The Impact of Foreign Aid on Economic Growth: The Case of Sub Sahara African Countries

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This is to certify that the thesis prepared by Sara Kefyalew Woldesemayat, entitled: **The Impact of Foreign Aid on Economic Growth: The Case of Sub Sahara African Countries**and submitted in partial fulfillment of the requirements for theDegree of Masters of Science in Economics (Development Economics) complies withregulations of the University and meets the accepted standards with respect to originalityand quality.

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Abstract

This paper investigates the impact of foreign aid on economic growth of Sub Saharan Africa countries. Its aimed at explaining the trends of the flow of foreign aid, investigating the relationship between foreign aid and economic growth as measured by the GDP and determining the magnitude of the impact. Taking a panel of 11 Sub Sahara African countries and employing GMM regression model, this study investigated the impact of foreign aid on economic growth of Sub Sahara African countries. This study covers a period of 30 years from 1988 to 2017. The key variables of this study are ODA, FDI, capital formation, school enrolment, population growth rate, net export and government expenditure. The findings of this study show that for SSA countries, foreign aid has positive, statistically significant and inelastic impact on economic growth. The results also suggest that the aid-growth relationship is non-linear and foreign aid has diminishing returns as the volume of aid increases. The study recommends to reduce aid dependency and to further study the conditions under which aid performs well.

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Table of contents

List of Figures and graphs

List of Tables

List of Appendix

List of Acronyms

ARDL	Autoregressive Distrusted Lag
DAC	Development Assistance Committee
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GMM	Generalized Method Of Moments
LDCs	Least Developed Countries
ODA	Official Development Assistance
OLS	Ordinary Least Square
SSA	Sub Sahara Africa
WB	World Bank

CHAPTER ONE: BACKGROUND OF THE STUDY

1.1 Introduction

Developing countries are characterized by scares resource economies, specifically capital-related. Capital to boost economic growth and welfare is largely insufficient domestically, which consequently necessitates external capital inflow. An external capital readily available to support development comes from foreign aid. It began in the late 1940‘s with the purpose of reconstructing the war-torn economy of Western Europe.

Developing countries need larger amount of capital, when compared to other developed nations, than they can save domestically in order to bust their economy. Most of the time, this capital gap is felled by aid they receive from other countries. Developed countries such as the United States and international organizations such as the World Bank and the International Monetary Fund provide assistance that attempts to help the economic growth of developing countries. The United Nations adopted the Millennium Development Goals (MDGs) in September 2000 (United Nations, 2009). The MDGs are representative of the partnership between countries, rich and poor, to achieve a common goal of commitment to increase overall living conditions. Living conditions can improve when a country experiences economic growth. Since their introduction in 2000, the principal goal of MDGs is to reduce world poverty by half by the year 2015.

Poverty is measured by the proportion of the population living with an income below the threshold income level set. These goals not only target the reduction of poverty but they also include: achieving universal primary education; promoting gender equality while empowering women; reducing child mortality by two thirds; improving maternal health; combating diseases; ensuring environmental sustainability; and developing a global partnership for development (United Nations, 2009).

Since poverty is one of the attributes of underdevelopment, development assistance or foreign aid is one way to achieve these goals. Foreign aid is defined as the “voluntary transfer of public resources” from one country to another “to better the human condition in the country receiving the aid” (Lancaster, 2007: 9). Foreign aid is measured by the net flow of resources. There are two measurements of aid used in foreign aid research: effective development assistance (EDA) and official development assistance (ODA). EDA is the sum of grants and the grant equivalents of

official loans whereas ODA includes both the direct grants and concessional loans for which the grant component is above 25 per cent. (Daalgard and Hansen, 2001). EDA combines aid in the form of direct grants and the portion of loans that are grants adjusted for inflation to reflect the real cost of providing the aid. ODA comprises direct grants and loans that have a grant component greater than 25 percent. Although the definitions of EDA and ODA differ, the results from using either measurement are comparable when studying the effect of foreign aid on economic growth.

Foreign aid is referred to a transfer of resources between countries in the form of grants and loans. (WDI, 2015) Official development assistance (ODA), in specific, is defined as "government aid designed to promote the economic development and welfare of developing countries" (OECD, 2014). Its impact is usually measured in terms of economic growth and poverty reduction. (Paul A. et al (2016)

The relationship between foreign aid receiving countries and their economic growth have been the issue of researchers since the 1950s, after the implementation of the Marshall Plan. It was in 1948 when US gave foreign aid which significantly contributed to the rebuilding of war-torn Europe. Initial findings were rewarding (Papanek, 1972); however, subsequent studies reached at different conclusions, with several cross-country studies finding that aid, in fact, had a negative impact on growth (Griffin and Enos, 1970; Easterly, 1999). Currently, even though there is still a debate, foreign aid is taken to be effective on average. Many researchers (like Mustafa E. et al., 2018, Clemens, et al, 2004) argue that aid is conditional on certain factors, and a large portion of the current literature is dedicated to finding the environment in which aid is most effective. Others disagree, finding that a "good" policy environment is not necessary for the achievement of aid-induced economic growth.

Many studies (Mustafa E. et al.,2018, Clemens, et al., 2004, Larsen, 2016, Ahmed, 2014, Haile, 2015, Mbah and Amassoma,2014) have analyzed the overall effect of aid on economic growth for different countries and found different results. This research provides more insight on whether aid giving to developing countries is effective on bringing economic growth using generalized method of moments (GMM) model.

1.2 Statement of The Problem

Sub Sahara African countries have been major recipients of international aid and there is significantincrease in the inflow(Haile, 2015) Despite notable donor intervention in the countries' economy, less economic growth and poverty reduction have been recorded. This put the actual role of foreign aidinflow in question. Even with this paradoxical scenario, there are few researches (Aurangzeb et al, 2010, Mustafa et al, 2018, Alabi, 2014) capturing the attention of assessing the effectiveness of aid in SSA countries in order to find out whether aid has been effective or the persistent poverty in these countries is not the result of the ineffectiveness of aid.

At present, the debate over the aid-growth relationship is particularly relevant to Sub-Saharan Africa (SSA) for a number of reasons. This is mainly because the Millennium Development Goals of the United Nation which was aimed at reducing poverty by half of the 1990 level by 2015, is probably not meted in SSA even though there is substantia aid flow. (Addison et al, 2005). In addition, the growing global financial crisis is leading to an increasing signs of donor exhaustion and growing concern for government debt levels (OECD, 2012), which threaten to further stagnate economic development in the region.

Research into the effect of aid in SSA benefits both donors and recipients, as findings can improve understanding of how different types of aid work, which types have the greatest impact, and the environment in which aid is most effective. Outcomes of such research can facilitate the design and implementation of policies that are capable of improving aid effectiveness further, as well as enhance the capacity of aid-recipient countries to use aid effectively. In addition, findings in support of the effectiveness of aid can help overcome donor exhaustion.

This study analyzes the impact of foreign aid on economic growth of eleven SSA countries, for whom there is no much research is done jointly, using recent 30 years (1988-2017) data by employing a system GMM model. Unlike the previous studies, this study makes the analysis assuming aid is managed well and it is employed for the intended purpose, which is development in this case. This study adds to the existing empirical literature and lead to a conclusive decision on the impact of foreign aid on economic growth.

1.3 Objectives

1.3.1 General Objective

The general objective of this study is to investigate the impact of foreign aid on the economic growth of Sub Sahara African countries covering 30 years data using GMM model.

1.3.2 Specific Objective

More specifically, the study is design to:

1) explain the trends of the flow of foreign aid in the SSA countries during the past three decade (1988-2017)
2) investigate the relationship between foreign aid and economic growth as measured by the GDP; and
3) determine the magnitude of the impact of the flow of foreign aid on the GDP of the Sub Sahara African Countries during the past three decades.

1.4 Hypothesis

In order to meet the objectives of this study the relationship between foreign aid and the growth of GDP is analyzed. The null hypothesis for this relationship isthe existence of positive relationship between foreign aid and the growth of GDP for SSA countries. The other hypothesis tested is the significant effect of foreign aid on GDP with null hypothesis supporting the existence.

1.5 The Scope of the Study

This study related Foreign Aid to the growth of GDP using 30 years data starting from 1988 to 2017 focusing on the Sub-Saharan African countries. The study starts by describing the trends of the flow of Foreign Aid in mainly focusing on the SSA countries during the past 30 years. Then the study investigates the relationships between the flow of Foreign Aid and the growth of the GDP of the target countries and whether foreign aid increase the growth of the GDP of the economies of the Sub-Saharan African countries during the past 30 years.

1.6 Significance of the study

The number of studies conducted so far on the impact of foreign aid on economic growth for Sub Sahara African countries, using the same sample countries, is limited in number, in which further study is required. Therefore, this study will add to the existing literature help to reach in to a conclusive relationship. Foreign aid is a back bone of Sub Sahara African countries' economy (Rajan and Subramanian, 2005), therefore the expected outcome from this study could help in the process of policy making.

1.7 Limitation of the Study

The restrictions of this study consist of geographical and institutional limitations. The regression of this study is limited to the region of Sub Sahara African as recipient countries of foreign aid. The existing institutions are different for each country and this could affect the expected result, even though its considered under the error term.

1.8 Organization of the Study

The study is organized into five chapters. Chapter one was background of the study covering introduction, statement of the problem, general and specific objectives, hypothesis to be tested, scope and significance of the study. The second chapter presents a brief review of both theoretical and empirical literatures, and the third chapter deals with analysis of economic model including model specification, description of variables, expected signs of coefficients and empirical analysis. The fourth chapter deals with discussion and interpretation of results. While the last chapter is conclusion and recommendation.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1 Conceptual Literature

2.1.1. Definitions

Formal definitions of aid were not developed until 1969 and have been continuously refined. (Führer 1994). Very recently, Daniel and others (2017) defined aid as 'resources transferred from one government to another foreign government on concessional terms that attempt to accomplish a foreign policy objective of the aid-granting government'. This definition was given three dimensions. The first one is they included aid across diverse issue domains and sectors, such as humanitarian and military aid. Second, they considered aid flows transferred through various channels, including direct cash and other material resource transfers such as in-kind aid, but also aid in the form of training and other services delivered by individuals of the donor government. Third, they included a broad palette of actors as potential donors and recipients.

Foreign aid has different concepts. The Development Assistance Committee of the Organization for Economic Cooperation and Development (OECD) defines it as official development assistance; consisting of grants or loans that one government or multilateral organization gives to a developing country to promote economic development and social welfare. Inanga and Mandah (2008) stated foreign aid as an international transfer of capital, goods, or services for the benefit of other nations. This kind of aid could be offered in several forms such as Capital transfers, in cash or kind, either as grants or loans, Technical assistance and training, usually as grants in the form of human resources and technical equipment, and Military assistance in the form of either equipment or training advisors.(Inanga and Mandah (2008))

The concept of aid for developmental assistance takes the forms of official assistance and official flows. The WB gives official development assistance and official development finance different meaning. That is official development which consists of grants plus concessional loan that have at least a 25 percent, calculated at a 10% discount rate, grant component is the subset of official development finance (WB, 1998). Broadly speaking ODA includes the costs to the donor of project and program aid, technical co-operation, forgiveness of debts not already reported as ODA, food and emergency aid, and associated administrative expenses.

The causal relationship of ODA and other explanatory variables with GDP growth rate is summarized as follows:

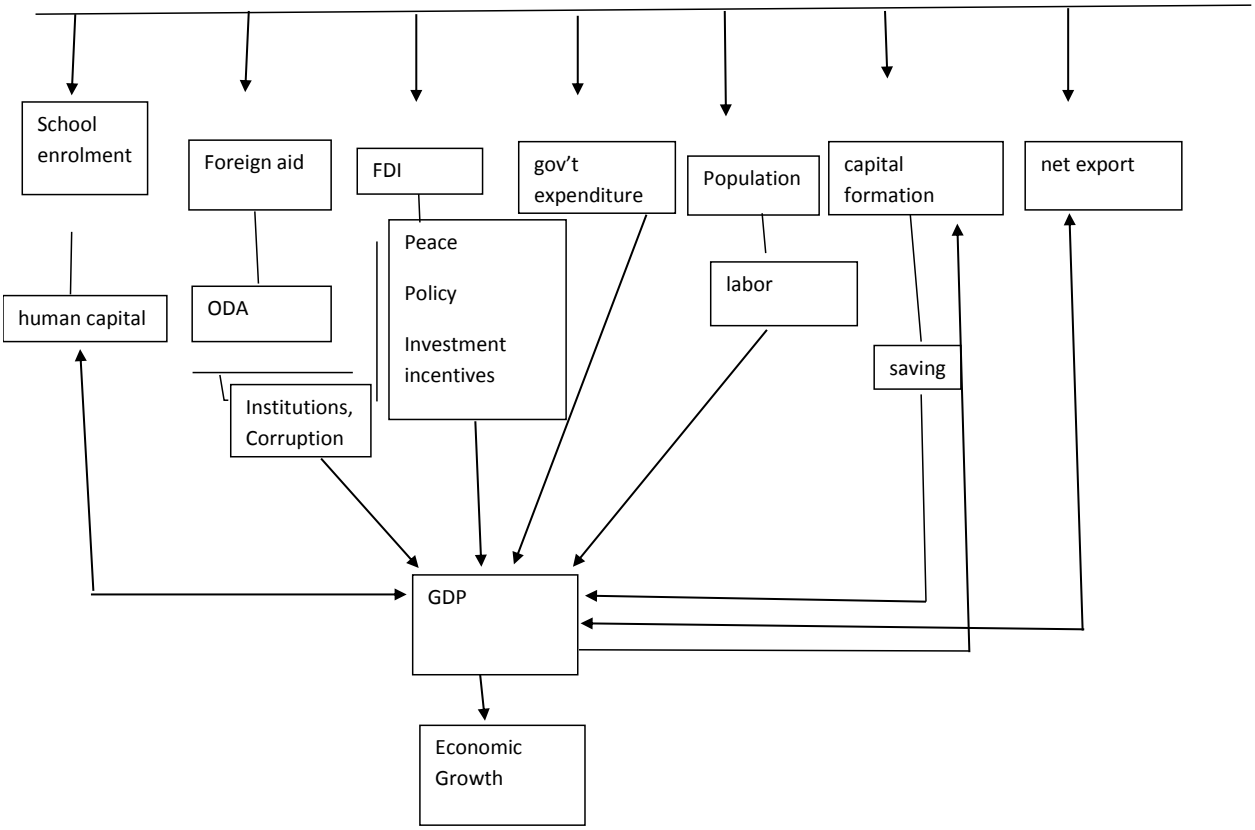


Figure 1: Conceptual frame work

2.1.2 Motives and Rationale of purposes of foreign aid

The motives of donating aid for foreign countries can be generally classified in to two, humanitarian motive and strategic interest motive. (Subhayu B. and E.Katarina Y., 2013) The humanitarian motive could be explained in terms of the desire to improve the living standard of aid receiving country. It could also be to help out temporary problem a country is facing like drought, epidemic disease and so on. It is based on the interest to help other countries with no further interest in mind. As stated by Rostow W.(1960), foreign aid could also be aimed at financing production investments and help countries through their take off stage of growth.

While in strategic motive, foreign aid is given with expectation of some benefit from the aid receiving country. (Leonard D. and Claude M.,1976) The expected benefit could be in terms of

donor's economic activity like opening up for trade and be mark for products of donor country. It could also be to have support of political strategy of aid receiving country. This motive of donating aid is becoming more dominant especially in recent years. (Subhayu B. and E.Katarina Y., 2013).

The economic objectives of foreign aid are poverty reduction and increasing savings, investment and rate of growth of GNP in developing countries. However, in many cases donor motives for giving aid and recipient motives for accepting it conflict with the economic objectives of foreign aid. According to Todaro (1989) there is no historical evidence that over large periods of time donor country assist others without expecting some corresponding benefits (political, economic, military) in return. This leads to the non-achievement of objectives of foreign aid in many cases.

2.1.3Arguments on foreign aid

There are two arguments on foreign aid, those who focus on the essentiality of aid to support the least developed countries (LDCs) promote economic and social development. While the others argue that foreign aid is an instrument to implement neo imperialism and it's better to focus on solving internal problems of LDCs than seeking for aid.

The argument supporting the impact of aid is presented in terms of economic rational, foreign aid can help in felling the gap that is created due to the imbalance between saving and investment. Most of LDCs are characterized by deficit and wider resource gap (Mustafa E. et al.2018) This further leads to imbalance of macro economy of the country by leading to a more import of goods and services than export. In other words, it will create foreign exchange gap or trade gap. This gap could be covered by inflow of capital from abroad. This could be in terms of loans, foreign development assistance or private foreign investment. This inflow of capital enables LDCs to invest more than what they saved and boost their economy. resource constraint could also be solved since the country could import more than they could be able to afford by their own capacity.

Other than feeling financial gap, foreign aid could also fill technological and man power gap of developing countries. (Mbah and Amassoma, 2014). Most of Sub Saharan African countries are characterized by this lack of advanced technology and man power to operate it.

Whereas in the argument against forging aid to governments is presented to be dangerous because it increases the power of the elite in the recipient governments. This leads to corruption and hinders economic growth. In particular, Bauer noted that aid discourages the growth of private sector investments and encourages public sector-led growth because profit goes to the government. This limits growth and further inhabits development.

2.2 The Harrod-Domar growth model

Until the mid-nineties, empirical studies on aid-growth relationships were made based on the growth theories that stated growth process depends on the accumulation of capita. Investment was taken as a major determinant of economic growth. Developing countries are characterized by a low saving rate which is because of their low per capital income. The lack of saving which is crucial for investment was taken as the single limitation for these developing countries to growth.

While the Solow growth model takes economic growth as a result of capital and labor. To include other output determining factors than capital and labor, Solow decomposed growth in to three components: labor, capital and total factor production, which is usually referred to as Solow residual. It is called residual because the estimate present the part of measured GDP growth that is not explained by the weighted-average measured growth of the factors of production (capital and labor). To explain this, Solow used the Cobb-Douglas production function as follows:

$Y = f(A, L, K)$ ……(1)

Where Y is total output

A is technological advancement

L is labor and

K is capital.

Solow stated this equation using Cobb-Douglas production function as:

$Y = AK^{\alpha}L^{1-\alpha}$ …… (2)

The Harrod-Domar used the Keynesian aggregate demand model to split goods in to consumption and investment goods as follows:

$Y_d = C + I$ …… (3)

Where $Y_d$is aggregate demand

C is consumption good and

I is investment.

The Harrod-Domar model assumes that productive investment is always equal to saving, so

$I = S$ ……..… (4)

Where I is investment and S is saving

Saving could be generated locally or could be financed from abroad. Thus, foreign capital inflows, foreign aid in specific, is needed to fill the saving gap that prevails in the developing countries. If they get foreign aid, they can grow more rapidly than they can manage by just using their own resources.

2.3 Empirical literature review

According to Sachs, (2006), cited by Ahmed (2014), the economic objectives of foreign aid are poverty reduction and increasing savings, investment and rate of growth of GNP in developing countries. However, in many cases donor motives for giving aid and recipient motives for accepting it conflict with the economic objectives of foreign aid.

The Gap model popularized by Chenery and Strout (1966) remains the most influential in projecting the macroeconomic impact of foreign aid (Asongue, 2012:4). In this model, developing

countries face shortages in savings and export earnings to meet the necessary level of investment to achieve the desired level of economic growth. If a country is unable to fill this gap through its domestic sources, an inflow of foreign aid is needed to move the country's economic growth upwards. (Hoda ,2013)

Carol et.al, as stated by Roosevelt S. (2018), take foreign aid to be beneficial and successful in addressing Africa's development problems. Their argument states that aid helps in achieving growth by expanding the economy, sustaining development, reducing extreme poverty and disease, improving social service access and democratic governance. They claim that foreign aid has significantly contributed for Africa's economy and living standard for the last three decades.

Calderisi, while stating the successfulness of foreign aid in Africa, argued that the problem of African development is its own. The problem of development is not colonialism, the cold war, natural resource abundance or the supposed inequality in globalization of the world. Africa's problem, as stated by Calderisi, is mainly authoritarian government, high corruption, absence of accountability and unattractive environment for foreign investors to invest in industrial and agricultural production in the continent.

On his study of Liberia's development complexity though the impact of foreign aid, Seedee (2018) sow that for aid to be effective the institutions of the country must be well functioning. This includes the case of corruption, human rights abuse and inequality, which are out of the concept of aid.

Mwanamanga (2015) investigated the argument on whether foreign aid contributes for economic or not using the case of Malawi covering the period of 1960s up to 2012. He made an empirical study using OLS time series analysis. The results showed that aid had negative and highly significant effect on economic development. He used three different models to confirm his conclusion and all of them confirmed that aid encourage higher government consumption rather than investment. Furthermore the study indicated that the effectiveness of aid depends on circumstances like the structure of governance, policies and political will.

Alabi (2014) studied the impact of agricultural foreign aid on agricultural growth for 47 Sub Saharan African countries using generalized method of moments (GMM) for the period covering from 2002 up to 2010. The result of the study showed that the agricultural aid had passivity and significant effect on agricultural GDP for sub Saharan African countries increasing productivity by 10%. Disaster and conflict were also found to had positive and significant impact on aid receipt at 5% significance, showing that foreign agricultural aid responds for disaster and conflicts. It also showed that bilateral aid influenced agricultural productivity more while multilateral aid influenced agricultural GDP more than that of bilateral aid.

Keefer and Knack (2000) considered whether foreign aid and institutional quality have any relationship. Quality of governance is defined by the authors as bureaucratic quality, the level of corruption, and rule of law. The results show higher aid levels reduce the quality of institutions, in particular, recipient countries that are dependent on large amounts of foreign aid have low levels of accountability, have more rent-seeking opportunities, prevent talented people from entering the bureaucracy, and reduce pressure for reforming inefficient policies and institutions.

Mustafa E. et al. (2018) studied the relationship between foreign aid and economic growth for the case of Sudan using time serious data for the period 1980 to2015. Analysis was made using autoregressive distrusted lag (ARDL) bounds test for co-integration. The results of the study showed that foreign aid in the form of official development assistance (ODA) had positive and significant long run impact on the economy of Sudan. While the interaction of aid with corruption in the public institution was found to have negative and significant effect in the long run. This negative effect also happens in the short run, reducing the possible contribution of aid for economic growth. The paper summarizes its conclusion by supporting the contribution aid for economic development through enhancing human capital and productivity.

A study done by Easterly, E. in 2004 reexamined the results of Burnside and Dollar's pivotal research with the same model specifications and econometric techniques using more elaborate data. With a sample covering a timeframe from 1970 to 1997 (four years longer than the sampled used by Burnside and Dollar), Easterly exposed evidence that aid does not promote economic growth, even in good policy environments.

Peter, B. (1994) also finds that aid has not raised any growth rates in developing countries either. He conducted a study of the effect of aid on ninety-seven countries over a period of twenty-nine years and discovered aid does not have any positive effect in any element that promotes economic growth such as human and capital resources or domestic investments.

Larsen (2016), studied the effect of linearity in the efficiency of foreign aid on economic growth. The paper extended the human capital augmented Solow model the level of foreign aid and corruption for 75 countries that received official development aid between 1985 and 2013. The result of the study showed that for low income countries, the efficiency of foreign aid is not constant. It also concluded that higher level of aid contributes positively for growth while the low levels of aid tended to have negative effect.

Aurangzeb, Zeb&Stengos (2010) applied a threshold test on standard growth regression to capture non linearity in aid-growth relationship. They found that the magnitude of aid matters in determining its effect on economic growth. They have also defined some threshold level above which the effect of aid would be positive and significant. While testing for the usual aid-policy – growth relationship, they found evidence for a threshold effect in terms of the amount of aid but not for policy variables. The study was made using data covering the period between 1970 and 2000 for 42 countries.

Dowling, M and Hiemenz, U. (1982) studied the aid-growth relationship for the Asian region by using data from 13 countries and employing pooled regression. They found a positive and significant impact of aid on growth. Several policy variables such as trade, finance and government intervention were controlled. However, using pooled regression undermines the findings of this study. Singh (1985) got similar results for a large sample of 73 Asian countries during 1960-70 and 1970-80. For Sub-Saharan Africa, Levy (1988) reported a significant positive relationship between aid and growth. He used a regression model which included aid as a ratio of GDP as the independent variable and income per capita as the dependent variable, covering a period from 1968 to 1982. This study also has problems due to methodological issues.

Ahmed (2014) studied the effect of foreign aid on economic growth taking the case of Sub – Saharan African countries. The result of the study suggested that aid did not have positive significant impact on economic growth. It further suggested that it could had more positive effect if corruption could be handled in both the donor and receiver sides. On the other hand education and foreign direct investments were found to have a positive impact on growth.

While evaluating the impact of foreign aid on economic growth taking a cross country case, Moreira(2005), found that in the short run, aid had less effect than that of the log run period. The aid – growth time lag was also considered while taking the case study. The dependent variables were considered using their per capita forms, which was a departure from the usual Harold Domar model.

Brautigam et al (2004) also showed the weakening effect of large aid quantities on governance quality in Sub-Saharan Africa. She found out that large-scale aid provides little encouragement for the country to improve its governance quality, thus creating soft budget constraints and more rent-seeking opportunities. Further, she proved that aid would increase corrupt activities. Aid

dependence thus leads to circumstances in which bureaucrats are often not rewarded for staying true to their main developmental functions but rather on gaining money from donors.

Haile (2015) used the autoregressive distributed lag (ARDL) approach to cheek whether aid effectiveness depends on stability in macroeconomic environment. He used time serious data from Ethiopian case for the period covering from 1974 up to 2011. The result of his study showed that foreign aid had negative effect on economic growth of Ethiopia, but could have had a positive effect if it was supplemented with stable macroeconomic policy environment

Mbah & Amassoma (2014) studied the linkage between foreign aid and Nigeria's economic growth for the period from 1981 up to 2012. They used econometric models such as ordinary least square, augmented Dicky Fuller and Johansen co integration test for the analysis of the data. The result of this analysis showed that foreign aid and economic growth had negative and insignificant. The studies put institutions, like corruption, quality of governance and miss usage of foreign aid for different purpose than developmental goals, that rival in the country as reasons for the frailer of aid to contribute for growth.

Addison, T. et al (2005) studied the trends in documented foreign aid provided to Africa over the period 1960 to 2002. They mainly stressed on the decrease in foreign aid over the decade as that decrease was bound to affect the standard of living of Africans and have some implications for the African economy as a whole. They argued that the unexpected decrease in foreign aid to African countries would make the Millennium Development Goals (MD Gs) much more difficult to achieve if not impossible. Their results suggested that aid in fact promoted growth and reduced poverty in the sampled countries, and aid had a positive impact on public sector total to induce higher public spending and lower domestic borrowing. Their study emphasized that the Millennium Development Goals (MGDs) cannot be achieved using foreign aid only. To fulfill the Millennium Development Goals (MD Gs), African countries need to explore and exploit other innovative sources of finance.

Some of the earlier studies to investigate the relationship between economic growth, povertyand whether economic growth "trickles down" to poverty reduction made by Thornton, Agnello, and Link (1978, 1980). Using the United States of America (USA) data for the period 1947 to 1974, the two studies found that economic growth alleviates the incidence of poverty. This finding was also supported by de Janvry and Sadoulet (2000), using a panel of 12 Latin American countries

between 1970 and 1994. However, using a sample of Latin American countries, Korzeniewicz (2000) concluded that economic growth had not led to significant poverty reduction in the region.

Dollar (2002), using a different data set and another specification, validated the significance of the policy environment. Collier and Dehn (2001) find that well-timed aid alleviates effects of negative export shocks, while Collier and Hoeffler (2004) find that aid works particularly well in good policy environments a few years after a conflict has ended. Hansen and Tarp (2001), adding a squared aid variable to the regressions, show that aid is effective on average, but with diminishing returns. This finding holds regardless of partner country policy.

Clemens, et al (2004) divided aid into three categories: (1) emergency and humanitarian aid; (2) aid that affects growth over a long period of time; and (3) aid that affects growth over a short period of time. The second category includes aid to health and education as well as to support democracy and the environment, while the third category includes budget support, infrastructure investments and aid for productive sectors. The authors found that the third aid category had a significant effect on growth over a four-year period, while the other categories had no significant effect. Furthermore, the impact was larger than found in similar studies where gross aid had been examined. This path will include a considerable amount of data work. Clemens et al. (op.cit.) used data from the Creditor Reporting System and the Donor Assistance Committee of the OECD.

Arellano et al. (2009) investigated in the case of Ivory Coast and found that as aid increases, it becomes an increasingly dominant influence on economic developments in the model economy. On the contrary, researchers like Moyo (2009a, 2009b), Rena (2008) concluded that aid had no substantial impact on growth, savings or investment. Aid was shown to increase unproductive public consumption (Mosley 1987). Aid is misallocated (donors give aid for strategic reasons to the wrong recipients), aid is misused (recipient governments pursue non-developmental agendas) and GDP growth is not achieved (Lensink and White 2001).

According to Chenery and Strout (1966), developing countries face constraints on savings and export earnings that hamper investment and economic growth. Aid flows are meant to fill the gap between investment needs and domestic savings, Several other researchers also addressed the problem of aid and economic development. According to Bandow (2002) foreign aid has failed

despite the best efforts of many dedicated professionals. Bandow supported his clam by using African countries that received aid in 1970 and1995, The United Nations Development Program reported in 1996 that 70 developing countries were poorer then than they were in 1980 were poorer than they were in 1970. Bandow argument is supported by Dambisa Moyo (2009) also advocated that Limitless development assistance to African governments has fostered dependency, encourage corruption and ultimately perpetuate poor governance and poverty, foreign aid helps perpetuate the cycle of poverty and hinders economic growth in Africa.

For Sub-Saharan Africa, Levy (1988) reports a significant positive relationship in a regression model including aid (as a ratio of GDP) and income per capita, for 1968-82. More recently Hadjimichael *et al.* (1995) find positive evidence for the period 1986 to 1992 using a sample of 41 countries. Their model is more sophisticated than most predecessors by attempting to capture potential side effects of foreign aid (such as 'Dutch-Disease'effects) and other policy variables that are hypothesized to affect growth.

Similarly, Burnside and Dollar (1997), using a model including a variety of policy variables, find that though the ratio of aid to GDP often does not significantly affect growth in LDCs, aid *interacted with policy variables* does. Boone (1996) however has cast doubt on the growth effects of aid, arguing that, for a sample of LDCs, aid has had no impact on either investment or income growth.

Nyoni (1998) explained the relationship between real exchange rate and foreign aid inflows. The results of the study show that due to trade inflows the economic performance of Tanzania was increased. The devaluation of the local currency caused real depreciation but there was real appreciation due to the increased government expenditures. The overall results show that foreign aid does not cause Dutch disease in Tanzania. So, it may be able to continue to have foreign aid and can used for productive investment.

Chatterjee and Stephen (2007) emphasized that in foreign aid shocks the endogeneity of the labor-leisure choice plays a significant role. The results show that the efficiency of foreign aid depends on the externalities which are linked with public goods that helps in finance. Burke et al.2006) does not found the positive relationship between foreign aid and growth for both pre and post Asian crises periods; rather it concludes that FDI and export growth plays dominant role in the growth of the countries

2.4 Evaluation of empirical literature review

As it's shown in the above literature different researchers have found different results on the effect of foreign aid on economic growth. This clearly couldn't make it easy to conclude the type of effect foreign aid has on economic growth of countries. This study contributes its own role in feeling this gap and initiate other similar studies.

CHAPTER THREE: METHODOLOGY

3.1 Research Design

The study uses a quantitative analysis. Quantitative approach is used to determine the magnitude of the impact of the flow of foreign aid on the GDP of the Sub Saharan African countries during the past three decades. This employee an explanatory type of research.

3.2 Sampling Method and source of data

The population of the study is the Sub-Sahara African countries. For this study, 11 SSA countries were purposively selected on the basis ofavailability of the data pertinent to the flow of foreign aid and data related to their GDP growth during the period under investigation. The criterion of the selection of the country were the availability and/or accessibility of data on the flow of foreign aid and GDP growth during the past 30 years starting from 1988-2017. The selected 11 countries of SSA are Benin, Botswana, Cameroon,Ghana, Mali, Mauritius, Niger,Nigeria, Senegal, Seychelles and Togo.This study entirely depends on secondary data collected from world bank data base.

3.3 Description of data and Variables

The empirical model is estimated using eleven (11) sub-Saharan countries' yearly data covering the period from 1980 to 2017. The countries were chosen only on the bases of which sufficient data for analysis is found.

The explanatory variables of the model are described as follows.

1. Education (school enrolment)

The World Bank defines gross enrollment as total enrollment, regardless of age, from the population of the age group that officially corresponds to the level of education shown. Primary education provides children with basic reading, writing, and mathematics skills along with an elementary understanding of such subjects as history, geography, natural science, social science, art, and music.

Literacy has a cost of 1.2 trillion dollars across the world. (world literacy foundation,2015). Literacy brings a better society by encouraging creativity and creating a healthier community. (World Alive, 2018). It also helps in reducing costs such as prison and health care system costs. The literacy rate is measured by educational attainment and /or enrolment rate. Education helps in building human capital which increases productivity then contribute for higher GDP. Accordingly higher educational level is expected to have a positive effect on economic growth.

2. Foreign aid

Foreign aid is the variable of interest and one of the explanatory variables. Aid that will be considered in this paper is that comes in form of net official development assistance recipient countries take.

Net official development assistance (ODA) consists of disbursements of loans made on concessional terms (net of repayments of principal) and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients. It includes loans with a grant element of at least 25 percent (calculated at a rate of discount of 10 percent). (WB data set). The square of ODA is taken to measure the diminishing returns to aid.

3. Foreign direct investment

Foreign direct investment, as defined by the World bank, is the net inflow of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows total net FDI. In BPM6, financial account balances are calculated as the change in assets minus the change in liabilities. Net FDI outflows are assets and net FDI inflows are liabilities.

Foreign direct investment, FDI, contributes for economic growth through its effect on capital accumulation and transfer of technologies to the receiving countries. (Kotrajaras.2010). For this study the direct physical capital will be considered as a FDI.

4. Initial GDP per capita (lag of GDP)

To get a closer perception of the relation between foreign aid and economic growth, initial GDP/capita is used as independent variable. GDP/capita is an annual measure of current US dollars calculated by the World Bank. Initial GDP/capita is logged in this data set to exclude outliers. The control variable GDP/capita in order to test for conditional convergence, meaning that a low GDP will generate a more rapid growth, GDP/capita describes diminishing returns to capital (Barro 1999)

This paper uses GDP at purchaser's prices, which is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. In the World Bank data set GDP is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

5. capital

Capital formation, as stated by the world bank, consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales, and "work in progress." Net acquisitions of valuables are also considered capital formation.

The saving is one of the main factors to that bring an economic growth. Accumulated saving is a sources of capital stock which plays a crucial role in creating investment, production, and employment. And all these activities eventually enhance the economic growth.

6. Population growth rate

In low-income countries, there is a rapid population growth rate with larger younger population. (World Bank). This young generation has a disadvantage in the short and medium term because it increases the dependency level. But in the long run it contributes for the labor force and be economically productive. The Sub Sahara African countries are characterized with this younger

generation. Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values shown are midyear estimates.

7. Government expenditure

Government expenditure refers to expense incurred by the government for purchases of goods and services including compensation of employees. It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation. Its expected to have a negative effect on economic growth.

8. Net exports

Net exports of goods and services represent the value of all goods and other market services provided to the rest of the world less by the value provided to the country. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services.(WB) They exclude compensation of employees and investment income - factor services and transfer payments. It is taken as policy variable and measure of openness of a country. It's expected to have a positive contribution for economic growth.

Instrumental variables

These variables are explanatory variables that are affected by other factors that does not have

impact on the dependent variables. They could also have a direct impact but they are not measurable (whose data is not available). For this model ODA and FDI are chosen to be an instrumental variable. ODA is affected by the relationship between donor and receiver and corruption while FDI is affected country peace, investment encouraging factors and economic policy of FDI receiving country.

Table 1: Summary of categories of study variables and their level of measurement

No.	Variable	Symbol	Type of variable	Expected direction of impact
I	Dependent variable (GDP)	GDP	Continues	
II	Explanatory Variables			
1	Education (school enrolment)	SE	Continues	Positive
2	Official development aid (ODA)	ODA	Continues	Positive
3	Foreign direct investment	FDI	Continues	Positive
4	Capital	K	Continues	Positive
5	Initial GDP per capita	GDP_{t-1}	Continues	Positive
6	Population	N	Continues	Negative
7	Government expenditure	G	Continues	Negative
8	Net export	Ex	Continues	Positive

3.4 Model Specification

Descriptive analysis is made to see the trends on the flows of ODA and growth rate of GDP. Trends of foreign aid and GDP growth rates are displayed using graphs drown for individual countries and overlapping graphs showing trends of both aid and GDP growth rates. Their relationship is discussed by the pattern of flow.

The empirical analysis is done using different panel data estimation models. A fixed effect estimation is used to control time invariant differences between individual countries and avoid biased estimates of coefficients that could occur because of omitted time invariant variables. The fixed effect estimation model has a drawback of not explaining the time invariant causes of the dependent variable. The random effect model, on the other hand, is based on the assumption that variation across entities is. random and uncorrelated with independent variable. It is used to include the effect of time invariant explanatory variables. The drawback of this model is that it could lead to omitted variable bias because some variables may not be available.

The main estimation model of this study is the Generalized Method of Moments (GMM). It is convenient to use this model because the period under study covers more than 25 years (1988-

2017). To decide between deference and system GMM model, the rule stated by Bond (2001) used. First, pooled OLS, for the within effect, and fixed effect models are estimated, and the coefficients for the lagged dependent variable from the pooled OLS estimation is taken as upper-bound estimate and the coefficient in the fixed effect estimation is taken as a lower-bound estimate. Second, one step and two step deference GMM model is estimated. The coefficient of the lagged dependent variable, which is GDP in this case, from the two-step difference GMM estimation is compared with the coefficients of the previous two estimations. If it is close to or below the fixed effect estimate, its suggested that the difference GMM is downward biased and system GMM estimator is preferred.

The analysis is mainly made using two step system GMM model as proposed by Arellano and Bond (1991) with some modification. First, the difference of the dynamic panel data model is calculated, then as an instrument lagged level of the right- hand side of the variables are taken. The dependent variable, per capita growth, is one period lagged and taken as one of the explanatory variables. To prevent estimation problem that occurs because of absence of a strong correlation of instruments with their lagged values, the number of lags is predetermined.

The GMM model, employed by Arellano and Bond (1991) helps in avoiding inconsistency of results and incorrect magnitude and meaning of growth parameters that comes from not considering the reverse causality that occurs between aid and income then with economic growth. GMM model has an advantage of estimating a differentiated equation that helps in avoiding a fixed effect. Using the system GMM also helps in correcting endogeneity by introducing more instruments to improve efficiency and transforming the instruments to make them uncorrelated with the fixed effect. This paper will take in to account that growth takes time and aid couldn’t bring an immediate impact on growth. It takes in to account the time lag value.

3.5 Representation of the Model

Empirical representation the model for fixed and random effects is as follows:

$$gdp_{it} = \beta_1 oda_{it} + \beta_2 (oda_{it}^2) + \beta_3 (\Delta oda_{it}) + \beta_4 (\Delta oda_{it}^2) + \beta_5 fdi_{it} + \beta_6 k_{it} + \beta_7 g_{it} + \beta_8 exp + \beta_9 se + \delta n_{it} + ł_i + w_{it} \quad \text{...}(5)$$

Where gdp_{it} is per capita GDP growth rate in country i, period t

oda is official development assistance

$\Delta oda$is change in official development assistance

$fdi$is foreign direct investment

$k$is capital formation

$g$is government expenditure

$n$is for population growth rate

$se$is for school enrolment

frepresents time period effects

The GMM model is empirically presented as follows:

$$gdp_{it} = \beta_1 gdp_{it-1} + \beta_2 oda_{it} + \beta_3(oda_{it}^2) + \beta_4(\Delta oda_{it}) + \beta_5(\Delta oda_{it}^2) + \beta_6 fdi_{it} + \beta_7 k_{it} + \beta_8 g_{it} + \beta_9 exp + \beta_{10} se + \delta n_{it} + \mathfrak{f}_i + w_{it}$$

$w_{it} = \mu_i + \varepsilon_{it}$……(6)

Where $gdp_{it}$is per capita GDP growth rate in country i, period t

$gdp_{it-1}$is lag value of GDP

oda is official development assistance

$\Delta oda$is change in official development assistance

$fdi$is foreign direct investment

$k$is capital formation

$g$is government expenditure

$n$is for population growth rate

se is for school enrolment

frepresents time period effects

while*w* represents both country effects (μ_i) and the remainder disturbance which varies over both country and time (ε_{it}).

Using the system GMM has an advantage of correcting endogeneity by introducing more instruments to improve efficiency and transforming the instruments to make them uncorrelated with the fixed effect.

The system GMM uses forward orthogonal deviations by subtracting the average of all available future observations of variables instead of su0btracting previous observations from the concurrent one. The system GMM model uses two equations: the original equation and the transformed equation. The first equation is expressed in level form while the second is expressed in first difference form as follows:

Original model:

$$gdp_{it} = \beta_1 gdp_{it-1} + \beta_2 oda_{it} + \beta_3(oda_{it}^2) + \beta_4(\Delta oda_{it}) + \beta_5(\Delta oda_{it}^2) + \beta_6 fdi_{it} + \beta_7 k_{it} + \beta_8 g_{it} + \beta_9 exp + \beta_{10} se + \delta n_{it} + \mathfrak{f}_i + w_{it} \quad (7)$$

The transformed equation:

$$\Delta gdp_{it} = \Delta gdp_{it-1} + \Delta oda_{it} + \Delta(oda_{it}^2) + \Delta(\Delta oda_{it}) + \Delta(\Delta oda_{it}^2) + \Delta fdi_{it} + \Delta k_{it} + \Delta g_{it} + \Delta exp + \Delta se + \Delta n_{it} + \Delta\mathfrak{f}_i + \Delta\mu_i \quad (8)$$

For the difference GMM we don't need to transform the model.

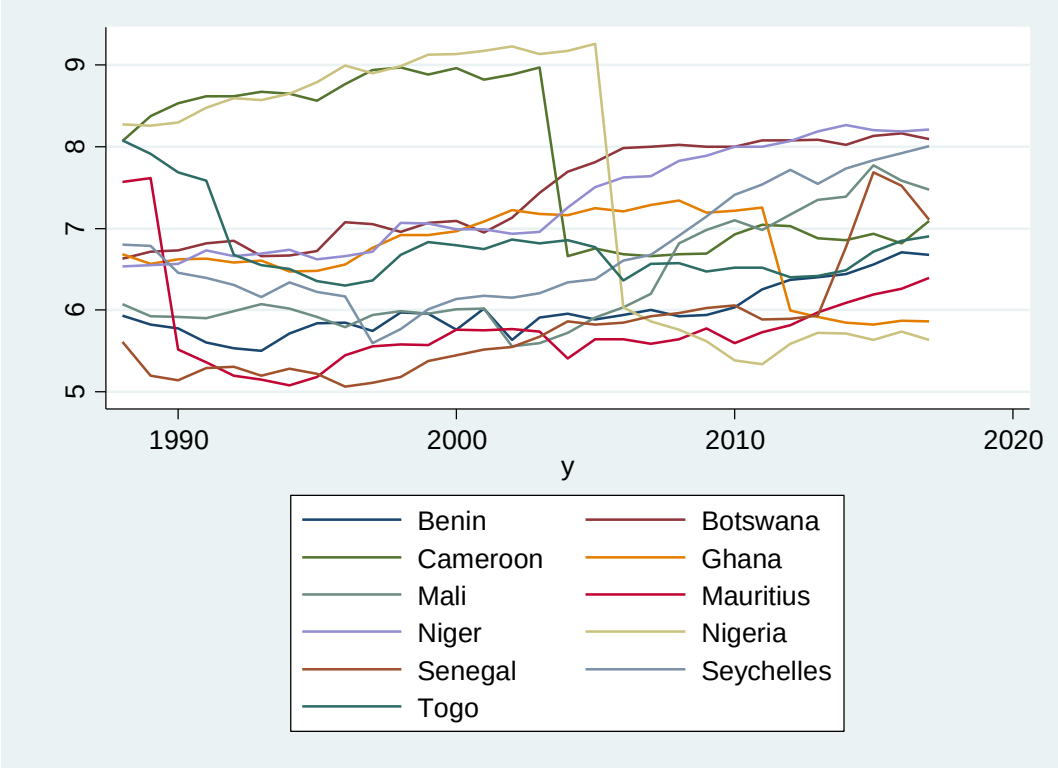
CHAPTER FOUR: REGRESSION RESULTS

The distribution of variables is summarized atappendix I in annex. It shows the number of total observations, number of groups, the overall, between and within effect, standard deviation, mean, minimum and maximum value of each variable.

4.1 Trends on The Flow of Foreign Aid in SSA

The patterns of ODA received by SSA countries fluctuates depending on, to a large extent, the economic, political and social circumstances that the countries are going through. The amounts of aid received rise when the countries are exposed to economic, political and social instability and will be lower when they are more stable. The trend of ODA flow is graphically represented in figure 4.1 below.

Figure 2 Trends on The Flow of Foreign Aid in SSA



Source: author's computation in stata

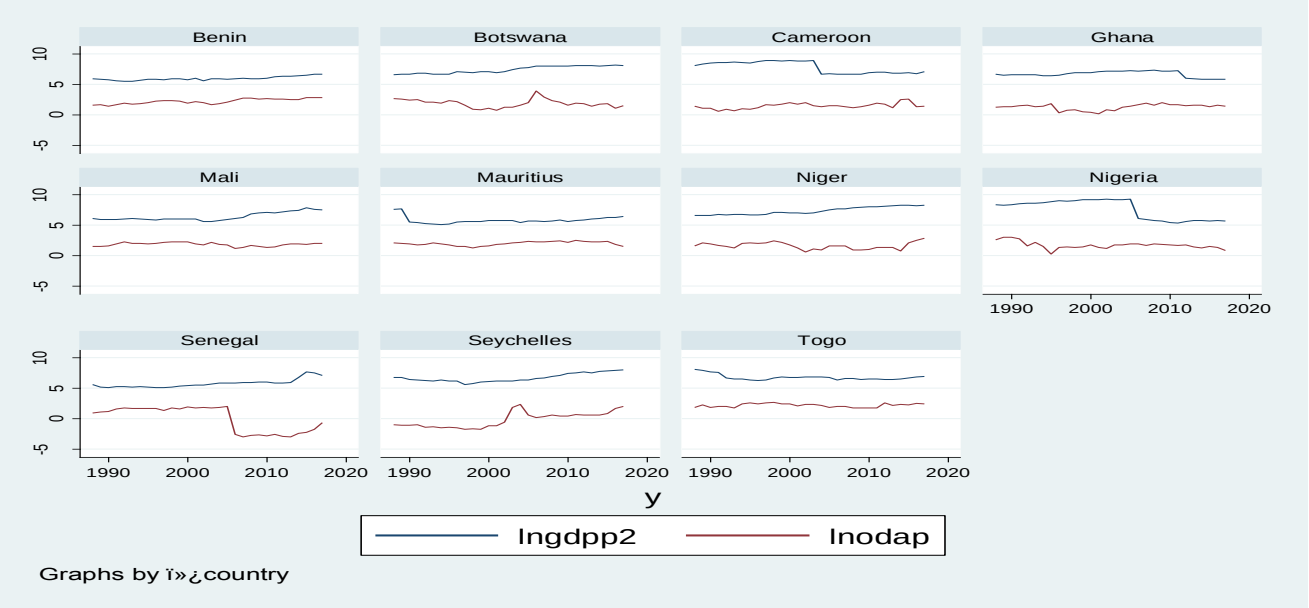
The data from 1988 up to 2017 shows that the official development assistance that flow to SSA countries has more or less similar pattern except for Cameroon, Ghana, Mauritius and Nigeria. The countries aid flow is more stable in the early years of the analysis while it starts to grow gradually after the beginning of the 20th century.

Cameroon, Mauritius and Nigeria showed a higher fluctuation in the amount of aid they received. Cameroon and Nigeria had a higher aid flow starting from the late 1980s up to the early 20 century and the flow had a sharp decline around 2005. After around 2005, the aid flow for these countries start to have more of the same patter like the rest of the countries under the study. Ghana has the same pattern stable and the increasing at a lower rate at the beginning of the analysis year like the majority of the countries under the study and it had sharp decline after 2010 and stayed at that lower state up to the end of the study year-2017. While for Mauritius, aid was stable at the beginning of the study year but had a sharp decline right at the beginning of 1990s. After this sharp decline, the aid flow was going at a more stable pattern with some ups and down and after around 2010 it shows an increasing pattern.

4.2 Relationship between Foreign Aid and GDP Growth

Figure 4.2 displays the trend of aid flow and economic growth rate on the same plot for each country. The figure shows that aid and economic growth had similar pattern for Benin and Togo throughout the entire study period. Cameroon, Ghana and Niger also have similar trend with a narrower gap for recent years, with Niger having a bit fluctuating aid flow. While Mali, Mauritius and Senegal had diverging flows for recent years. For Botswana the GDP growth rate flow is stable with a little increment after mid period while ODA declines at the end of 1990s and stays lower having a pic increase at around 2005. The flow of aid and GDP growth rate shows that they have similar stable trend up to around 2000 and starts to converge afterwards for Seychelles. While figure 4.3.2 shows that there is a pattern for the flow of aid and economic growth for Sub Saharan African countries. The figure shows that after the beginning of the analysis period, 1988, the gap was wide but it became narrower after around 2005. Both figure 4.2.1 and 4.2.2 shows that there is a pattern to the flow of aid and economic growth confirming they have a relationship.

Figure 3: Trend on the flow of ODA and GDP growth rate for each country



Source: author's computation in stata

4.3 Empirical regression results

4.3.1 Unit root test

Variables must be stationery, which is constant mean, variance and covariance, in order to have non spurious results. One course of non-stationarity is existence of unit root. Unit roots are nonstationary autoregressive (AR) or autoregressive moving average (ARMA) time serious processes which may include an intercept or a trend.

Unit root test is made using Levin-Lin-Chu (LLC) test. This test has a null hypothesis that all panels contain unit root with an alternative stating the series is stationery. The Levin-Lin-Chu test covers all asymptotic assumptions about panel in the data set and the period each panel covers including dataset with few panels and many time periods. This test works with the assumption of balanced panel data set. Adjusted t statistic will be reported in order to avoid bias.

Depending on the LLC test result presented in the appendix V, we reject the null hypothesis of all panels contain unit root, so they all are stationery but with different significance level. School enrolment, net export, capital, government expenditure, change in ODA and its square are

stationery at significance level of 1%. While ODA and population growth rate are stationery at 5% and the square of ODA and FDI are stationery at10%

4.3.2 Random effect regression model

Table (4.3.1) presents the regression result of the random effect model. For the random effect model, the variation on GDP growth rate is explained by 74.1% of variation of explanatory variables across time and between countries. The interclass correlation result shows that the difference across panels doesn't affect the variance in GDP growth rate and its due to the standard deviation of residuals or the overall error term e_i.

The result shows that ODA increases GDP growth rate on average by 0.51 when ODA increases by one unit across time and between countries, other things remaining constant. Its coefficient is statistically significant at 5% and its true value is between 0.0748112 and 0.9444528 for 95 % of the cases. The average effect of square of ODA on GDP growth rate is -0.11 when the square of ODA increases across time and between countries by one unit, citrus paribus, showing diminishing returns to scale. The coefficient of the square of ODA is statistically significant at 1% and its true value lays between -0.1782527 and -0.0512312for 95%of the cases. While change in ODA increases GDP growth rate on average by 0.39 and a square of change in ODA decreases it by an average of 0.01 when change in ODA and its square increase by one unit across time and between countries other things remaining constant. There coefficients are statistically significant at 1% with 95% confidence interval of 0.1006631and0.6802353 and 0.0172722 and -0.0033823 respectively.

FDI affects the GDP growth rate on average by 0.09 when FDI increases across time and between countries by one unit, citrus paribus, showing a positive impact. The coefficient of FDI is also statistically significant at 1% with 95% confidence interval of 0.0277026 and0.1475473.

The impact of capital on GDP growth rate is positive. A unit increase on capital leads to an average increase on GDP growth rate by 0.84, holding other things constant. The true value for the coefficient of capital is found between -0.0191774 and 0.0359411 for 95% of the cases with statistical significance level at 10%.

Other things remaining constant, a unit increase in government expenditure, G, across time and between counties reduces GDP growth rate by an average of 0.03 with statistical significance at

1%. The true value of the coefficient for G lays between -0.03456 and -0.0170532 for 95% of the cases.

Like government expenditure, a unit increase in population growth rate across time and between countries decreases GDP growth rate on average by 0.34, citrus paribus. The coefficient of population growth rate is also statistically significant at 1% with its true value laying between -0.4082022 and -0.265221for 95% of the cases.

School enrollment and net export have a positive impact but they are not statistically significant. If all the explanatory variables are set to be zero, GDP growth rate would be 9.81 for a given country. The random effect model could be written as:

$$gdp_{it} = 9.81 + 0.5oda_{it} - 0.11oda_{it}^2 + 0.39(\Delta oda_{it}) - 0.01(\Delta oda_{it}^2) + 0.09fdi_{it} + 0.08k_{it} - 0.03g_{it} + 0.02exp + 0.39se - 0.34n_{it} + e_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots(9)$$

Table 2:Result for random effect regression model

LnGDP	Coef.	Std. Err.	Z	P>z	[95% Conf. Interval]
LnODA	0509632	.2218514	2.30	0.022	.0748112 .9444528
LnchODA	.3904492	.1478528	2.64	0.008	.1006631 .6802353
LnODA2	-.1147419	.032404	-3.54	0.000	-.1782527 -.0512312
Lnchoda2	-.0103272	.0035434	-2.91	0.004	-.0172722 -.0033823
LnSe	.0866619	.0551633	1.57	0.116	-.0214563 .19478
LnFDI	.0876249	.0305732	2.87	0.004	.0277026 .1475473
Lnk	.083819	.0140611	1.99	0.551	-.0191774 .0359411
LnG	-.0258066	.0044661	5.78	-0.000	-.03456 -.0170532
LnN	-.3367119	.0364754	9.23	-0.000	-.4082022 -.2652215
LnEx	.0224675	.0143631	1.56	0.118	-.0056836 .0506186
_cons	9.812464	7.127194	1.38	0.169	-4.15658 23.78151
sigma_u	0				
sigma_e	.87554363				
Rho	0 (fraction of variance due to u_i)				
R^2	within	0.0815			
	Between	0.7410			
	Overall	0.3724			
Wald chi2(10)	189.28				
Prob> chi2	0.0000				

Source: author's computation in stata

4.3.3 Fixed effect regression model

The fixed effect regression shows the within effect which explains only13.52% of variation on GDP growth rate across time and within countries with an overall explanation of 27.13% of variation. The interclass correlation result shows that 47.33% of the variancesis due to difference across panels.

A unit increase in ODA decreases GDP growth rate on average by 0.35 across time for a given country, other things remaining constant, showing a negative impact of ODA in the short run. The coefficient of ODA is statistically significant at 10% and its true value lays between -0.743718 and0.044558for 95 % the cases. While a unit increase in square of ODA increases GDP growth rate by an average of 0.04 across time for a given country citrus paribus with statistical significance level at 5%. This shows ODA has an increasing return to scale.

Other things remaining constant, FDI increases GDP growth rate on average by 0.06 when it increases by one unit across time for a given country. Its coefficient is statistically significant at 10% with 95% confidence interval between -0.0019057 and0.1126644.

On average, a unit increase in capital increases GDP growth rate by 0.05 at 5%statistical significance level, citrus paribus. The true value of the coefficient of capital is found between -0.0332486 and .0233095 for 95% of the cases.

Government expenditure on the other hand reduces GDP growth rate on average by 0.01 when it increases by one unit across time for a give country, other things remaining constant. The coefficient of G is statistically significant at1% with its coefficient's true value laying between -0.0192795 and -0.0030949 for 95% of the cases.

Population growth rate has also a negative impact on GDP growth rate. A unit increase in population growth rate results in an average decrease of 0.26 on the growth rate of GDP for a given country, other things remaining constant, with a confidence interval of 95% laying between -0.3609299 and -0.152063. Its statistically significant at 1%.

Unlike population growth rate and government expenditure, net export has a positive impact on economic growth. A unit increase in net export increases GDP growth rate on average by 0.03

across time for a given country, citrus paribus. Its coefficient is statistically significant at 10% with 95% confidence interval laying between -0.000848 and 0.0519459 for 95% of the cases.

The other explanatory variables- the square of ODA, change in ODA and its square and school enrollment have coefficients which are not statistically significant. If all the explanatory variables are set to be zero, GDP growth rate would be 15 for a given country.The fixed effect model could be written as:

$$gdp_{it} = 15 - 0.35oda_{it} + 0.04oda_{it}^2 + 0.18(\Delta oda_{it}) - 0.003(\Delta oda_{it}^2) + 0.06fdi_{it} + 0.05k_{it} - 0.01g_{it} + 0.03exp + 0.03se - 0.26n_{it} + e_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(10)$$

Table 3: Result for fixed effect regression model

LnGDP	Coef.	Std. Err.	T	P>t	[95% Conf. Interval]
LnODA	-.34958	.2003069	-1.75	0.082	-.743718 .044558
LnchODA	.1757838	.1263308	1.39	0.165	-.0727936 .4243613
LnODA2	.0417968	.0302133	2.38	0.038	-.017653 .1012466
Lnchoda2	-.0032068	.0032368	-0.99	0.323	-.0095758 .0031623
LnSe	.0298876	.0455712	0.66	0.512	-.0597816 .1195567
LnFDI	.0553793	.0291131	1.90	0.058	-.0019057 .1126644
Lnk	.049696	.0143719	2.60	0.030	-.0332486 .0233095
LnG	-.0111872	.0041126	-2.72	0.007	-.0192795 -.0030949
LnN	-.2564965	.0530746	-4.83	0.000	-.3609299 -.152063
LnEx	.025549	.0134153	1.90	0.058	-.000848 .0519459
_cons	14.99789	6.918458	2.17	0.031	1.384637 28.61113
sigma_u	.8300385				
sigma_e	.87554363				
Rho	.47333886 (fraction of variance due to u_i)				
R2	within	0.1352			
	Between	0.4162			
	Overall	0.2713			
F(10,10)	3.43				
Prob> chi2	0.0325				

Source: author's computation in stata

4.3.4 Hausman test

The Husman tests are tests for econometric model misspecification based on a comparison of two different estimation model parameters. The Hausman test takes correct model specification and both estimators are consistent for the true parameters of the model under the null hypothesis. Correct specification of the model ensures that the size of the test can be controlled asymptotically and it gives it power. When the model is correctly specified the compared estimators are close to each other but if itsmis specified they would be far apart.

This study uses random and fixed effect estimation coefficients for the comparison of parameters. Both the random and fixed effect models are consistent under correct specification and regressors are independent of individual specific effects. The random effect estimation is efficient under the assumption of individual specific effect and the difference between the random and fixed effect estimators will be small. If the assumption is failed to meet and the model is correctly specified, the fixed effect estimator remains consistent but the random effect estimator would be inconsistent. This extends the gap between the estimators.

The null hypothesis we use for the Hausman test is random effect model is not appropriate. From the result shown in Appendix II we see that the probability chi-square is less than 0.01, so we cannot rejectthe null hypothesis and the fixed effect estimation model is appropriate.

4.3.5 One step difference GMM

From 330 observations Stata used only 308 of them with 11 countries being group variable and year being time variable. The minimum, maximum and average number of observations is 28 with 7 instruments and Wald value being 33,133.93. With Hansen test being equal 1, we cannot reject the validity of instruments. The Arellano-Bond test for AR(2) is not rejected as its equal to 0.800, stating there is no serial correlation.Stata regression result shows that the coefficients of the square of change in ODA, school enrollment, government expenditure and net export are statistically insignificant, and then they won’t be interpreted. Empirical result from one step difference GMM model for the statistically significant coefficients is presented as follows.

A 1% increase on the lag of GDP growth rate results on an average increase of 0.89% on the present value of GDP growth rate other things remaining constant. The coefficient of lag GDP growth rate is significant at 1% and its inelastically related with its future value.

For ODA, a 1% increase leads to 0.03% increase on GDP growth rate on average and citrus paribus. This increment is statistically significant at 1%. An increase in change in ODA by 1% also increases GDP growth rate by an average of 0.06% with statistical significance level at 10% other things remaining constant. While for the square of ODA the relationship is inverse, it leads to a decrease of GDP growth rate by an average of 0.01% with statistical significance level at 5%. All ODA, its square and its change have inelastic relationship with GDP growth rate for the Sub Saharan African countries under study.

The estimation result shows that capital has positive impact on GDP growth rate. A1% increase on capital results in 0.09% increase, on average other things remaining constant, in GDP growth rate. The coefficient of capital is significant at 5%. The relationship of capital and GDP growth rate is inelastic.

FDI has an increasing effect on GDP growth rate by an average of 0.04%, other things remaining constant, when it increases by 1%. Its coefficient is statistically significant at 5%. The relationship between FDI and GDP growth rate is inelastic.

Unlike FDI, population growth rate has a negative effect on GDP growth rate. A 1% increase in population growth rate leads to an average decrease by 0.07% on GDP growth rate, citrus paribus. Their relationship is the same as that of FDI- inelastic. The coefficient of population growth rate is significant at 5%. If all the explanatory variables are set to be zero, GDP growth rate would zero.

One step difference GMM could be empirically presented as:

$$gdp_{it} = 0.89gdp_{it-1} + 0.03oda_{it} - 0.01oda_{it}^2 + 0.06(\Delta oda_{it}) - 0.001(\Delta oda_{it}^2) + 0.04fdi_{it} + 0.09k_{it} - 0.01g_{it} + 0.001exp + 0.01se - 0.07n_{it} + \mu_i \quad \text{.....(11)}$$

Table 4: Result For One Step Difference GMM regression

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
lnGDP L1.	.8907936	.0341553	26.08	0.000	.8238504 .9577369
LnODA	.0315316	.0215522	2.60	0.009	.0012182 .0442814
LnODA2	-.0059758	.0075268	-0.79	0.027	-.020728 .0087764
LnSe	.0089656	.0069188	1.30	0.195	-.0045949 .0225262
LnFDI	.0386101	.0194801	1.98	0.047	.0004297 .0767904
lnK	.0932697	.0055815	0.59	0.048	.0676698 .1142091
LnchODA	.0560901	.001403	1.09	0.075	.0138487 .0983316
lnG	-.0139804	.0158147	-0.88	0.377	-.0449766 .0170158
LnN	-.0724239	.0359246	-2.02	0.044	-.1428348 -.002013
Lnex	.0009504	.0072762	0.13	0.896	-.0133107 .0152114
Number of observation		308			
Number of instruments		7			
Number of groups		11			
Wald chi2(11)		33,133.93			
Arellano-Bond test for AR(2)		Pr> z = 0.800			
Hansen		1			

Source: author's computation in stata

4.3.6 Two step difference GMM

Like one step difference GMM estimation, Stata take 308 observations from the total of 330 for the two step difference GMM estimation. The minimum, maximum and average observations are also the same with the one step difference estimation with 6 instruments and Wald value of 753.91. Results of Arellano-Bond and Hansen test show that there is no serial correlation and instruments are valid. The Arellano-Bond test result is 0.55 and that of Hansen is 1. For the two step difference GMM, the statistically significant variables are lag of GDP, ODA, the square of

ODA, capital, school enrollment, government expenditure and FDI. The analysis is made only for the statistically significant variables.

The relationship of GDP growth rate and its lag value is positive and elastic. A 1% increase on lag of GDP growth rate increases its future value, on average, by 0.84% other things remaining constant. The coefficient for the lag of GDP growth rate is statistically significant at 1%.

A 1% increase in ODA increases GDP growth rate by 1.28% on average other things remaining constant. This is true with a statistical significance level at 5%. The coefficient of ODA shows that it is elastic in affecting GDP growth rate.

The square of ODA decreases GDP growth rate by an average of 13.23% when it increases by 1% other things remaining constant with a statistical significant level of 10%. This shows that ODA has diminishing returns to scale for Sub Saharan Africa countries and its elastic.

Other things remaining constant, a 1% increase in school enrollment results in average 2.2% increase in GDP growth rate with 10% significance level. School enrolment and GDP growth rate have elastic relationship.

Result from the Stata regression of the two step difference GMM shows that there is an increasing return to capital. A 1% increase in capital brings, on average, 1.14% increase in GDP growth rate, other things remaining constant. This is true with a statistical significance level at 5%.

Government expenditure, on the other hand, reduces GDP growth rate. When government expenditure increases by 1%, GDP growth rate decreases on average by 9.5%, other things remaining constant. This shows that they have elastic relationship. If all the explanatory variables are set to be zero, GDP growth rate would zero.

The two step difference GMM model can be empirically expressed as:

$$gdp_{it} = 0.84gdp_{it-1} + 1.28oda_{it} - 13.23da_{it}^2 + 1.29(\Delta oda_{it}) - 0.04(\Delta oda_{it}^2) + 0.13fdi_{it} + 1.14k_{it} - 9.5g_{it} + 0.28exp + 2.2se - 3.42n_{it} + \mu_i \quad \ldots\ldots\ldots\ldots (12)$$

Table 5: Result Of Two Step Difference GMM regression

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
lnGDP L1.	.8414017	.9547054	2.33	0.009	-.4571708 3.285206
LnODA	1.282816	1.730082	1.98	0.049	-2.108083 4.673715
LnODA2	-13.23683	17.77975	1.99	0.057	-48.08451 21.61084
LnSe	2.197626	3.124488	2.01	0.082	-8.321509 3.926258
LnFDI	.1268465	.079069	1.99	0.092	-.0281259 .281819
lnK	1.143224	1.668962	2.03	0.038	-4.414329 2.127881
LnchODA	1.29297	2.550529	-0.51	0.612	-6.291916 3.705975
LnchODA2	. 0438788	.0626461	0.70	0.484	-.0789052 .1666629
lnG	-9.506396	10.82015	2.67	0.079	-11.70071 30.7135
lnN	-3.417865	4.746711	-0.72	0.471	-12.72125 5.885518
Lnex	.2762482	.3579108	0.77	0.440	-.4252441 .9777405
Number of observations		308			
Number of instruments		6			
Number of groups		11			
Wald chi2(11)		753.91			
Arellano-Bond test for AR(2)		Pr> z = 0.55			
Hansen		1			

Source: author's computation in stata

4.3.7 Choosing between difference and system GMM models

The coefficient of the lagged dependent variable from the two-step difference GMM estimation is compared with the coefficients from the pooled OLS and fixed effect model to decide between difference and system GMM. Unlike the previously discussed fixed and random regressions, we use the lag of dependent variable as an explanatory variable while regressing the three models.

The result shows that its below and close the fixed effect coefficient. The results of estimation are presented in the next table.

Table 6: Coefficients for the lag of GDP

Estimators	Coefficients for lag of GDP
Pooled OLS	0.8954387
Fixed Effect	0.8282213
One-step Diff. GMM	0.8907936
Two-step Diff. GMM	0.8414017

Source: author's computation in stata

Estimation from the difference GMM suggests that using system GMM is beneficiary in this case.

4.3.8 One step System GMM

The system GMM model estimation is made on the transformed equation presented in equation (9). The regression used country as a group variable and year as time variable. The number of observations taken by Stata out of 330 observations is 319, omitting the rest 11 observations, with 29 observations per group being minimum, maximum and average. The number of instruments is 7 with F value of 26,109.

Stata result shows that there are 7 instruments which is good because its less than the number of group variables,11. The value of Hansen test is equal 1 in which case the hypothesis cannot reject the validity of instruments. The Arellano-Bond test for AR(2) is 0.844 also stating there is no serial correlation.

The empirical regression result shows that capital, the square of change in ODA and net export rate are statistically insignificant. The rest of statistically significant variables are discussed below with a Stata result table (4.5) as follows:

The lag of GDP growth rate increases GDP growth rate of Sub Sharan African countries by 0.86% on average and citrus paribus when it increases by 1% with a statistical significance level of 1%. The relationship of GDP growth rate with it's one period lag value is inelastic as shown by its coefficient.

A percentage increase in ODA is also associated with 0.04 % increase in GDP growth rate in the short run, at 5% statistical significance, on average citrus paribus. The square of ODA, on the other hand, is associated with decrease in GDP growth rate on average by 0.02% when it increases by 5%, other things remaining constant. The square of ODA shows that it has a diminishing return to scale. A percentage increase in change in ODA leads to an average of 0.12% increase in GDP growth rate on average citrus paribus with a 1% statistical significance. This shows their relationship is inelastic.

While for FDI a 1% increase leads to an average of 0.03% increase in GDP growth rate with 10% statistical significance resulting in inelastic relationship. A percentage increase in school enrollment also increases GDP growth rate by an average of 0.01% with a statistical significance at 10%. The effect of capital formation is the same as school enrolment with 1% statistical significance level.

The coefficients of government expenditure and population growth rate shows that they both have a negative and inelastic effect on GDP growth rate of the Sub Saharan African countries. A 1% increase in government expenditure leads to an average decrease on GDP growth rate, other things remaining constant by 0.003% while for population growth rate it is 0.05% decrease. The coefficient of G is statistically significant at 10% and it is at 5% for population growth rate. If all the explanatory variables are set to be zero, the rate of GDP growth rate would be -5.07.

The one step system GMM model could empirically presented as:

$$\Delta gdp_{it} = -5.07 + 0.86gdp_{it-1} + 0.04oda_{it} - 0.02da_{it}^2 + 0.12(\Delta oda_{it}) + 0.01(\Delta oda_{it}^2) + 0.03fdi_{it} + 0.01k_{it} - 0.003g_{it} + 0.01ex + 0.01se - 0.05n_{it} + \mu_i \quad \text{.....(13)}$$

Table 7:Result for One step system GMM regression

LnGDP	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]
LnGDP L1.	.8571554	.0339462	26.43	0.000	.8215187 .9727922
LnODA	.0420175	.080734	3.19	0.014	-.1378692 .2219042
LnchODA	.1225764	.0291049	4.21	0.002	.0577267 .1874261
LnODA2	-.0158002	.0123021	-2.86	0.028	-.043211 .0116106
LnchODA2	.0019538	.0015525	1.26	0.237	-.0015054 .005413
LnSe	.0137111	.007317	1.87	0.090	-.0025921 .0300144
LnFDI	.0324849	.0148871	2.18	0.054	-.0006857 .0656555
Lnk	.0057941	.0036765	3.51	0.006	-.0023976 .0139858
LnG	.0029842	.0015364	1.94	0.081	-.0004391 .0064074
LnN	-.0458581	.0172443	-2.66	0.024	-.0842807 -.0074354
LnEx	.0067938	.0067811	1.00	0.340	-.0083154 .0219031
_cons	-5.073898	2.868607	-1.77	0.107	-11.46555 1.317758
Number of observation2		319			
Number of instruments		7			
Number of groups		11			
F(11, 10)		26,109			
Arellano-Bond test for AR(2)		Pr> z = 0.844			
Hansen		1.000			

Source: author's computation in stata

4.3.9 Two step system GMM

Two step system GMM model is regressed after one step system GMM model. The number of observations with its minimum, maximum and average is the same with that of one step. The number of instruments for the two step system GMM model is 5 with 32.59 Wald value. The hypothesis that states instruments are not valid is rejected because the Hansen test of override value is equa1 to 1. Arellano-Bond for AR2 also shows that there is no serial correlation. The

statistically significant variables for the two step system GMM are ODA and its square, capital, foreign direct investment and net export. They are interpreted as follows.

Other things remaining constant, a 1% increase on the value of lag of GDP growth rate results in 0.87% increase on the GDP growth rate on average. The coefficient for the lag of GDP growth rate shows that their relationship is inelastic and it is statistically significant at 5%.

The main explanatory variable for this study, ODA, increases GDP growth rate on average by 0.68% when it increases by 1% ,ceruse paribus. Whereas, the square of ODA reduces GDP growth rate by 0.02%, on average and other things remaining constant, when it increases by 1%. This shows that there is diminishing return to ODA. The statistical significance level for both ODA and its square is at 1%. They both also have inelastic relationship with GDP growth rate.

Increasing capital by 1% increases GDP growth rate by 0.08% on average holding other things constant. This is true with a statistical significance level at 5%. Stata regression result shows that their relationship is inelastic.

The two step system GMM regression result states that foreign direct investment has a positive impact on GDP growth even though it is inelastic. Other things remaining constant, a 1% increase in FDI increases GDP growth rate on average by 0.98% with statistical significance level at 1%.

For net export the relationship is positive and inelastic. When net export increases by 1%, there is an average increase on GDP growth rate by 0.26%, holding other things constant. This is true at 5% statistical significance level. If all the explanatory variables are set to be zero, the rate of GDP growth rate would be -9.32.

The two step system GMM model could empirically presented as:

$$\Delta gdp_{it} = -9.33 + 0.87gdp_{it-1} + 0.68oda_{it} - 0.02da_{it}^2 + 0.21(\Delta oda_{it}) + 0.04(\Delta oda_{it}^2) + 0.98fdi_{it} + 0.08k_{it} - 0.97g_{it} + 0.26exp + 1.75se - 0.47n_{it} + \mu_i \quad \text{.....(14)}$$

Table 8: Result for two step system GMM regression

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
lnGDP L1.	0.8653082	1.487011	3.72	0.037	-2.435693 3.393283
LnODA	.6848077	.4257415	5.95	0.008	-.1496304 1.519246
LnODA2	-.0228871	.3024853	8.34	0.000	-.6157474 .5699732
LnSe	1.753664	5.339747	1.64	0.101	-1.712048 19.21938
LnFDI	.978336	.8021264	1.22	0.023	-.5938028 2.550475
LnK	.0778179	.2642536	4.29	0.006	-.4401096 .5957454
LnchODA	0.206373	2.40581	-1.33	0.183	-7.921674 1.508928
LnchODA2	.0438788	.0626461	0.70	0.484	-.0789052 .1666629
LnG	-.9706905	1.062027	-0.91	0.361	-3.0522261.110845
LnN	-.4732445	.9773809	-0.48	0.628	-2.388876 1.442387
Lnex	.2612228	.2779408	3.62	0.017	-.2835311.8059767
Number of observations		319			
Number of instruments		6			
Number of groups		11			
Wald chi2(11)		32.59			
Arellano-Bond test for AR(2)		Pr> z = 0.229			
Hansen		1			

Source: author's computation in stata

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.1. Conclusion

This study was aimed at evaluating the impact of foreign aid on the economic growth of Sub-Saharan African countries. In order to achieve greater accuracy and improve upon existing procedures, which were viewed as possible causes of the ambiguous conclusions,a moderately different methodology and the most recent data, from1988 up to 2017, was used for the analysis than the previous studies mentioned in the empirical literature review. The system GMM was used for regression to reduce endogeneity by introducing more instruments to improve efficiency and transform the instruments to make them uncorrelated with the fixed effect.

The regression result shows that foreign aid is beneficial to the economic growth of SubSaharan African countries. The fixed effect regression interclass correlation result shows that 47.33% of variation is due to difference across panels. Given this, it can be stated that the method rather than the theoretical basis is the main problem inherent in the assessments being carried out that lead to conclusion of aid having a negative impact on economic growth. Moreover, there is empirical evidence to assert that the "micro-macro paradox" should be given less importance as an overall appraisal of the effectiveness of foreign aid.

It should be stressed, however, the conditions that must be in place for aid to be more effective. The empirical results of this study also suggest that diminishing returns to higher aid flow, country heterogeneity, and endogeneity of foreign aid should be factored in when assessing the impact of foreign aid on the economic growth of developing countries. The squared aid term is used to find evidence for diminishing returns to aid rather than a constant return to GDP growth and focused on the issue of time lags between aid-financed activities and their eventual impact on growth that has been neglected.

5.2 Recommendation

The result of this study shows that foreign aid is not as beneficial as it is perceived to be for the SSA economies. Even though aid has positive impact, its magnitude is very small and has diminishing returns. Thus, SSA countries have to reduce their dependency on aid and focus on economic activities that brings growth. The conditions under which aid performs well also has to be studied.

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Annex

Appendix I: distribution of variables

Variable		Mean	Std. Dev.	Min	Max	Observations
LnGDP	Overall	22.75579	1.342094	20.73806	27.06539	N = 330
	Between	1.030664		21.55652	25.30179	n = 11
	Within	.9124597		21.42278	26.73667	T = 30
LnODA	Overall	4.845758	1.971631	1.198035	9.032061	N = 330
	Between	1.019344		3.179807	6.408734	n = 11
	Within	1.714601		1.930847	9.755482	T = 30
LnODA2	Overall	27.35692	20.09015	1.435288	81.57813	N = 330
	Between	9.249716		12.25635	41.90648	n = 11
	Within	18.04435		-1.429488	86.55208	T = 30
ΔlnODA2	Overall	38.42047	18.83383	10.3657	97.6867	N = 330
	Between	9.361077		22.51582	53.35281	n = 11
	Within	16.57732		-1.511869	85.36053	T = 30
ΔlnODA	Overall	.0025436	.469604	-4.568212	2.377571	N = 330
	Between	.0463754		-.0662639	.090419	n = 11
	Within	.4675113		-4.514644	2.289696	T = 30
LnSe	Overall	.2198661	1.238312	0	20.86856	N = 330
	Between	.2203318		.0325238	.7957254	n = 11
	Within	1.220307		-.5758552	20.2927	T = 30
LnFDI	Overall	234.4685	2.012292	226.5983	239.9463	N = 330
	Between	1.122262		233.2628	237.2996	n = 11
	Within	1.703192		227.804	239.6735	T = 30
LnK	Overall	13.42598	4.651081	-.073016	20.03016	N = 330
	Between	3.162062		5.95912	17.27634	n = 11
	Within	3.537691		2.858636	24.44574	T = 30

LnG	Overall	20.58019	1.082108	17.55889	24.21826	N = 330
	Between	.5644725		19.8029	21.49605	n = 11
	Within	.9383045		18.29354	23.64186	T = 30
LnPop	Overall	15.531	1.882011	11.03731	19.06712	N = 330
	Between	1.679673		11.54882	18.12267	n = 11
	Within	.9845567		11.0405	18.76949	T = 30
LnEx	Overall	29.21648	4.425237	13.71867	39.44455	N = 330
	Between	2.243866		25.75779	33.19264	n = 11
	Within	3.871898		15.44806	37.23507	T = 30
Year	Overall	2002.5	8.668586	1988	2017	N = 330
	Between	0		2002.5	2002.5	n = 11
	Within	8.668586		1988	2017	T = 30
Country	Overall	6 3.16708		1	11	N = 330
	Between	3.316625		1	11	n = 11
	Within	0		6	6	T = 30

Appendix II: Hausman test

	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	Fixed	Random	difference	S.E
LnODA	-.34958	.509632	-.859212	.1086496
$LnODA^2$	.0417968	-.1147419	.1565387	.0183935
LnchODA	.1757838	.3904492	-.2146654	.0491152
LnSe	.0298876	.0866619	-.0567743	.0107477
LnFDI	.0553793	.0876249	-.0322456	.0188243
Lnk	-.0049696	.0083819	-.0133514	.0107902
$LnchODA^2$	-.0032068	-.0103272	.0071205	.0018382
LnG	-.0111872	-.0258066	.0146194	.0024038

LnN	-.2564965	-.3367119	.0802154	.0543488
Nex	.025549	.0224675	.0030815	.0082109
b = consistent under Ho and Ha; obtained from xtreg				
B = inconsistent under Ha, efficient under Ho; obtained from xtreg				
Test: Ho: difference in coefficients not systematic				
chi2(10) = 115.83				
Prob>chi2 = 0.0000				

Appendix III: pooled OLS estimation with lag of GDP

LnGDP	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
LnGDP L.1	.9854387	.0213356	41.97	0.000	.8536217	.9372557
LnODA2	-.013963	.0072367	-1.93	0.054	-.0281466	.0002206
LnODA	.1075548	.0740228	1.45	0.146	-.0375272	.2526368
LnchODA	.0770317	.0567488	1.36	0.175	-.0341938	.1882573
LnSe	.0206807	.0214107	0.97	0.334	-.0212835	.0626448
LnFDI	.0371602	.0125772	2.95	0.003	.0125095	.061811
LnK	.0091272	.0054927	1.66	0.097	-.0016383	.0198927
LnchODA2	.0003506	.0013172	0.27	0.790	-.0022311	.0029323
LnG	-.0400037	.0237388	-1.69	0.092	-.0865308	.0065235
LnN	-.0515495	.0154421	-3.34	0.001	-.0818154	-.0212836
LnEx	.0021242	.005825	0.36	0.715	-.0092925	.013541
_cons	-5.050407	2.899076	-1.74	0.081	-10.73249	.6316783

Appendix IV fixed effect estimation with lag of GDP

lngdpcth |	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
L1. |	.828221	.0275575	30.05	0.000	.7739884 .8824536
noda2n |	-.0102999	.0082865	-1.24	0.215	-.0266075 .0060077
nnoda2 |	.0728864	.0871038	0.84	0.403	-.0985325 .2443053
nodach |	.0738249	.0559462	1.32	0.188	-.0362763 .1839261
LnSe |	.0136926	.0212868	0.64	0.521	-.0281995 .0555847
nfdi2 |	.0403664	.0143856	2.81	0.005	.0120558 .068677
lnk |	.0068921	.0073496	0.94	0.349	-.0075718 .0213559
choda2 |	.0011827	.001448	0.82	0.415	-.0016669 .0040322
lng|	-.0570271	.0259339	-2.20	0.029	-.1080646 -.0059897
lnpop|	-.0561311	.0256126	-2.19	0.029	-.1065362 -.0057259
nex |	.0015653	.0061681	0.25	0.800	-.0105735 .0137041
_cons |	-3.76915	3.427246	-1.10	0.272	-10.51391 2.975615

Appendix V: Unit root test

Levin-Lin-Chu unit-root test for LnchODA		
Ho: Panels contain unit roots	Number of panels =	11
Ha: Panels are stationary	Number of periods =	30
AR parameter: Common		Asymptotics: N/T -> 0
Panel means: Included		
Time trend: Not included		
ADF regressions: 1 lag		
LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)		
	Statistic	**p-value**
Unadjusted t	-14.9390	
Adjusted t*	-9.1055	0.0000

Levin-Lin-Chu unit-root test for LnSe		
Ho: Panels contain unit roots	Number of panels =	11
Ha: Panels are stationary	Number of periods =	30
AR parameter: Common		Asymptotics: N/T -> 0
Panel means: Included		
Time trend: Not included		
ADF regressions: 1 lag		
LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)		
	Statistic	**p-value**
Unadjusted t	-11.0195	
Adjusted t*	-5.3299	0.0000

Levin-Lin-Chu unit-root test for LnEx		
Ho: Panels contain unit roots	Number of panels =	11
Ha: Panels are stationary	Number of periods =	30
AR parameter: Common		Asymptotics: N/T -> 0
Panel means: Included		
Time trend: Not included		
ADF regressions: 1 lag		
LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)		
Statistic	**p-value**	
Unadjusted t	-16.4613	
Adjusted t*	-10.1108	0.0000

Levin-Lin-Chu unit-root test for LnK		
Ho: Panels contain unit roots	Number of panels =	11
Ha: Panels are stationary	Number of periods =	30
AR parameter: Common		Asymptotics: N/T -> 0
Panel means: Included		
Time trend: Not included		

ADF regressions: 1 lag	
LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)	
Statistic	**p-value**
Unadjusted t -8.3289	
Adjusted t* -4.0325	0.0000

Levin-Lin-Chu unit-root test for LnG	
Ho: Panels contain unit roots	Number of panels = 11
Ha: Panels are stationary	Number of periods = 30
AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	
ADF regressions: 1 lag	
LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)	
Statistic	**p-value**
Unadjusted t -8.3289	
Adjusted t* -2.7554	0.0029

Levin-Lin-Chu unit-root test for LnchODA^2	
Ho: Panels contain unit roots	Number of panels = 11
Ha: Panels are stationary	Number of periods = 30
AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	
ADF regressions: 1 lag	
LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)	
Statistic	**p-value**
Unadjusted t -19.7987	
Adjusted t* -16.9208	0.0000
Levin-Lin-Chu unit-root test for LnODA^2	
Ho: Panels contain unit roots	Number of panels = 11
Ha: Panels are stationary	Number of periods = 30
AR parameter: Common	Asymptotics: N/T -> 0
Panel means: Included	
Time trend: Not included	
ADF regressions: 1 lag	
LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)	
Statistic	**p-value**
Unadjusted t -6.5676	
Adjusted t* -1.3100	0.0951

Levin-Lin-Chu unit-root test for LnODA		
Ho: Panels contain unit roots	Number of panels =	11
Ha: Panels are stationary	Number of periods =	30
AR parameter: Common	Asymptotics: N/T -> 0	
Panel means: Included		
Time trend: Not included		
ADF regressions: 1 lag		
LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)		
Statistic	**p-value**	
Unadjusted t	-5.8369	
Adjusted t*	-1.9105	0.0167

Levin-Lin-Chu unit-root test for LnN		
Ho: Panels contain unit roots	Number of panels =	11
Ha: Panels are stationary	Number of periods =	30
AR parameter: Common	Asymptotics: N/T -> 0	
Panel means: Included		
Time trend: Not included		
ADF regressions: 1 lag		
LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)		
Statistic	**p-value**	
Unadjusted t	-0.1067	
Adjusted t*	1.9358	0.0378

Levin-Lin-Chu unit-root test for LnFDI		
Ho: Panels contain unit roots	Number of panels =	11
Ha: Panels are stationary	Number of periods =	30
AR parameter: Common	Asymptotics: N/T -> 0	
Panel means: Included		
Time trend: Not included		
ADF regressions: 1 lag		
LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)		
Statistic	**p-value**	
Unadjusted t	-4.4655	
Adjusted t*	-1.5224	0.0640