the two measure of external finance as sources of overseas exchange needed to pay for imports; so that the purchasing power of these revenues will hinge on the exchange rate. The study incorporate numerous measures to capture such influences: black market premium (BMP), terms of trade (TOT), real exchange rate (ER) and a dummy (CFA) that takes a value of one for nations which are members of CFA franc zone.

The import regression is stated as:

$$MGDP_{it} = \eta_0 + \eta_1 XGDP_{it} + \eta_2 AID_{it} + \eta_3 TOT_{it} + \eta_4 RER_{it} + \eta_5 BMP_{it} + \eta_6 CFA_{it} + e_{it} \qquad (B2)$$

Generally, the performance of the regression was good (Table B2). The chosen specification clarifies at least 31 percent in relation to the variation present in the dependent variable. External finance flows appear to be an important source of fund for imports (as would be anticipated). From the study, we find out that, on average, a one percent point upsurge in GRANTS upsurges imports/GDP by 0.9 percent, while each additional percent of TAID create an addition of 0.7 percent to the share of imports in GDP. Looking at these estimates, it would seem that imports are a potential transmission mechanism. For the fact that the coefficients on aid and exports which we see as the sources of foreign exchange in this study sum to more than unity is not itself an issue. Several nations uphold large (aid-funded) trade deficits, as well as other variables having a tendency to lessen imports (or, lessen the purchasing power of export and external finance revenue). Relating to our situation,

imports are not discovered to be the determining factors of economic growth, the transmission effect does not essentially have to be included.

Table B2
Pooled OLS imports regressions

	IMPORT	IMPORT
XGDP	0.614 (5.51)***	0.610 (5.50)***
GRANTS	0.921 (3.24)***	
TAID		0.713 (3.42)***
TOT	-0.045 (2.04)**	-0.049 (2.14)***
RER	-0.003 (1.96)*	-0.004 (2.07)**
BMP	-0.027 (2.02)**	-0.029 (2.07)**
CFA	-6.236 (1.80)*	-6.187 (1.75)*
Constant	22.095 (3.16)***	25.115 (3.24)***
Observations	131	131
R-squared	0.33	0.31
F-Stat Prob> F-Stat	13.36	14.01
	0.00	0.00

Notes: As for Table B1.

B3 Determinants of government consumption

Numerous literatures show how external finance impact regime fiscal behavior, addressing either fiscal response model or fungibility (McGillivray and Morrissey 2004 gave a comprehensive review on this issue). In this study, based on requirement, we abstract from the difficulties of these models and adopt a simple framework. Regime consumption expenditure, by definition, is certain proportion of revenue. Both overseas and domestic sources of regime revenue were consider – foreign aid flows (AID), total tax revenue as a share of GDP (TRGDP), external debt as a share of GDP (EXTDEBT) and inflation (INFL) representing seigniorage. Recognizing the fact that features of the existing political institution may possibly impact the earmark of regime resources; in this case we introduce the variable STATE (Englebert 2000) as more suitable for our purposes than Gastils or DEM employed formerly. So in this case, this takes the value of 1 (or else 0) for legitimate nations which are believed to have more well-organized regimes. Based on the assumption that more well-organized or legitimate governments will be more probable to spend on investment, the hypothesized coefficient is negative. So based on this, we estimate the subsequent equation:

$$GCON_{it} = \lambda_0 + \lambda_1 TRGDP_{it} + \lambda_2 INFL_{it} + \lambda_3 EXTDEBT_{it} + \lambda_4 AID_{it} + \lambda_5 STATE_i + u_{it} \qquad (B3)$$

The result is presented in Table B3. Generally, the regressions perform sensibly well. They clarify approximately fifty percent of the variation in regime consumption and the entire variables enter with the anticipated signs; but, the coefficient on aid is not significant. External finance does not appear to clarify cross-country variation in GCONS in this study sample. In its place, seigniorage and tax revenue clarify the variations in recurrent expenditure. Consequently, regime consumption does not seem to be a transmission mechanism, that is to say, the coefficient on GCON in aid growth regressions may possibly not involve any substantial indirect influence of external finance. This outcome may possibly appear surprising (though it is not inconsistent with the proof from fiscal response models), for that reason, in this study we permit for a (negative) transmission influence.

Table B3
Government consumption regressions

	GCON	GCON
TRGDP	0.524	0.516
	(8.97)***	(8.89)***
INFL	0.003	0.003
	(4.47) ***	(4.19)***
EXTDEBIT	-0.001	0.000
	(0.09)	(0.03)
GRANTS	0.106	
	(1.36)	
TAID		0.076
		(1.02)
STATE	-1.508	-1.296
	(1.71)*	(1.56)
Constant	4.809	5.187
	(3.12)***	(3.48)***
Observation	138	138
R-squared	0.51	0.50
F-Stat	10.89	11.51
Prob> F-Stat	0.00	0.00

Notes: As for Table B1.

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