TRADE AND AID IN AFRICA'S GROWTH PERFORMANCE: AN ANALYTICAL INVESTIGATION

By

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Abstract

The debate about how growth can be generated and sustained in Africa, particularly in sub Saharan Africa has pitched scholars and even policy analysts against one another. Of interest is the debate over the relative roles of foreign aid and international trade in re-starting growth and placing it on a sustained path. A question that is frequently asked is does Africa need aid or trade? The empirical literature is far from being conclusive on the relative impact of aid and trade in fostering growth in sub Saharan Africa. Based on the endogenous growth model, this study seeks to examine the impact of trade and trade related activities vis-à-vis the impact of aid on economic growth. Using a feasible generalized least squares technique on an unbalanced panel of 47 sub Saharan countries from 1970 to 2007, and a set of trade and trade related variable on the one hand and a set of aid variables on the other, while controlling for other important environmental factors, the study observes that the relationship between trade and growth is positive and more robust than the relationship between aid and growth in sub Saharan Africa. However, when the study controls for the impact of commodity price boom, the relationship between growth and trade became less robust. The study observes that the robust relationship between trade and growth is more price-induced than volume-induced, suggesting that favorable international terms-of-trade has been a major driving force behind the trade-growth relationship. The study concludes by making findings-specific recommendations on how aid can work better in sub Saharan Africa and on how trade can be wealth-creating and growth-inducing.

1. INTRODUCTION

That countries use trade to achieve rapid economic growth and reduce poverty is not new in development literature and was made popular by the Scottish economist, Adam Smith, in his 1776 classic work.[1] The experiences of some South East Asian countries since the 1970s have demonstrated that countries can use trade to climb out of low income status. Of course, production is the bases for trade, an economy that intends to participate in the

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[1] Smith, Adam. *An Inquiry into the Nature and Causes of the Wealth of Nations*, London: Methuen and Co., Ltd., ed. Edwin Cannan, 1904. Fifth edition.

global trading system needs to have a sound production base. Thus, if the issue of trade for growth has been around for the past four centuries or so one might ask, "what is the big deal?" Why do we need further discussion on the issue of trade and aid?

Since the late 1970s, Africa, particularly sub Saharan African (SSA) countries, have been net receivers of western financial aid. There are several reasons for the huge financial aid directed towards African countries in the 1970s and 1980s. First, the late 1970s marked the beginning of the collapse of the prices of major primary commodities traded by African countries. With worsening terms of trade, many African countries require financial support. Second was the effect of the 'cold-war'. The West and the East pumped money into Africa to gain alliances and allegiances. Many African dictators capitalized on this. Third was the blatant mismanagement of the various economies by ruthless political elites which saw the erosion of the production base of many countries. Many of the African leaders acted in economically irrational ways and there was limited domestic capacity for capital accumulation and utilization. Of course, we should not forget the external debt issue. With mounting foreign debt and limited servicing capacity due to poor export performance, many African countries relied on external aid for survival. For many primary commodity exporting countries, the so called 'Dutch disease' was already entrenched. With the end of the cold war, emergence of new and attractive markets, and rapid financial globalization, Africa was faced with a new reality—the drying up of aid inflows. To attract further financial assistance from donor countries, agencies, and multilateral lending institutions, African countries were required to 'structurally adjust'. The adjustment process and financial assistance came with some very stringent conditions attached to it. It was called "conditionalities."

After over two decades of adjusting, many countries have observed that the social cost, and in some cases the political cost, of adjustment is high. The much expected export boost seems to be a mirage while international commodity prices continued their downward journey. Aid flow to Africa is also on the decline (compared to other part of the developing world). The continent is now faced with deteriorating trade balance and declining aid inflow—double calamity. This has led to the debate about what Africa needs to restore growth and get out of the low income status. In general, many analysts are of the opinion that, given recent experiences, trade (and not aid) is the answer while some are of the opinion that aid is important in jump-starting economies of SSA countries. In fact the debate has turned to a kind of "trade versus aid" argument. Analysts are of the opinion that external aid had grown significantly, at least in absolute terms, but paradoxically, sub-Saharan Africa countries have become poorer over time instead of being better off. This is in sharp contrast to the experience of other part of the world, particularly South East Asia countries, which have succeeded to create vibrant economies and have become high income economies without the kind of aid SSA countries received. Obviously, the questions that readily comes to minds of observers is what has SSA countries achieved with aid and has aid positively (or even negatively) impacted on economic growth in SSA countries. Asian countries have been able to create economic systems which are largely export-driven. This model is been suggested for African countries.

However, the aid-versus-trade debate model of development for SSA countries can be contextualized from the new focus on the MDGs (Millennium Development Goals) which

requires the rich economies to provide increasing aid to the poorer countries coupled to the inability of countries to agree on a new global trading system that might have benefited many developing economies in the Doha round of World Trade Organization talks. Thus, this paper sets out to examine the roles played by trade and aid in the growth process of SSA countries with the aim of making informed contribution to the theoretical and empirical debates. The paper does not set out to discriminate amongst both strategies, but rather to provide empirical support in terms of the relative impact of both variables to economic growth in SSA countries. The subsequent sections of the paper are as follows. First I discuss the basic theoretical relationship between aid and trade on the one hand and growth on the other. I then present some stylized facts on aid, trade, and growth in SSA countries. Subsequently, the empirical framework for analysis is presented after which the results are presented and discussed. The study is then concluded.

1.1 Theoretical Considerations

1.1.2   The Aid-Growth Relationship

Generally speaking the development literature is not clear about how aid is suppose to affect economic growth, however, researchers have justified the aid-growth relationship by resorting to the famous 'two-gap' model of Chenery and Strout (1966) which itself is an extension of the famous Harrod-Domar model of growth.[2] The model develops from a simple national income identity as follows:

$$Y = C+I+X-M \qquad (1)$$

Y is GDP (gross domestic product). Here note that government expenditure, G, is included in consumption, C, (private and government) and investment, I, (private and government). X and M are, respectively, export and import of goods and services. The gist here is that to reach the desired GDP growth rate (g), I and net exports (X-M) must reach certain levels. Domestic savings, S, is required to finance I, and M is required to make certain imported capital goods available to produce and export. Thus, with a little rearrangement of equation (1) we have:

$$Y-C-I = X-M \qquad (2)$$

If we let S=Y-C, then we can write equation (2) as;

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[2] It is important to state that the famous Economist Walt Rostow in his 1960 book also described how aid can be imperative in mobilizing savings to generate sufficient investment for growth, thus reducing domestic capital constraint (Newark 1995: 228).

(S-I) = (X-M)
$$(3)$$

Here come the savings (S-I) and external (M-X) gaps. Note that these gaps are not additive. In other words, the government should do its best to cover the largest of the two gaps (whether the domestic or foreign gap), once the largest gap is covered, the other will not form a problem. If the government successfully determines the larger of the two gaps and the required amounts to cover it, then the means to finance must be found. The most commonly used are foreign borrowing and foreign direct investment (FDI).

Over the years, African countries, particularly SSA countries, have relied on foreign borrowing to cover for the gap. Foreign direct investment flow to Africa in general has been very poor. FDI flow is mainly to the mineral extractive sub-sector. With mounting debt burden, poor export performance, and poor FDI flow, the only way to finance an external gap is through foreign aid.

1.1.2   The Trade-Growth Relationship

The trade-growth relationship is anchored to the general Ricardian framework/model of international trade. This model suggests that, given technology and preferences, under perfect competition, trade will lead to growth and improved welfare based on comparative advantage. Comparative advantage can come from different sources such as productivity, technology, cost, factor endowment, and so on. I will not pursue this issue further here.[3] What is to be noted is that the pure theory of trade suggests that, under certain conditions, trade is growth inducing and welfare enhancing.

It is a well known fact that SSA countries' capacity to export has not improved significantly in the past 30 years since 1970. Coupled to this is the collapse of international commodity prices. Hence, SSA countries are faced with worsening terms of trade. This implies that, over the years, many SSA countries could not finance their external gap (X-M) through export, thus, the increasing reliance on external debt and foreign aid to finance the gap.

1.1.3 Some Empirical Views

a) Aid to Growth

Several empirical studies have been carried out to examine the impact of aid on growth. Due to severe data limitations, most of the studies done in the 1960s, 1970s, and 1980s were very inconclusive. There was also the problem of specifying correctly the mechanism

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[3] Interested reader is referred to any standard text on international trade.

through which aid impact on growth. An extensive review of the literature can be found in Hansen and Tarp (2000) and Clemens et al. (2004). It should be emphasized that recent interest in the subject was sparked by the work of Boone (1996) which observed that aid finances consumption rather than investment suggesting that aid is not effective in stimulating growth. The paper introduces some political variables as determinants of aid thus avoiding the issue of reverse causation. Burnside and Dollar (2000) study examine some of the skepticism observed in Boone (1996) and also attempt to forge a consensus. Researchers that have shown interest in this subject include Hansen and Tarp (2001), Dalgaard and Hansen (2001), Guillamont and Chauvet (2001), Collier and Dehn (2001), Lensink and White (2001), Collier and Dollar (2002), and Easterly (2003). Essentially, the studies were some kind of variant of the Burnside and Dollar (2000) by introducing additional variables such as the square of aid, terms of trade shocks, variability of agricultural output and exports and such other variables as interactive term combining aid with terms of trade shocks.

It should be observed that some of the studies confirm the position of Burnside and Dollar that aid is effective only under a good policy environment, while others studies observed that when some other variables are introduced into the model, the coefficient on the interaction between aid and some policy variables approaches zero and in many cases becomes statistically insignificant. However, Easterly (2003:26) points out that "This literature has limitations: how to choose the appropriate specification without guidance from theory, which often means there are more plausible right-hand side variables than there are data points in the sample." In a recent study, Rajan and Subramanian (2007) found little robust evidence of a positive (or negative) relationship between aid inflows into a country and economic growth. The paper also found no evidence that aid works better in better policy or geographical environments, or that certain forms of aid work better than others. The study concludes by suggesting that for aid to be effective in the future, the aid apparatus will have to be rethought. In sum, recent studies are also inconclusive about the impact of aid on growth.

b) Trade to Growth

The literature on trade and growth is enormous and I will not attempt to review all here. However there are some influential papers on the subject which I would like to discuss their major findings. First, it should be pointed out that, though related, there is a clear distinction between trade policy (openness/liberalization) and trade itself. However, in many studies, this distinction is blurred. I would like to maintain the distinction in this paper. A good survey of the literature on openness and growth through the late 1980s can be found in Edwards (1993) which argues that much of the studies have been plagued by empirical and conceptual problems. Furthermore, the paper argues that the issues of endogeneity and measurement errors are not well dealt with in most of the studies making the results very fragile, unconvincing, and inconclusive. Berg and Krueger (2003) provide a more recent survey of the literature. The paper poses two important questions—is trade openness an important determinant of growth and is the growth that is associated with trade liberalization particularly pro- or anti-poor? Rodríguez and Rodrik (2000) argue that a large body of literature provides an affirmative answer to the first question. Berg and Krueger (2003) also demonstrate that increases in openness to trade are an important contributor to growth. Other influential contributions to the subject include Dollar (1992), Sachs and Warner (1995), Edwards (1998), Frankel and Romer (1999), Lee (1993), Harrison (1996), and Wacziarg (1998).

In general, many of the studies examining the differences across countries in the level of output per capita point out that openness is systematically related to growth even when the issue of endogeneity is taken into consideration. Most of these studies are based on cross-country and panel regressions. Some other influential ones with the same submission include Barro (1997), Alcala and Ciccone (2001), Barro and Lee (1994), Easterly and Levine (2001), Dollars and Kraay (2001), Dollar and Kraay (2002), Irwin and Tervio (2000), Islam (1995), Sala-i-Martin (1997), Hall and Jones (1997), Frankel and Rose (2000), and Greenaway et al. (1998).

In terms of trade per se (as against openness), some influential studies include Frankel and Romer (1996, 1999) and Levine and Renelt (1992) who have found modest positive correlations between growth in per capita income and trade share and interpreted the correlation as causation. Barrows (2004) argues that the simultaneity bias issue is a major draw back of many of these studies which can make OLS estimations to overstate the effect of trade on growth of per capita income. The Frankel and Romer (1999) study instrument for trade using geographic characteristics of a country. However, Barrows (2004) argues that omitted variable problem could still exist if growth is determined by these geographic factors.

Due to the inconclusiveness of the literature and the barrage of criticism trailing many of the adopted methodologies and manner of measuring the various variables, there seems to be a qualification of the findings of the openness/trade and growth relationship. The submission now is that, generally, more exposure to international trade <u>may</u> cause faster economic growth, <u>but does not always and necessarily do so</u>, and the determinants of whether trade is good or bad for growth are institutions and other economic policies (Whao!).

The qualification is suggesting that if a country is getting other manners of (socio-political and) economic policies basically right, and has reasonably well-functioning government and institutions, then we should expect trade (liberalization) to enhance growth and development thus raising the quality of life for many more people than it harms. However, if a country only liberalizes trade and does not get things right in terms of other policies, increase trade liberalization by itself could make many more people worse off than it makes better off. This line of argument can now be found in more recent literature such as Wacziarg and Welch (2003), Baldwin (2003), Bolaky and Freund (2004), Chang et al. (2005) and Balat and Porto (2005) among several. There submission is that trade liberalization in itself cannot ensure growth unless some other complementary policies are up and running well.

2. AID, TRADE AND GROWTH IN SUB-SAHARAN COUNTRIES: SOME STYLYZED FACTS

In this section, I make a brief presentation of the trend in major aid, trade, and growth indicators in sub Saharan Africa countries. I attempt to match the behavior of the indicators with major findings in the empirical literature.

Figure 1 shows the trends in major aid indicators in sub Saharan Africa from 1970 to 2006. The data includes figures for Nigeria and South Africa. It can be observed that since the late 1970s when the international prices of primary commodity exports collapsed, through the structural adjustment program (SAP) era and up till the late 1990s, all the major aid indicators suggest massive aid flows to SSA. Of interest is the fact that aid per capita has continues to rise since 2000 while other indicators tend to have stabilized. Though aid as a percentage of gross national income (GNI) has not been too high, the figure has approached about 8 percent since the mid-1980s. Aid as percentage of import of goods and serves have averaged about 17 percent since the mid-1980s, while aid as a percentage of gross capital formation as averaged about 28 percent since the mid-1980s. Of course the figures are averages as there are both upper and lower outliers. However, a tentative conclusion here is that since the late 1970s, on the average, aid flow to SSA countries has risen significantly.

Figure 1: Major Aid Indicators in sub Saharan African Countries
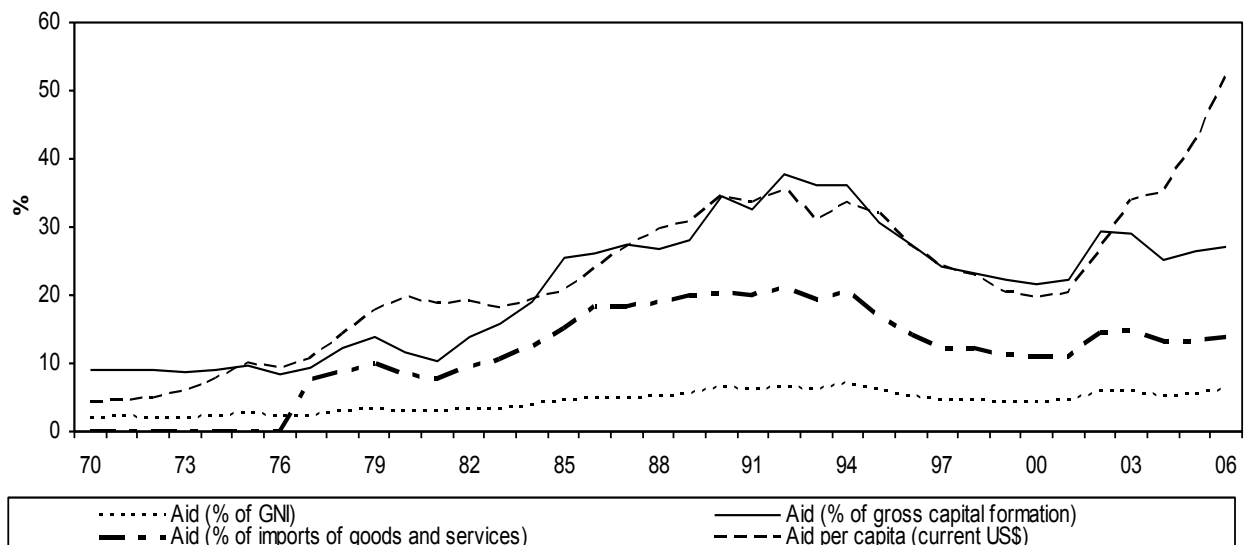
Source: World Development Indicators CD ROM (2008)

Figure 2: Major Trade and Growth Indicators in sub Saharan African Countries.
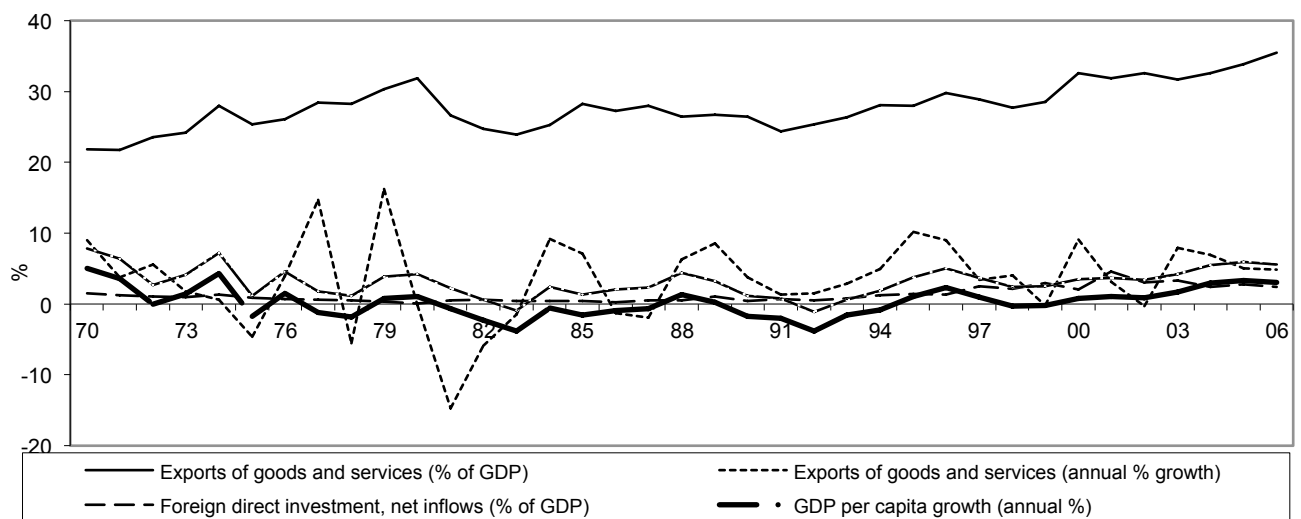
Source: World Development Indicators CD ROM (2008)

Source: World Development Indicators CD ROM (2008)

Figure 2 presents trends in major trade and growth indicators in sub Saharan Africa. It can be observed that export of goods and services as a percentage of gross domestic product (GDP) has been relatively stable since the 1970s. A major reason for this is that the structure of production and export has not changed significantly in these countries. SSA countries have continued to produce and export those (primary) commodities they have been exporting since independence in the 1960s. Figure 2 shows further that the growth of export of goods and serves has been very volatile over time and on the average it has been close to the x-axis (meaning close to zero growth rates). A similar pattern can be found for GDP growth and GDP per capita growth. Foreign direct investment as a percentage of GDP shows a trend that is similar to the others.

Essentially, what Figure 2 is showing is that over time output growth, output per capita growth, export growth, and FDI share in output have all been very low in SSA countries. This definitely implies that external gap in SSA countries can only be largely covered by borrowing or aid flows, as export performance have been very poor and erratic. Despite the massive aid flow since the late 1970s, GDP per capita growth and GDP growth have remained poor. Trade itself has not improved significantly.

3. FRAMEWORK FOR ANALYZING GROWTH

3.1   The Model

In examining the relative impact of aid and trade in Africa's growth process, the study adopts some extensions of the basic Solow-Swan neo-classical growth model. A popular approach is the one developed in Barro (1997) in which economic growth is modeled as a function of two sets of variables—set of initial variables and set of control or environmental

variables. In this study, the variant by Yanikkaya (2003), which is just a further decomposition of the Barro approach, is adopted. Following Yanikkaya (2003), one specifies a growth model in its general form as follows:

$$g_{yi,t} = F(\eta_{i,t}, k_{i,t}, h_{i,t}; Z_{(i,t)}) \tag{4}$$

where $g_{yi,t}$ is the growth rate of real per worker (or per capita) gross domestic product, gdp; $\eta_{i,t}$ is some measure of initial conditions; $k_{i,t}$ and $h_{i,t}$ are, respectively, some measures of (quality and/or quantity of) physical and human capital (per worker), all at time period t for country i. $Z_{(i,t)}$ represents a vector of some controlled or environmental variables. There are various ways in which researchers have attempted to operationalize equation (4) depending on how the vector Z is specified and/or measured and the specific production function adopted. In the sense of the Solow (1956) growth accounting framework, vector Z is regarded as TFP (total factor productivity) growth—growth not due to accumulation of primary factor inputs. It is not uncommon in growth models to assume that TFP is driven (linearly) by a set of unobserved country specific (fixed effect) characteristics that are time invariant, μ_{0i}, a vector of observed non-input fundamentals, X_{it}, a set of time varying factors, represented by $\theta_{it}t + v_{it}$, where v_{it} is a time varying residual and t is a time trend common to all countries. Hence, TFP growth is modeled as:

$$Z_{(i,t)} = \mu_{0i} + \theta_{it}t + X_{it} + v_{it} \tag{5}$$

It is suggested in the literature that one can think of three different hypotheses: the TFP growth is the consequence of (i) good macroeconomic policies, (ii) just plain good luck, or (iii) a good institutional stance (Jadresic and Zahler, 2000). This implies that the vector X is composed of macroeconomic, external (including aid and trade) and institutional factors. Macroeconomic factors include variables that capture the different macro policy decisions.

3.2 Determinants of Growth Considered

In examining the determinants of long-term growth, growth rate of real per worker (or per capita) gross domestic product, gdp, is usually used as the dependent variable. Thus, the following variables are suggested by the literature as some of the determinants of growth.[4]

3.1.1 Initial Conditions

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[4] It should be observed that the determinants of growth as suggested by the vast literature on economic growth are numerous. Levine and Renelt (1992) identified over 50 of such variables.

This is usually proxied by (log of) some level of income at a given past period (the beginning of the period over which growth is measured). Generally, initial level of real per worker (or per capita) gdp is a common variable (see Harn and Kim, 2000)[5]. Based on the convergence hypothesis, this variable is expected to be negatively related to growth. Variable such as initial life expectancy rate at birth have also been used in the literature to proxy for initial state of heath of the labor force (see for example O' Connel and Ndulu, 2000 and Yanikkaya 2003). Another measure of initial (human capital) condition is the use of (log of) adult literacy rate which is defined as the fraction of population over the age of 15 that is able to read and write at the beginning of the sample period (Temple, 1998; Kourtellos, 2002). Enrolments in secondary or tertiary schools have also been used to proxy for initial level of human capital in terms of educational attainment.

Factor inputs

According to the Solow growth model, factor inputs are important in the growth process. These are measured as logs of $s_{k,i}$, $s_{h,i}$ which are, respectively, the savings rate for physical and human capital accumulation out of real output (having positive impact on growth), and the log of $(n_i + \rho + \delta)$, where n_i is the population growth rate of country i while ρ and δ represent common rates of technical change and depreciation of human and physical capital stocks, respectively. A common practice in the empirical literature is to assume that $(\rho + \delta) = 0.05$ (see for example, Kourtellos, 2002). Hence the variable $(n_i + \rho + \delta)$ can be measured as logarithm of average growth rate of the population plus 0.05 for depreciation. The neoclassical (Solow) growth model predicts a negative impact of this variable on growth.

The measurement of human capital has always been quite problematic in growth regressions (see Lin, 2006). Hoeffler (1999) argues that educational attainment—defined as average year of schooling achieved by the population aged 15 or older—is more appropriate than school enrollment rates in the measurement of human capital. Some authors, like O'Connel and Ndulu (2000), prefer to use 25 years and above. It is agreed that, in general, the human capital variable is also to include measures of health and nutrition of the labor force. Though this is somewhat difficult to incorporate and hence ignored by most studies. A typical implementation of the Hoeffler (1999) measure, as expressed in Lin (2006), is to define human capital as the average number of years of formal education per person among employed people [i.e., the average number of years of formal education per person = [(primary stock × 6 + junior stock × 9 + senior stock × 12 + college stock × 16) / total employed people]. Data on this measure is generally absent for most SSA countries. It should be noted that some authors have used cost based measures of education to measure human capital (see Judson 2002). The cost based approach is particularly difficult to implement in our case due to severe data limitations. Virtually all the sampled countries do not report public expenditure per level of education. Also, the absence of private cost on education makes the approach unattractive in this case. In this study, primary and

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[5] Barro (1997) argues that for certain values of education and health, an increased initial level of GDP per capita could be interpreted to mean a greater stock of physical capital per person (or a larger quantity of natural resources).

secondary school enrolment rates are used to proxy for human capital. The study excludes tertiary enrolment rates due to dearth of data.

In terms of physical capital stock, a popular approach is to adopt the perpetual inventory approach following the work by Nehru and Dhareshwar (1994). This study simply uses an investment rate measured by average proportion of real gross domestic investment (including government) to real GDP (Gross domestic investment, % of GDP).

The Z vector

As argued by Levine and Renelt (1992), there are well over 50 potential variables that can be included in a typical growth regression.[6] In practical terms, it is difficult to include all such variables due to data and sample size limitations. Hence, it is the practice to include the traditional variables and some others judged to be more relevant. As discussed earlier, the *Z* vector will be made up of policy and institutional factors as well as some elements of good luck. Due to dearth of long time series on many variables for many SSA countries, particularly institutional and socio-demographic variables, the study relies largely or macroeconomic aggregates. The variables used in the analyses are as follows:

Role of the Public Sector

- General government final consumption expenditure (% of GDP). This variable is expected to indicate if government consumption expenditure impacts on growth. When the economy is close to full employment, a negative relationship is expected as it would crowd-out private investment. However, at low level unemployment equilibrium, the impact can be positive.
- Gross investment, public (% of GDP). Investment in infrastructure, R&D, and other productive public activities can enhance growth particularly when the economy is experiencing low level employment. Data on public expenditure on R&D for SSA countries is generally absent. Thus, this study relies on the use of public investment while recognizing that not all public investment expenditure would be productive (this variable and gross domestic investment do not enter an equation at the same time).
- Taxes on domestic goods and services as share of total revenue excluding grants (%). The fiscal stance of the government in terms of taxation can be used to stimulate investment and savings if it is on the low side. On the other hand, high taxation would discourage investment and savings thus impacting negatively on growth.
- Fiscal deficit (% of GDP). This is a measure of the impact of the fiscal balance of the central government on economic activities. The impact of fiscal deficit on growth can be positive when there is low level equilibrium or fall in aggregate demand. However, when the money market is highly interest-inelastic, the impact can be inflationary and thus impact on growth negatively.

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[6] A list of commonly used variables in cross-country growth models as contained in the World Bank data set and the Penn World Table data can be found in Ciccone and Jarocinski (2008).

International Trade Restrictions/Openness

▪ Taxes on international trade as share of total revenue excluding grant (%). The growth literature suggests that openness is conducive to growth. Thus, high international trade taxes can discourage trade, which in turn, reduces growth. Trade liberalization is expected to impact positively on growth.

▪ Openness—(export plus import)/GDP (% of GDP). This is another crude measure of the degree of economic openness. This measure suffers several drawbacks, however, this study intends to use it. Data on international capital restrictions are also generally absent for SSA countries.

▪ Export growth (annual growth %). A high rate of growth of export is expected to be growth inducing. Rapidly growing export implies expanding output which could translate to employment and growth. The experience of the South East Asian countries supports this proposition.

Aid Variables

▪ Aid per capita (current US$). Development aid is supposed to create long-term sustainable economic growth. Thus it is expected to be growth inducing. Due to data constraints, this study would not distinguish between the various types of development aid—official development assistance, official aid, and other official flows.

▪ Aid to GDP (% of GDP). Above argument holds for this variable too.

▪ Aid to Import (% of imports of goods and services). Theoretically, as aid increases we expect that the capacity of the recipient economy to import capital goods would increase. This is expected to contribute to capital accumulation and thus growth.

▪ Aid (% of central government Expenditure)

External Debt Burden

▪ Debt service to export ratio, (ex-post %). This ratio is a measure of external resource commitment of a country, thus measuring the relative amount of resource available for development financing. High values would impact negatively on growth as it would lead to resource transfer leaving little for development.

▪ Total External Debt to GDP (% of GDP). The impact of this variable on growth is not linear. With well utilized debt, a ratio up to a point can be growth enhancing while after that point, debt service would be high and growth would be affected.

▪ Concessional debt to export ratio (% of exports). Concessional debt, by definition, has low interest and longer repayment period. They are particularly helpful to low income countries. They are development financing instruments, thus expected to be growth enhancing, again up to a point.

▪ Concessional debt to GDP (% of GDP). The same argument above holds for this variable.

Financial and Banking system Development

▪ Domestic credit to private sector (% of GDP). This variable measures the extent to which the private sector have access to credit thus it is a proxy for the extent of financial development in a country. In a market where the government is a major competitor for

credit in the system, it would stifle credit to the private sector thus reducing investment and growth.

- Money and quasi money (M2) (% of GDP). This is also a proxy for measuring the level of financial intermediation in the economy. The higher this ratio, the higher is the level of financial intermediation, and this is expected to be growth enhancing. Due to paucity of data, a variable such as market capitalization of listed firms (% of GDP) could not be included.

Macroeconomic factors

- Final consumption expenditure plus discrepancy (% of GDP). This variable measures the combined impact of public and household final consumption on economic growth. With low level of economic activity, the impact is expected to be employment generating and thus growth stimulating.

- Gross domestic savings (% of GDP). This variable measures the capacity of the economy to mobilize resources for investment and development financing. High savings rate (up to a point) is expected to be growth stimulating as it provides the required resources for investment. In general, in SSA countries, savings and growth are expected to be positively related.

- Foreign direct investment (% of GDP). According to the endogenous growth model, FDI is a source of knowledge diffusion and technological transfer which are both growth enhancing. Thus, the study expects a positive relationship between FDI and economic growth in SSA countries.

- Terms of trade index (year 2000=100). Defined as the relative prices of a country's export to import, they are sometimes used as a proxy for the relative social welfare of a country.[7] In general, an improvement in a country's terms of trade (the increase of the ratio) is good for that country in the sense that it has to pay less for the products it imports, that is, it has to give up fewer exports for the imports it receives. Thus a positive relationship with growth is expected. This measure also indirectly measures the impact of resource rich SSA countries in driving growth in sub Saharan Africa.

- Current account balance (excluding net official capital grant) (% of GDP). A surplus in the current account is an indication of a healthy economy which could suggest improved export earnings. It would provide the required foreign exchange for financing growth and development. Thus a persistent negative balance could slow growth.

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[7] It should be observed that this heuristic measure has been questioned in the literature on technical grounds and so it should be used with extreme caution in this context.

- Real interest rate (%). This is a macroeconomic indicator of the kind of liquidity market investors are facing. High real interest rate would discourage investment which in turn could translate to low growth. On the other hand, low real interest would encourage investment and thus enhance growth.

- Real effective exchange rate index (2000 = 100) (%). A fall in the real effective exchange rate (either due to depreciation of the local currency or increase in foreign prices) is expected to make domestic goods more competitive internationally, export is expected to rise, thus growth will increase. On the other hand a rise in the real effective exchange rate would reduce the international competitiveness of local goods.

- Inflation (CPI, % Change). Low inflation can be growth inducing while high inflation could be growth depressing. Hence, the relationship between inflation and growth is ambiguous. However, in economies with low level unemployment equilibrium, it is possible that moderate inflation would be growth inducing.

Macroeconomic Uncertainty

- Inflation, terms of trade, official nominal exchange rate (local currency unit per US$) variability. The volatilities of these variables are used to capture the level of macroeconomic uncertainty. Macroeconomic uncertainty is expected to be growth depressing as it increases investment risk and can lead to capital flight. In this study, volatilities in the variables are measured by the standard deviation of the variables over the relevant five-year period. It should be noted that there are several approaches to deriving volatility, however for analytical convenience this study uses the standard deviation approach.

Political Instability

- War Period Dummy—value zero for years of war and unity otherwise.[8] This variable attempts to examine if countries with stable political structure enjoy higher growth. It should be observed that this dummy does not capture the entire political instability space (which includes coups, election violence, revolutions, etc.), but rather, only the space that has generated civil conflicts and wars.

Geography and Oil

- Landlocked dummy—value zero for landlocked countries and unity otherwise. The variable captures the impact of absence of access to seaport on economic growth. Lack of such access increases transaction costs thus discouraging investment and growth. Thus countries that are not landlocked are expected, on the average, to have higher growth rates. Due to severe data constraints, the study could not capture other geographical variables such as absolute values of latitude, distances from the equator,

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[8] Data represent update of Collier and Hoeffler (2004).

proportion of land within 100km of the coast, average temperatures and average rainfall, soil quality, disease and ecology, and so on.

- Oil Dummy. A dummy variable is included to capture the growth pattern of major oil exporters in SSA. The dummy takes the value of 1 from the year the countries started commercial exportation of oil.

Socio-Demography

- Fertility rate (total births per woman), Population growth rate (%), and Life expectancy at birth (total years). These socio-demographic variables are very relevant in the context of the MDGs. High fertility rate increases number of children per household which reduces the chances of the mothers contributing to economic activity. High population growth rates reduce income per head. However, high life expectancy at birth would impact positively on growth. Some of these demographic factors are actually used as part of the variables of the initial conditions. Thus, the initial socio-demographic characteristics of a country could define its growth path into the near (and even distant) future. Thus, in this study, many of the initial condition variables are interpreted in the context of the MDGs.

- Age dependency ratio (dependents to working age population). This variable measures the impact of average national 'family burden' on the work force. The higher is this ratio, the higher would be the burden on the work force, and thus the lower is growth going to be.

Currently, due to absence of sufficiently long time series, this study could not include variables that measure quality of governance, institutions, property rights, rule of law, corruption, and other related institutional and environmental factors.

3.3 Sample, Data, and Scope of Analysis

There are 48 countries categorized in the World Bank data set as being in sub Saharan Africa. However, Eritrea was excluded from the sample as the country's data were part of that of Ethiopia before independence in 1993. The study period covers 1970 to year 2007. The data points are made up of averages over five-year periods—1970-74, 1975-79, and so on. The final data points are averages of three years—2005-2007. The averaging process is done in order to exploit the temporal dimension of the data and to analyze the long-term relation between the determinants and economic growth. Where complete data points are not found for a particular five-year period, the average over the available data points is used. Thus, there are 8 observations per country. Most of the data are derived from the World Bank World Development Indicators (2008) and World Bank African Development Indicators (2007). In few cases, the study resort to specific country reports and profiles to source some data.

3.3.1   Estimation Technique

Thus, based on equations (4) and (5), the estimating growth equation adopted in this study is as follows:

$$y_{it} = \alpha_{it} + x_{it}' \beta + \varepsilon_{it}$$
(6)

where $i = 1, 2, ..., N$ represent the country and $t = 1, 2, ..., T$, the time period. y_{it} is growth of real per capita GDP, x_{it} is the vector of both the initial and control variables, α_{it} is the individual/time effect, β is a vector of parameters, while ε_{it} is the error term. There are various approaches that have been adopted in the literature to address the issue of cross-country growth disparities. Studies such as Easterly (2000), Kraay and Monokroussos (1999) applied Pooled OLS analyses on panel data, Fischer (1993) and Barro (2003) used three–stage least squares, Levine and Schmukler (2003), Claessens, Klingebiel, Schmukler (2003) used FGLS (feasible generalized least squares).[9]

This study reports results from the use of Pooled Least Squares (PLS) and FGLS (for the random effect models) as econometric techniques in the analysis of growth in sub Saharan Africa. The reason for using the FGLS is to take into consideration the existence of variable variances in the residuals between countries, which can give rise to cross-section heteroskedasticity. Thus, to allow variances within a cross-section to differ across time the study uses White heteroskedasticity covariance, which estimate covariances that are robust to general heteroskedasticity. A common test of variable variances of the residuals is the Bartlett, Levene, and Brown-Forsythe tests. This is adopted in the study.

In general, models types as expressed in equation (3) are normally estimated using either fixed or random effect techniques. Both techniques are designed to deal with some observed regular tendency of individual specific components to be higher for some entities than for others. Specifically, the random effect estimator is appropriate if the individual specific component is assumed to be random with respect to the explanatory variables, while the fixed effects estimator is appropriate if the individual specific component is not independent with respect to the explanatory variables. It should be observed that the fixed effect model is a special case of the random effect model rather than the opposite—if the random effect is assumed constant over time, the result is the fixed effects. A common test employed to discriminate amongst the two estimators is the Hausman specification test. The Hausman test tests the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator. Statistically, fixed effects are always admissible with panel data (they always give consistent results) but they may not be the most efficient model to estimate. To be able to

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[9] It is sometimes the case that results from several estimation techniques are reported together.

use as much as possible data, due to the fact that there are some observations missing for some countries at some time periods, the study uses unbalanced data in Eviews 6.0.

4. ANALYSIS AND RESULTS

A usual starting point in modern analysis of longitudinal data is to examine the properties of the data. However, due to the fact that the sample size is small (8 per country per variable in principle) and the fact that the study is adopting the use of unbalanced sample due to missing data problem, it will be inefficient to carry out such tests.

Results from three estimators are reported where feasible. These are pooled least squares (PLS), fixed (FE) and random (RE) effects estimators. The 10 percent significance level is used in interpreting the various results. Table 1 presents the results when only core neoclassical variables are included in the equations. These are variables described as initial conditions and factor inputs. The three estimators indicate that domestic investment (as a percentage of GDP) is positively and significantly related to growth in SSA countries. However, the FE estimator indicate that initial level of GDP per capita and life expectancy are negatively and significantly related to growth in SSA countries. The negative sign of initial level of real GDP per capita is usually interpreted to suggest evidence of conditional convergence in the neoclassical sense.

To this basic neoclassical model, I add trade and aid variables. The results are presented in Table 2. It can be observed that the growth of export is consistently positive and significant while aid as a percentage of GDP is significant in the PLS and RE estimations. However, the variable has negative signs in all the three estimations. Also, openness was observed to be insignificant in the three estimations but surprisingly negative. Aid per capita, though insignificant, changed sign from one estimation to another. A tentative submission here is that export growth is consistently and positively correlated with economic growth in SSA countries. It should be observed that the FE redundancy and the Hausman tests suggest that the FE estimator is more efficient. However, in this estimation, no aid variable is significant and aid as a percentage of GDP is actually negatively signed.

To investigate how trade and aid variables behave as one control for other factors, I systematically introduce other variable to Table 2 to see how both set of variables will behave.

Table 1: Regression Results of Core Neo-Classical Variables.

Dependent Variable ⇒ growth of real per capita gdp (%)				
	Estimator			
Independent Variables ⇓	PLS	PLS-FE	PLS-RE	

Core Neoclassical Variables	Constant	-3.843487 (-2.573)***	2.717109 (1.152)	-3.533923 (-2.312)***	
	Initial gdp	0.000111 (0.467)	-0.002447 (-4.892)***	-4.53E-05 (-0.184)	
	Life expectancy	-0.011429 (-0.344)	-0.125457 (-2.403)***	-0.025531 (-0.741)	
	Primary School	-0.001455 (-0.160)	0.011451 (0.884)	0.001106 (0.115)	
	Secondary School	-0.008687 (-0.519)	0.008121 (0.398)	-0.002967 (-0.177)	
	Population growth	0.151619 (0.645)	0.574218 (2.192)***	0.254599 (1.129)	
	Domestic Investment to gdp ratio	0.263211 (11.174)***	0.178489 (6.092)***	0.259242 (11.114)***	
Cross sections (pool unbalanced Observations)		45 (282)	45 (282)	45 (282)	
R^2 (R^2-adjsuted)		0.36 (0.35)	0.58 (0.49)	0.31 (0.30)	
Standard Error of Regression		3.35	2.98	3.17	
F (prob.)		26.08 (0.000)	6.31 (0.000)	21.23 (0.000)	
Redundant FE test			F =2.67 (0.00) χ^2 =115.85 (0.00)		
Hausman Test				χ^2 = 40.00 (0.000)	

White cross-sectional heteroscedastic consistent t-statistics in parentheses.

***(**)* significance at 1%(5%)10%. FE implies fixed-effects while RE implies random-effects.

In Table 3, two sets of variable introduced are first variables capturing the impact of public sector activity and impact of external debt on growth profile of SSA countries. None of the debt variable was found significant and they are not consistently signed. Government consumption was observed to be negatively related to growth but insignificant. Only domestic taxes as a ratio of tax revenue was observed to be significant in the PLS and RE estimations but found to be consistently positively signed.

The addition of these two sets of variables produced some interesting results in terms of aid and trade. First, in terms of the trade variables, only growth of export was observed to be (consistently) significant and positively related to growth. Other trade variables were not significant. In respect of the aid variables, it can be observed that aid as a percentage of GDP was observed to be consistently negatively signed but significant on in the FE and RE estimations. However, aid as a percentage of import was observed to be positively signed and significant. However, tests suggest that the FE estimation is less efficient than the RE estimation. Again, a tentative submission here is that growth of export is significantly and positively related to growth. Though the FE and the more efficient RE estimation shows that aid as a percentage of GDP is negatively and significantly related to GDP, it is not significant in the PLS estimation.

In Table 4, I add some other sets of variables representing financial development, political stability, geography and demography to the variable in Table 3. It could be observed that none of the aid variables is significant in these estimations. However, the results still indicate some interesting contradictions. It should be observed that results from Table 4 suggest that aid per capita and aid as a percentage of import are positively related to growth, however, aid as a percentage of GDP is negatively related to growth. Again, the growth of export is observed to be consistently positive and significantly related to growth. Other observations are that government consumption (as a percentage of GDP) is negatively related to GDP, domestic credit to the private sector (as a percentage of GDP) is positively related to GDP, the oil dummy indicates that on the average, the major oil exporters are growing faster. Also, there is some evidence that fertility rate is negatively related to growth.

In Table 5, the third column reports the result when other variables—macroeconomic environment and volatility—are included in the regression estimates using PLS. Column 3 indicates that growth of export is positively and significantly related to economic growth and there is some evidence that international trade taxes as a ratio of tax revenue is also positively and significantly related to economic growth. However, it can be observed that aid as a percentage of GDP is now positively and significantly correlated with GDP. Aid per capital is positive but not significant while aid as a percentage of import is also insignificant but now negative.

Table 2: Regression When Trade and Aid Variables are added To the Core model.

Dependent Variable Þ growth of real per capita gdp (%)					
		Estimator			
Independent Variables ß		PLS	PLS-FE	PLS-RE	
Neoclassical Variables	Constant	2.209645 (0.921)	4.581944 (0.899)	2.61873 (1.089)	
	Initial gdp	0.000221 (0.594)	-0.001048 (-0.334)	0.000249 (0.672)	
	Life expectancy	-0.127296 (-2.504)***	-0.214023 (-2.327)***	-0.138206 (-2.730)***	
	Primary School	0.000736 (0.068)	0.020674 (1.047)	0.002092 (0.190)	
	Secondary School	-0.010747 (-0.422)	0.01933 (0.413)	-0.010376 (-0.412)	
	Population growth	0.244216 (0.965)	0.405606 (1.362)	0.230907 (0.964)	
	Domestic Investment to gdp ratio (%)	0.215148 (4.723)***	0.121702 (1.933)*	0.211346 (4.806)***	
Trade Variables	International taxes as a ratio of tax revenue (%)	-0.004106 (-0.254)	0.009868 (0.320)	-0.003939 (-0.239)	
	Openness (%)	-0.002711 (-0.313)	0.012337 (0.457)	-0.001413 (-0.158)	
	Export Growth (%)	0.212869 (6.796)***	0.145911 (3.554)***	0.212648 (7.089)***	
Aid Variables	Aid per capital ($)	0.007678 (1.096)	-0.004802 (-0.220)	0.007702 (1.094)	
	Aid to GDP (%)	-0.110774	-0.064565	-0.111771	

		(-3.168)***	(-0.880)	(-3.188)***	
	Aid To Import (%)	0.013415 (1.140)	0.035631 (1.253)	0.014783 (1.227)	
Cross sections (pool unbalanced Observations)		34 (118)	34 (118)	34 (118)	
R^2 (R^2-adjsuted)		0.59 (0.54)	0.76 (0.60)	0.58 (0.53)	
Standard Error of Regression		2.44	2.26	2.38	
F (prob.)		12.42 (0.000)	4.99 (0.000)	12.10 (0.000)	
Redundant FE test			F =1.53 (0.067) χ^2 =62..74 (0.001)		
Hausman				χ^2 = 22.71 (0.030)	

For the PLS-FE and PLS-RE, White cross-sectional heteroscedastic consistent *t*-statistics in parentheses.

***(**)* significance at 1%(5%)10%. FE implies fixed-effects while RE implies random-effects. Aid as a percentage of central government expenditure is omitted as it reduces the number of cross-sections and observations significantly due to problem of missing data points.

Table 3: Regression Controlling for Public Sector and External Debt.

Dependent Variable Þ growth of real per capita gdp (%)					
Independent Variables ß		Estimator			
		PLS	PLS-FE	PLS-RE	
Neoclassical Variables	Constant	-0.308378 (-0.101)	7.140306 (0.856)	-0.308378 (-0.073)	
	Initial gdp	-0.000432 (-1.030)	-0.004533 (-1.078)	-0.000432 (-1.607)	
	Life expectancy	-0.096931 (-1.808)*	-0.3288 (-2.525)**	-0.096931 (-1.377)	
	Primary School	0.002448 (0.211)	0.033352 (1.317)	0.002448 (0.208)	
	Secondary School	0.027486 (0.986)	0.042206 (0.711)	0.027486 (1.671)*	
	Population growth	0.480699 (1.809)*	0.688389 (1.989)*	0.480699 (1.898)*	
	Domestic Investment to gdp ratio (%)	0.166374 (3.165)***	0.242533 (2.883)***	0.166374 (3.399)***	
Trade Variables	International taxes as a ratio of tax revenue (%)	0.004589 (0.208)	-0.021284 (-0.407)	0.004589 (0.266)	
	Openness (%)	0.005994 (0.638)	0.046477 (1.074619	0.005994 (0.550)	
	Export Growth (%)	0.163495 (4.588)***	0.107677 (1.920)*	0.163495 (5.027)***	
Aid Variables	Aid per capital ($)	0.008415 (1.130)	0.003273 (0.128)	0.008415 (1.516)	
	Aid to GDP (%)	-0.081569 (-1.354)	-0.241429 (-1.898)*	-0.081569 (-2.410)**	
	Aid To Import	0.013095	0.092284	0.013095	

	(%)	(1.007)	(2.206)**	(1.129)	
Public \Sector	Government Consumption to GDP (%)	-0.083338 (-1.175)	-0.168341 (-1.181)	-0.083338 (-1.157)	
	Domestic taxes as a ratio of tax revenue (%)	0.048792 (2.266)***	0.036693 (0.941)	0.048792 (2.427)**	
	Overall Budget balance to GDP (%)	0.015993 (0.410)	-0.036389 (-0.684)	0.015993 (0.296)	
External Debt	External debt to GDP (%)	-0.007509 (-0.915)	0.014114 (0.638)	-0.007509 (-0.960)	
	Concessional Debt to Export (%)	-0.00063 (-0.519)	0.000353 (0.163)	-0.00063 (-0.646)	
	Concessional debt to GDP (%)	0.006812 (0.558)	-0.012549 (-0.501)	0.006812 (0.729)	
Cross sections (pool unbalanced Observations)		32 (93)	32 (93)	32 (93)	
R^2 (R^2-adjsuted)		0.52 (0.40)	0.71 (0.39)	0.52 (0.40)	
Standard Error of Regression		2.25	2.27	2.25	
F (prob.)		4.39 (0.000)	2.18 (0.005)	4.39 (0.000)	
Redundant FE test			F = 0.95 (0.550) $\chi^2 = 48.61$ (0.023)		
Hausman Test				$\chi^2 = 0.00$ (1.00)	

White cross-sectional heteroscedastic consistent *t*-statistics in parentheses.

***(**)* significance at 1%(5%)10%. FE implies fixed-effects while RE implies random-effects. External debt service as a percentage of export is omitted as it reduces the number of cross-sections and observations significantly due to problem of missing data points.

In column 4 of Table 5, the results of PLS estimation while retaining only significant variables are presented. It should be observed that the result presented in column 4 is not just by simply deleting insignificant variables in column 3, but by a systematic process of model reduction. The results presented in column 4 suggest that the three trade variables are positively and significantly correlated with growth while aid as a percentage of GDP is also positively and significantly related to growth. The model is again re-estimated with the assumption of valid fixed-effects. The results are presented in column 5. The three aid variables are observed to still be significant and positive while aid as a percentage of GDP is observed not to be significant. The Model is again re-estimated under the RE assumption. Openness and growth of exports are positive and significantly related to growth while aid as a percentage of GDP is also significantly related to growth. However, it should be noted that the FE redundancy test indicate that the FE assumption is valid.

Table 4: Regression Controlling for Finance, Geography and Demography

Independent Variables ß		PLS	PLS-RE
Neoclassical Variables	Constant	4.388026 (0.799)	4.388026 (0.472)
	Initial gdp	-0.001019 (-1.835)*	-0.001019 (-3.314)***
	Life expectancy	-0.068658 (-1.041)	-0.068658 (-0.747)
	Primary School	0.003431 (0.231)	0.003431 (0.309)
	Secondary School	0.009991 (0.280)	0.009991 (0.269)
	Population growth	0.709911 (2.324)**	0.709911 (6.775)***
	Domestic Investment to gdp ratio (%)	0.108962 (1.762)*	0.108962 (2.374)**
Trade Variables	International taxes as a ratio of tax revenue (%)	0.010302 (0.435)	0.010302 (0.498)

	Openness (%)	0.009376 (0.931)	0.009376 (0.783)
	Export Growth (%)	0.116828 (2.936)**	0.116828 (5.445)***
Aid Variables	Aid per capital ($)	0.010457 (1.195)	0.010457 (1.539)
	Aid to GDP (%)	-0.016535 (-0.245)	-0.016535 (-0.262)
	Aid To Import (%)	0.002925 (0.212)	0.002925 (0.406)
Public Sector	Government Consumption to GDP (%)	-0.125138 (-1.696)*	-0.125138 (-1.675)*
	Domestic taxes as a ratio of tax revenue (%)	0.046066 (1.553)	0.046066 (1.634)
	Overall Budget balance to GDP (%)	0.019748 (0.489)	0.019748 (0.355)
External Debt	External debt to GDP (%)	-0.013698 (-1.367)	-0.013698 (-1.323)
	Concessional Debt to Export (%)	-0.000458 (-0.352)	-0.000458 (-0.427)
	Concessional debt to GDP (%)	0.010301 (0.742)	0.010301 (0.818)
Financial Development	Domestic Credit to Private sector to gdp ratio (%)	0.022856 (1.197)	0.022856 (1.859)*
	Broad Money to gdp ratio	-0.03901	-0.03901

	(%)	(-1.045)	(-1.608)
Political Stability	War (Dummy)	1.162482 (1.017)	1.162482 (1.627)
Geography	Landlocked (Dummy)	-0.997736 (-1.185)	-0.997736 (-1.216)
	Oil (Dummy)	2.513331 (1.595)	2.513331 (2.333)**
Demography	Fertility	-0.941796 (-1.329)	-0.941796 (-1.761)*
	Age Dependency	0.776784 (0.129)	0.776784 (0.183)
Cross sections (pool unbalanced Observations)		31 (89)	31 (89)
R^2 (R^2-adjsuted)		0.58 (0.41)	0.58 (0.41)
Standard Error of Regression		2.14	2.14
F (prob.)		3.47 (0.000)	3.47 (0.000)
Redundant FE test			
Hausman Test			$\chi^2 = 0.00$ (1.00)

White cross-sectional heteroscedastic consistent t-statistics in parentheses.

***(**)* significance at 1%(5%)10%. FE could not be undertaken due to the inclusion of some dummy variables.

Table 5: Full Variable Regression.

Dependent Variable Þ growth of real per capita gdp (%)					
		Estimator			
Independent Variables ß		PLS	PLS (Only Significant Variables)	PLS-FE	PLS-RE
Neoclassical Variables	Constant	10640.73 (1.423)	2.326779 (1.324)	0.905524 (1.033)	1.975788 (0.996)
	Initial gdp	-0.000519 (-0.732)			
	Life expectancy	0.025679 (0.323)			
	Primary School	0.013263 (0.860)	-0.011335 (-1.864)*	0.028726 (1.543)	-0.00769 (-1.040)
	Secondary School	-0.026177 (-0.619)	-0.02804 (-2.299)**	-0.027461 (-0.746)	-0.02522 (-1.827)*
	Population growth	0.441201 (4.237)***	0.305678 (3.0313)***	0.402549 (2.229)**	0.362275 (3.325)**
	Domestic Investment to gdp ratio (%)	-0.017455 (-0.299)			
Trade Variables	International taxes as a ratio of tax revenue (%)	0.025698 (1.908)*	0.026718 (1.927)*	0.039702 (2.070)**	0.023315 (1.577)
	Openness (%)	0.00644 (0.464)	0.014619 (2.007)**	0.030109 (2.591)**	0.014787 (1.745)*
	Export Growth (%)	0.133372 (4.038)***	0.163106 (6.152)***	0.088608 (3.054)***	0.14881 (5.325)***
Aid Variables	Aid per capital ($)	0.003274 (0.395)			
	Aid to GDP (%)	0.132678 (2.245)**	0.142895 (6.428)***	0.048999 (0.729)	0.13805 (5.372)***
	Aid To Import (%)	-0.019596 (-1.566)			
or	Government	-0.046669 (-	-0.094239 (-	-0.066072 (-	-0.10653 (-

	Consumption to GDP (%)	0.618)	1.929)*	0.745)	1.932)*
	Domestic taxes as a ratio of tax revenue (%)	0.025147 (0.907)			
	Overall Budget balance to GDP (%)	0.091926 (1.752)*			
External Debt	External debt to GDP (%)	-0.014752 (-2.667)**	-0.018956 (-3.671)***	0.001875 (0.219)	-0.01713 (-2.988)***
	Concessional Debt to Export (%)	0.002053 (3.270)***			
	Concessional debt to GDP (%)	0.007167 (0.517)			
Financial Development	Domestic Credit to Private sector to gdp ratio (%)	0.062228 (3.890)***	0.025238 (3.001)***	0.074746 (3.422)***	0.025854 (2.536)**
	Broad Money to gdp ratio (%)	-0.115634 (-3.727)***	-0.042582 (-2.616)**	-0.14125 (-3.348)***	-0.04394 (-2.230)**
Political Stability	War (Dummy)	1.829696 (1.908)*	1.791093 (1.746)*	2.308327 (2.592)**	1.84863 (1.714)*
Geography	Landlocked (Dummy)	-0.896361 (-0.825)			
	Oil (Dummy)	3.106563 (2.661)**			
Demography	Fertility	-1.597141 (-1.891)*	-0.962016 (-5.254)***	-1.35436 (-7.055)***	-0.944037 (-4.464)***
	Age Dependency	9.453224 (1.365)			
Environment	Final Consumption Expenditure to GDP (%)	-106.4752 (-1.423)			
	Domestic savings to GDP (%)	-106.4411 (-1.422)	0.053387 (8.905)***	0.000939 (0.018)	0.048206 (5.673)***

	Foreign Direct Investment to GDP (%)	0.446234 (2.227)**	0.398409 (8.202)***	0.229604 (3.833)***	0.413745 (8.333)***
	Terms-of-Trade	0.037077 (3.242)***	0.016148 (2.091)**	0.017094 (3.334)***	0.01602 (1.991)**
	Current Account balance to GDP (%)	0.006362 (0.143)	0.058634 (2.429)**	0.057233 (3.452)***	0.058595 (2.352)**
	Consumer Price index (% Change)	-0.018664 (-2.240)**	-0.009545 (-2.029)**	-0.022235 (-2.297)**	-0.010476 (-2.519)**
Volatility	Inflation	0.039156 (0.721)	0.005883 (1.926)*	0.013847 (2.228)**	0.00646 (2.391)**
	Terms of Trade	-0.106698 (-2.252)**			
	Nominal Exchange Rate	0.00042 (0.594)			
Cross sections (pool unbalanced Observations)		27 (75)	32 (114)	32 (114)	32 (114)
R^2 (R^2-adjsuted)		0.76 (0.56)	0.77 (0.72)	0.89 (0.80)	0.75 (0.70)
Standard Error of Regression		1.85	2.06	1.73	1.97
F (prob.)		3.72 (0.000)	16.16 (0.000)	10.10 (0.000)	15.12 (0.000)
Redundant FE test				F = 2.26 (0.003) $\chi^2 = 85.30$ (0.000)	
Hausman Test					$\chi^2 = 0.00$ (1.00)

White cross-sectional heteroscedastic consistent t-statistics in parentheses. ***(**)* significance at 1%(5%)10%. Real Interest rate and real effective exchange rate are omitted as they reduces the number of cross-sections and observations significantly due to problem of missing data points.

4.1. Implications of Findings

This study sets out to examine the relative roles of trade and trade related variables on the one hand and aid on the other on the growth profile of SSA countries. Three trade variables were used—international trade taxes as a percentage of total tax revenue, degree of openness and growth of exports. Also, three aid variables were used—amount of aid per capita, aid as a percentage of GDP, and aid as a percentage of imports of the respective economies. A core neoclassical growth model was first estimated which was then augmented with trade and aid variables. Subsequently, the responses of these variables were observed relative to the inclusion of other control and environmental factors. The following could be observed from the results:

- When the trade variables were added to the core model (see Table 2), taxes on international trade and openness were both insignificant and changed signs over different estimators. However, growth of export was consistently positive and significant over different estimators. Also, in these results, aid per capita and aid as a percentage of imports were both insignificant but the latter did not change sign. Aid as a percentage of GDP is observed to be negative over different estimators but significant in the PLS and RE estimates and also did not change sign. However, the FE redundancy and Hausman tests indicate that the FE estimate is more efficient, which is the estimate in which the aid as percentage of GDP is not significant.
- In Table 3, where public sector and external debt variables are included, it could be observed that of the three export variable, only growth of exports remained positive and significant. In these estimates, openness is positive but insignificant over the various estimators. International trade tax change sign over estimators. Also, aid per capita and aid as a percentage of imports are consistently positive while the latter is significant in the FE estimate. Aid as a percentage of GDP remains negative over all estimators adopted and significant in the FE and RE estimates. However, the FE redundancy test could not be rejected.

- Furthermore, in Table 4, where variables capturing financial development, political stability, geography and demography are added to the model in Table 3, all the trade variable are positive while only growth of exports is observed to be significant over the various estimators. In these estimates, all aid variables were observed to be insignificant over all estimators, while aid as a percentage of GDP continues to be negative. Other aid variables are observed to be positive.

- In Table 5, when all hypothesized variables are included, all trade variables are positive while all aid variables except aid as a percentage of import are observed to be positive. Except in the FE estimate, aid as a percentage of GDP is observed to be significant. Growth of exports continues to be significant and positive. Openness was insignificant in the full-variable PLS estimate but positive and significant in other estimates. It should be noted that aid as a percentage of GDP has become positive while aid as a percentage of import has become positive. International taxes as a percentage of total taxes is consistently positive but insignificant in the RE model.

- Thus, only growth of exports could be described as a robust determinant of growth in the sampled SSA countries over the study period. Irrespective of what variables are controlled for and sample size, the variable remains positive and significant. Aid as percentage of GDP is sensitive to what variables are controlled for and changes sizes under different estimators given same controlled variables. Thus it may not be regarded as a robust determinant of growth. In fact, it direction of impact on growth can best be described as inconclusive.

- Aid as a percentage of GDP could be observed to be positive (and significant) when the study includes variables capturing macroeconomic environment. This is a subtle evidence in support of the proposition that sound macroeconomic environment is a prerequisite for aid effectiveness.

- These results also could be interpreted to imply that the debate should not be about aid versus trade, but rather, both are required (at least in the short-term) in SSA countries growth process.

1. **CONCLUDING REMARKS**

The amount of aid given to SSA countries has grown over time, yet economic performance has not improved significantly. This phenomenon has made observers to question the relevance of aid in jump-starting the economies of SSA countries and many analysts are of the opinion that the focus should be on trade rather than aid. This study provides empirical evidence to support the positive and significant role of export in the growth process of SSA countries. The significance of a variable like terms-of-trade further demonstrate that, with fair prices for primary commodities that SSA countries export, these countries would be able to climb out of the low-income status. This does not suggest that SSA countries should continue to be primary commodity dependent, rather, value-addition to export could be a viable way of improving terms-of-trade of these countries. There is some convincing evidence in the study that, given sound macroeconomic environment, aid can contribute significantly to growth in SSA countries. Thus, SSA countries may need to improve on the macroeconomic environment to ensure that they reap optimal results from aid. The study does not find a robust evidence to support openness as a way of stimulating growth. Though the proxy for openness used could not be described as a perfect one, nonetheless, the evidence is not robust. The ultimate source of growth would come from significant growth in exports rather than aid. The findings could be interpreted to indicate some support for the view that aid can be given to enhance the capacity of SSA countries to trade.

Currently, this study does not claim to have addressed the simultaneity/endogeneity issue in growth regressions as well as the issue of multicollinearity. In fact, it assumes that all the fundamentals are exogenous, which is not always the case. Also, it can be observed that there are more plausible hypotheses than data points, particularly when more qualitative, fixed, and region-specific variables are considered. These are issues that this study considers to be of significant interest for further interrogation. Thus, this current study would provide a platform for comparative analysis of estimates and results when these issues are pursued further. Finally, it should be observed that there are more aid and trade variables that are used in this study. The availability of data is what constraints the use of the current variables.

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