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Effectiveness of Foreign Aid in Poverty Reduction in Africa: The Role of Fiscal Policy

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This study examines foreign aid effectiveness in poverty reduction in Africa with focus on the role of regional fiscal policy on education and health. The study employs panel dynamic ordinary least squares (DOLS) estimation technique and covers the period 1980-2017. The results reveal that foreign aid augmented with effective fiscal policy on education significantly improves the income level in all the regions except Central Africa, and consumption in the Western and Central regions. When augmented with effective fiscal policy on health foreign aid enhances households' income in West and Central Africa and consumption in West and Southern regions. Furthermore, foreign aid augmented with effective fiscal policy in education (health) reduces poverty head-count in the West and Central (in all regions except Central) regions of Africa. The study concludes that foreign aid augmented with fiscal policy on education improves income in all regions except Central Africa; and West and East Africa when augmented with health expenditure. To sustain the effectiveness of foreign aid in Africa there is the need to improve governments' allocation to the health and education sectors to deepen households' income.

Keywords: Education, foreign aid, government expenditure, health, panel dynamic ordinary least squares

JEL Classification: F35, H51, H52, I32

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1. Introduction

One fundamental economic discourse that has trailed developing economies is on poverty and the inability to break away from the reoccurring economic quagmire for decades. Attempts have been made by most developing economies including those in Africa to seek viable ways of lifting her citizenry out of poverty, thereby improving the quality of life. Developing economies have made significant attempt to reduce

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poverty by strengthening their trade policies, eliminating institutional rigidities, and encouraging diversification of the economy. However, due to financing limitations arising from low savings and domestic investments, such policies have yielded little or no significant improvement in alleviating poverty. The developed economies have shown concern and commitment in helping the developing economies grow faster and alleviate the persistence of poverty by providing foreign aids (Veiderpass & Andersson, 2007).

Foreign aids take the form of disbursement of funds made on concessional terms and grants by official agencies of the members of the Development Assistance Committee (DAC), multilateral institutions, and by non-DAC countries. Foreign aids also include funds from official donors and territories of more advanced countries of Central and Eastern Europe, countries of the former Soviet Union, and certain advanced developing countries to developing countries (World Bank, 2019).

The purpose of providing foreign aid is to promote economic development and improve the welfare of households in developing countries. Foreign aids can be tied to investment in education and health. This presupposes that foreign aid can help to augment the existing fiscal policy measures implemented at the start of every fiscal year. However, aid may not on its own effectively reduce poverty except there are operative fiscal and monetary policy measures.

Various components of foreign capital inflow, such as foreign direct investment, foreign portfolio investment, remittances as well as foreign aid can augment the domestic resources of developing economies. The eclectic paradigm theory (Dunning, 1988) argues that most often, direct and portfolio investments are for the benefit of the investors and the home country. Although there can be a spillover effect in increasing the output of the domiciled country, direct and portfolio investments may not translate into improvement in the quality of life or poverty reduction (Denisia, 2010). This is because direct and portfolio investments are profit-driven and will certainly ensure that private benefits are maximized and may not directly reduce the incidence of poverty. However, foreign aids are for specific purpose and tied towards developmental projects (for hospitals, the educational system, innovation, research and development) which directly impacts on the socioeconomic wellbeing of the re-

cipient economy and this type of capital flow will have a greater impact on poverty reduction of developing economies with minimal exploitation. The gains of foreign aid towards poverty reduction, therefore, justify the need to examine the effect which foreign aid amongst other capital inflows has on poverty reduction in Africa.

There are divergent opinions in the literature about the effectiveness of foreign aid on poverty reduction in developing economies. Some strands of literature opine that foreign aid can be used to alleviate poverty incidence as this will augment the limited resources especially in the education and health sectors (Dollar & Burnside, 2000; Masci, 2004). Another strand of literature argues that the foreign aid into Africa has spelled nothing else but misery and abject poverty as many countries in Africa irrespective of aids receipts have not been able to leapfrog the poverty menace that is trailing the region (Easterly, 2003; Preble & Tupy, 2005; Magnon, 2012). Such inconclusive findings can be attributed to the existing policy measures on education and health.

This study is different from others as it considers fiscal policy measures that can be the determining factor in foreign aid and poverty reduction nexus. The fiscal policy measures used in this study are government expenditure on education and health. Effective fiscal policy on education and health can kick-start the poverty alleviation process in line with the human capital theory. Foreign aid can then augment the effectiveness of the existing policy measures. Thus, foreign aid will have different impacts on poverty incidence depending on the fiscal policy measures on education and health in place. It is against this backdrop that this study investigates the effectiveness of foreign aid on poverty reduction given each country's fiscal policy measure. In addition, this study examines the effect of fiscal policy on education and health, and the effect of foreign aid on poverty reduction (captured by income and consumption levels) in Africa.

The rest of the study is structured as follows: Section 2 presents the literature review, while Section 3 is data and methodology. Section 4 discusses the results and Section 5 provides conclusion and policy recommendations.

2. Literature Review

2.1 Theoretical Literature

Strands of theoretical literature that identify the causes of poverty in developing countries exist. There are also theories on the effectiveness of foreign aid in the development process of a nation. The individual theory of poverty as upheld by the Neoclassicals reiterates that individuals are the main reason for the persistent occurrence of poverty in their locality (Bradshaw, 2006). This theory presupposes that poverty is due to the inability of individuals to be productive. The Neoclassical economists as championed by Alfred Marshall and supported by Kaldor-Hicks emphasize that individual choice in the market, their investment decisions and educational choices, can either lead to prosperity (growth in output) or misery (poverty). Spencer (2014) argues that poverty is largely due to the laziness of individuals. The structural theory of poverty as developed by Wilson (1987) attributes poverty to structural imbalances regarding individual's economy, political and social factors. These are the determinants of poverty within a region (Makhalane, 2009; Sameti, Esfahani & Haghighi, 2012). Weak structures in the economy that is monocentric in production process and the inability to export are signals of poverty.

The cultural theory of poverty attributes the causes of poverty to societal imbalances in cultural values, norms and practices perpetrated by people. This implies that poverty is trans-generational through the acceptance of beliefs and systems (Bradshaw, 2006). This theory is not relevant in explaining the effect of foreign aid on poverty reduction in developing countries. The geographic poverty theory asserts that spatial geographical differences in resource allocation is the core determinant of the prevalence of poverty in a region. That is, the people, institutions and resource endowment in certain regions are the prime causes of poverty. To this end, poverty differs from one region to the other as this could be severe in regions that lack the natural resources needed to generate income that will be sufficient for consumption and investment purposes. Rural areas and communities without these endowments should not be blamed for being poor as their environment does not support poverty reduction. This theory is weak as it fails to explain why and how most economies in the Southeast Asia region although disadvantaged in natural resource allocation, has

come out of poverty (Addae-Korankye, 2019; Bradshaw, 2006).

Reviewing theories that explain the effectiveness of foreign aid in the development process leading to poverty reduction, we note that the two-gap model according to Chenery and Strout (1966) provides an insight. The theory provides a theoretical linkage between foreign aid and long-run growth which will ultimately lead to increase in the income of individuals and then reduce poverty by augmenting the gaps that exist in investment-savings, and import-export relations. However, the international dependency theory and its variants provide a theoretical explanation of why relying on developed economies for assistance will not translate into poverty reduction but worsening of economic situations.

The international dependency revolution follows the radical approach of the Marxian school of thought in explaining that developing economies principally remain where they are economically, politically and socially due to the "dependence and dominant" relationship that exists between them and the rich countries (Todaro & Smith, 2015). The variants of this theory are the Neocolonial dependence model, the False-Paradigm model, and the Dualistic-development thesis. The basic argument of the Neocolonial dependence model is that underdevelopment (poverty, low level of income per capita, low economic growth rates) remains persistent in developing countries due to the high unequal capitalist relationship between rich and poor countries which are exploitative, counter-productive and unintentionally neglectful. Under this theory, only a few groups who act on behalf of the international capitalist agencies enjoy high income. As such, poverty is externally induced. The false-paradigm model attributes the high poverty rate in developing countries to the 'faulty and inappropriate advice provided by well-meaning but often uninformed, biased, and ethnocentric international experts or advisers from developed country assistance agencies and multinational donor organizations' (Todaro & Smith, 2015, pp 133). This implies that poverty and underdevelopment are principally due to the inappropriate technical aids that are received from developed countries. This theory unarguably supports the assertion that foreign aid and official assistance are principally the root causes of poverty in developing countries.

Foreign aid explains the need for foreign intervention and is practicable to open

economies. It emphasizes that the domestic resources of most developing economies are not adequate to spur growth and development necessary for reducing the poverty level. Thus, developing economies may depend on the developed countries for assistance and resource augmentation. Given this scenario, the appropriate model that explains the need for foreign intervention either in the form of capital tied projects or investment inflows is the two-gap model as developed by Chenery and Strout (1966). Chenery and Strout (1966) provide a theoretical linkage between foreign aid and growth, and it should be noted here that inclusive growth is a pre-requisite condition for income-poverty reduction. Therefore, linking foreign aid and growth using the two-gap model is a framework that can explain foreign aid and poverty. The two-gap model argues that long-run growth can be stimulated through foreign aid which helps to supplement national capital formation that is lacking due to the savings gap.

There are two constraints that explain the two-gap model, the savings-gap and the foreign-exchange gap. These constraints affect the growth pattern of developing economies. The savings-gap emanates from the Harrod-Domar model of investment financed solely by savings. For developing economies, savings are not sufficient to meet investment requirements due to lower per capita income. Thus, to augment this, foreign aid becomes necessary (Dollar & Easterly, 1999). We then state:

$$Foreign\ \ Aid(FA) = Investment(I) - Savings(S) \tag{1}$$

Also, further growth constraint occurs in developing economies with respect to foreign-exchange gap. The foreign exchange gap arises due to the inability of developing economies to earn sufficient foreign exchange to finance her imports. Thus, foreign aid can act as a supplement to the foreign exchange gap. Countries can now grow rapidly through foreign aid and reduce poverty. We can therefore write:

$$Foreign\ \ Aid(FA) = Imports(M) - Exports(E) \tag{2}$$

The two-gap model is widely used by the World Bank (Easterly, 2003) to explain the relevance of foreign aid in a developing economy, although it is marred with contestable theoretical foundations (Mbah & Amassoma, 2014). Todaro and Smith

(2015) strongly opine that financial assistance needs to be supplemented with technical assistance in the form of high-level worker transfers to ensure that aid funds are used most efficiently to generate economic growth in the recipient countries. Chenery and Strout (1966) opine that the potency of foreign aid in spurring long-run growth which reduces poverty is dependent on the absorptive capacity of aid recipients and some internal factors which are the state of infrastructure, availability of skilled labor, institutional structures and administrative capacities of the governments.

An extension of the two-gap model is the three-gap model as developed by Bacha (1990) and Taylor (1991). The three-gap model posits that the utilization and growth of the productive capacity is constrained by not only the availability of domestic and foreign savings resources as opined by Chenery and Strout (1966), but as an extension, the extent of public sector resources available. According to the model, there are fiscal constraints that determines the capacity of the economy to grow. The extent of public sector savings (revenue and taxation) and its investment (expenditures on infrastructure and on critical sectors of the economy) determines the productive capacity of the economy directly through the extent of engagement of public sector enterprises and indirectly, through the provision of human, physical and social infrastructure (Sepehri & Akram-Lodhi, 1999). Iqbal (1995) noted that increases in foreign reserves used in financing imports and the devaluation of the local currency can lead to increase in output through increases in foreign exchange earnings. However, the devaluation of the currency can affect the potential increases in output if the consequential reduction in foreign savings is not compensated with increases in national savings (Ijirshar *et al.*, 2019).

The essence of the third gap is that government's efforts in stimulating investment can be marred with insufficient government revenue in financing imports and investments. The implication of this is that the closing of the fiscal gap (dependent on the extent of revenue and expenditure) to a large extent, determines the extent of growth (Albiman, 2016; Ijirshar *et al.* 2019). This is evident as Ogunniyi, *et al.* (2019); Odior and Iwegbu (2021) noted that the increasing debt profile widens this gap and this affects growth. Adeoye and Iwegbu (2020) suggested that with the dwindling oil prices and high debt profile, the fiscal gap can be reduced through other sources of

government revenue such as expansion of the agriculture value chain and exploration of the solid minerals. Fiscal policy on education and health fall under this category. Following the theoretical framework of the two-gap model with an extension of the three-gap model, few studies have used poverty indicators as the dependent variable in replacing growth (Boone, 1996). Equation (2) is thus extended to include the fiscal policy gap represented by the difference between government revenue (GR) and government expenditure (GE).

2.2 Empirical Literature

This study focuses on the intervening role of fiscal policy on the impact of foreign aid on poverty. The empirical review focuses studies that examined the impact of foreign aid on poverty through per capita income, poverty headcount and the role of fiscal policy in the foreign aid–poverty reduction relation. Recent studies have established different impacts of foreign aid on poverty. The study by Anetor, *et al*. (2020) examined the effect of foreign direct investment (FDI), foreign aid and trade on poverty in twenty-nine selected Sub-Saharan Africa (SSA) countries for the period 1990-2017. The study employed the feasible generalized least squares estimation technique, and showed that FDI and foreign aid did not reduce poverty, however, trade did. The nexus between foreign aid and poverty in Anetor *et al*. (2020) findings is not in conformity with the extensive literature review conducted by Mahembe and Odhiambo (2019) as they found that foreign aid significantly results in poverty reduction. In a related study, Maruta *et al.* (2020) examined the effect of foreign aid into health, education and agriculture, and institutional quality on growth of seventy-four developing economies across South America, Asia and Africa over the period 1980 – 2016. The result using the two-stage least squares estimation technique found that the extent of the effect was determined by the quality of institutions in the region. In South America, education aid was more effective unlike in Asia where health aid was more effective. In Africa, agricultural aid is more effective in promoting growth. Also, using endogeneity-robust generalized method of moments, the studies by Asongu and Tchamyou (2019) found that foreign aid improves educational attainment when measured using primary school enrollment, and life-long learning of fifty-three African countries. Similarly, Brid and Choi (2019) examined the effect of foreign aid, remit-

tances and foreign direct investment on economic growth using dynamic and fixed effect panel regression technique on seventy-six developing economies. The results showed that while foreign direct investment and remittance increased growth, the effect of foreign aid was ambiguous.

Ugwuanyi *et al.* (2017) examine the impact of foreign aid on poverty in Nigeria using an autoregressive distributed lag (ARDL) model. The results revealed that foreign aid has an insignificant and positive impact on poverty reduction in Nigeria. However, the findings of Alvi and Senbeta (2012) for a group of developing economies revealed that aid has a significant poverty-reducing effect even after controlling for income. The study also showed that multilateral aid and grants do better in reducing poverty than bilateral aid and loans. This implies that aid can reduce the persistence of poverty through other channels apart from income (Lensink & White, 2000). This does not conform to studies supporting average income as the only channel through which aid reduces poverty (Ravillion & Chen, 1997; Dollar & Kraay, 2004; Besley & Burgess, 2003). The inconclusive findings of these empirical studies are often attributed to differences in data, and identification of the pass-through channel of the effectiveness of aid and the econometric techniques employed. This opens the possibility of considering fiscal policy as an operative channel through which foreign aid can impact on poverty reduction.

Empirical evidence of country-specific foreign aid-growth nexus as conducted by Mbah and Amassoma (2014) using the ordinary least square estimation technique found that foreign aid is not beneficial in stimulating output growth. A possible reason for the result is attributed to the methodology as it does not take care of the endogeneity in the foreign aid-growth nexus. Ridwell (2014) found that aid tied to projects executed and monitored by non-governmental organizations (NGOs) or in the form of technical assistance improves the growth of the economy. Guillaumont and Wagner (2014) examined the various channels in which poverty can be reduced. The study found that foreign aid, government expenditure, and economic growth reduce poverty. The study also confirmed the findings of Ridwell (2014).

Still on the country-specific studies, Yohannes *et al.* (2011) examined the effect of foreign aid on economic growth in Ethiopia by employing the Johansen Cointegra-

tion approach. The study's major conclusion is that foreign aid significantly improves the growth of Ethiopia's output provided it is assisted by operational monetary, fiscal and trade policies. Our study takes a different view with that of Yohannes *et al.* (2011) by examining the effectiveness of foreign aid on poverty in a macroeconomic environment with operational fiscal policy on the education and health sectors. In the same country, Woldekidan (2015) examined the role of foreign aid on poverty using multivariate cointegration technique. The results from the study revealed that foreign aid reduces poverty incidence.

Olofin (2013) showed the impact of foreign aid on poverty reduction in eight West African countries using panel ordinary least squares estimation technique. The findings revealed that foreign aid is significant in reducing the prevalence of poverty. This conclusion is in contrast with Nakamura and Macpherson (2005), and Ijaiya and Ijaiya (2004) that used the two-stage least square GMM to investigate the effectiveness of foreign aid in reducing poverty in SSA. Their study found that foreign aid does not contribute to poverty reduction in SSA.

Javid and Qayyum (2011) examined the effectiveness of foreign aid in reducing poverty in Zimbabwe by employing an ordinary least squares estimation technique. Their findings showed that foreign aid has a negative impact on sustainable economic growth. A possible explanation for the result is the measure employed in determining poverty and gross domestic product. This is because increases in output is a necessary condition for poverty reduction but not all increases in output can translate into poverty reduction. There are institutional bottlenecks associated with output translating to improvement in the quality of lives. The study by Seedee (2018) found that foreign aid does not lead to poverty reduction in Liberia despite the billions of dollars the country received as aid. This result is attributed to the institutional bottlenecks such as high level of corruption.

Girma (2015) evaluated the effectiveness of foreign aid in enhancing economic growth in Ethiopia. The study employed an ARDL model, and results showed that without a stable macroeconomic policy, foreign aid may have an adverse impact on growth. These findings are similar to that of Wrangberg (2018) whose study covers 31 countries, from Africa, West Asia and Europe using a fuzzy regression discontinuity de-

sign. However, foreign aid in an economy with stable macroeconomic policy leads to increase in economic growth. The critics on the relevance of foreign aid are concerned of its productivity. They argued that foreign aid does not increase growth as it displaces finances, consumption, domestic savings and leads to overvaluation of the real exchange rate (Rajan & Subramanian, 2007; Boone, 1996). Others opined that foreign aid leads to the weakening of the recipients' country institutions (Brautigam & Knack, 2004; Svensson, 2000; Easterly, 2007; Arvin & Barillas, 2002). These inconclusive findings motivate this research. This study extends the work of Girma (2015) by considering fiscal policy as a crucial macroeconomic policy that can reduce poverty. It also extends the scope by considering the regions in Africa.

The study is significant and different from others as it takes into consideration the role of fiscal policy in the effectiveness of foreign aid on poverty reduction in Africa. It is also worth conducting as it takes wider coverage by examining the underlining discourse across Africa as a continent which other researchers have not devoted their attention to. This study is relevant to major economic organizations in Africa (AU and other regional blocs) as it provides policy direction.

2.3 Stylized Facts

SSA as a region has received considerable amount of foreign aid. Figure 1 shows that it is the highest recipient of foreign aid amongst other regions of the world (Middle East, Latin America and the Caribbean, East Asia and Pacific).

From Figure 1, SSA received the highest inflow of foreign aid between 1980 and 2017. Between 1980 and 1990, a total of US$229.8 billion was received, which is 235% higher than what was received by Latin America and the Caribbean put together. Foreign aid to SSA decreased from US$229.8 billion to US$212.3 billion between 1991 and 2000 but increased to US$336.2 billion from 2001 to 2010. This increase is 342.37% higher than the one received by the Latin America and the Caribbean.

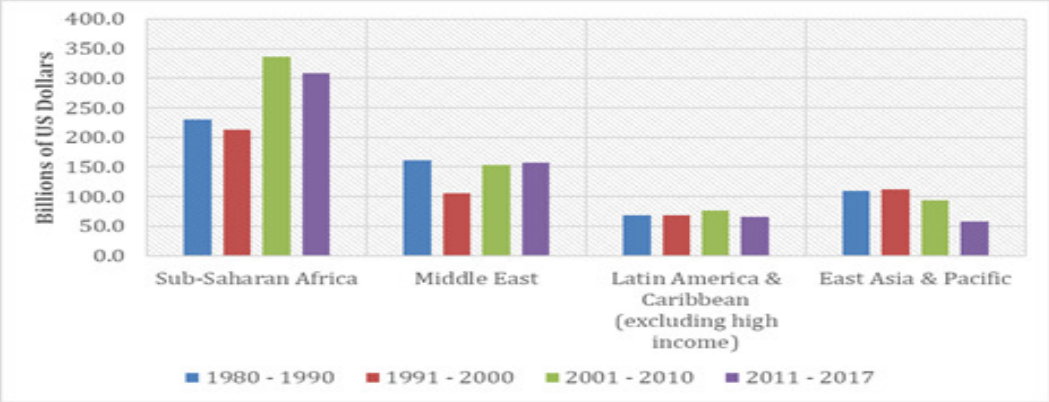

Figure 1: Foreign aids received by developing regions of the world. (Source: World Bank, 2019).

Foreign aid received on regional basis among African countries between 1980 and 2017 is shown in Figure 2. Figure 2 reveals that the East Africa is the largest recipient of foreign aid throughout the period. There was however a slight decline in foreign aid received by the region, from US$99.7 billion between 1980 and 1990 to US$98.8 billion between 1991 and 2000. However, between 2001 and 2010, it increased to US$135.1 billion, and further to US$137.8 billion between 2011 and 2017. The least recipient of foreign aid is Southern Africa. The aid received grew from US$6 billion between 1980 and 1990 to US$12.3 billion between 2011 and 2017. All other regions followed an upward trajectory which shows that developed countries are making significant improvement in assisting developing countries.

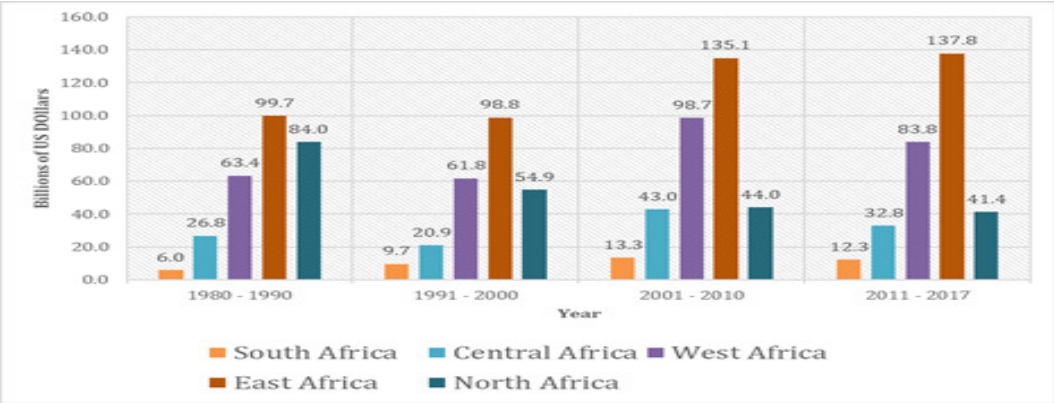

Figure 2: Foreign aids received by regions in Africa.(Source World Bank, 2019).

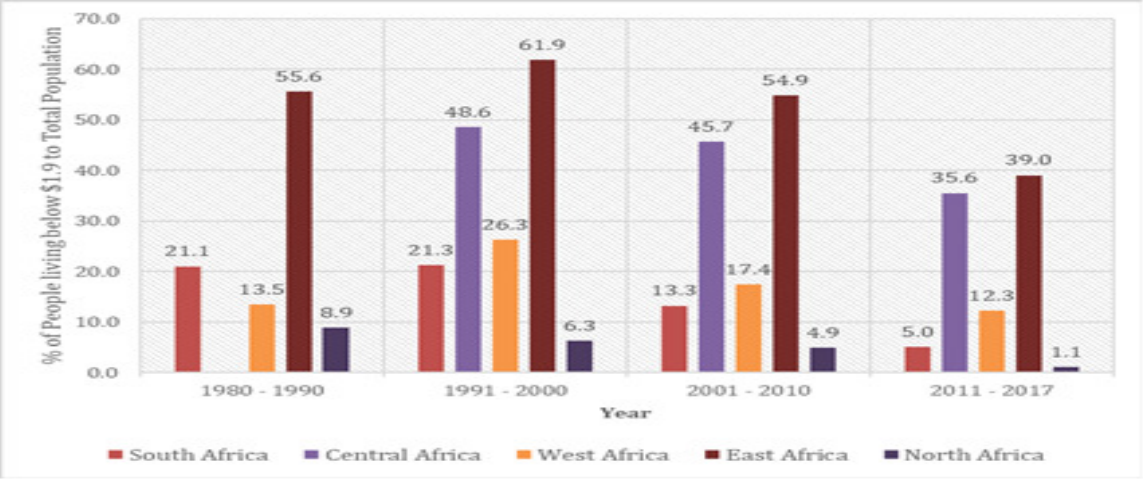

Figure 3: Poverty profile of the African region, measured by the poverty headcount ratio. (Source: World Bank, 2019).

As revealed from Figures 2 and 3, the Eastern region, the highest recipient of foreign aid is the poorest. Between 2011 and 2017, a whopping US$137.8 billion were received as foreign aid. Yet, 39% of the population are living below US$1.90 per day. The worst hit was between 1991 and 2000 when 61.9% of the population lived below US$1.90 per day. However, the Northern region is the third recipient of foreign aid; yet, it is the least region hit by poverty. The trends from Figures 1 and 3 suggest that regions that have received a large chunk of foreign aid were the worst hit by poverty.

Table 1 presents government expenditure as a percentage of GDP, on education and health sectors of the regions between 1980 and 2017, and shows that Southern Africa region has higher government expenditure on education and health than other regional blocs. Again, the data show that for all the regions, expenditure on education is more than the expenditure on health in the three decades considered. Thus, it can be concluded that in these regions, education has been given more attention than health.

Table 1: Government expenditure on education and health as a percentage of GDP in Africa

Period	Southern Africa		Central Africa		West Africa		East Africa		North Africa	
	Educ.	Health	Educ.	Health	Educ.	Health	Educ.	Health	Educ.	Health
1991-2000	7.00	3.91	2.57	1.42	3.45	1.38	5.00	1.99	5.02	1.81
2001-2010	7.21	3.98	3.10	1.33	3.74	1.48	4.50	1.90	4.63	2.17
2010-2017	5.95	4.27	2.98	1.20	4.31	1.46	4.21	1.73	6.42	2.72

Note: Educ. represent Education

3. Data and Methodology

3.1 Data

The data employed are domestic credit to the private sector, domestic general government health expenditure, net foreign direct investment, and total government expenditure on education, all measured as a percentage of GDP. Others are GDP per capita (constant 2010 US$), household final consumption expenditure per capita (constant 2010 US$), total labor force participation rate, (percentage of total population ages 15-64, International Labour Organization (ILO) estimate), net official development assistance and official aid received (Constant 2016 US$), official exchange rate in local currency unit (LCU) per US$, period average), percentage of the population living on less than $1.90 a day at 2011 international prices, domestic general government health expenditure (percentage of GDP), and inflation rate. All data were retrieved from the World Bank Development Indicators database (World Bank, 2019).

3.2 Model Specification

We re-state our objective which is to examine the effectiveness of foreign aid on poverty reduction given each country's fiscal policy. Thus, we expand Equation (2) in a more explicit regression form. For a long-run regression equation, we specify:

$$POV_{it} = \zeta_0 + \zeta_1 FA_{it} + \zeta_2 X_{2it} + \zeta_3 X_{3it} + ... + \zeta_\rho X_{\rho it} + \mu_{it} \tag{3}$$

where *POV* is poverty rate, *FA* is foreign aid received, *Xs* are the other explanatory variables that determine the level of poverty. If from Equation (3), there are some $X'_\rho s$ that have stochastic trends and are I(1), say X_3, the coefficients can become asymptotically normal by adding to the cointegrated regression, the changes in the random-walk explanatory variables as well as their lead and lagged values (Stock &

Watson, 1993). Thus, equation (3) becomes:

$$\begin{aligned} POV_{it} = \zeta_0 + \zeta_1 FA_{it} + \zeta_2 X_{2it} + \zeta_3 X_{3it} + \gamma_1 \Delta X_{3,t+2} + \gamma_2 \Delta X_{3,t+1} + \gamma_3 \Delta X_{3,t} \\ + \gamma_4 \Delta X_{3,t-2} + \gamma_5 \Delta X_{3,t-1} + ... + \zeta_\rho X_{\rho it} + \mu_{it} \end{aligned} \quad (4)$$

Stock and Watson (1993) noted that the ζ_i coefficients obtained from (4) are consistent and efficient. The other $_{X_i's}$ variables from Equation (4) can thus be defined to include the relevant variables to this study. To do this, we follow the study by Wrangberg (2018) who examined the effect of foreign aid on poverty in 31 countries without interacting it with other macroeconomic policy variables. We also adopt some of the macroeconomic variables as used by Alvi and Senbeta (2012); Mahembe and Odihiambo (2018). From Equation (4), the variants of *POV* are poverty headcount ratio and poverty gap (Lensink & White, 2000). Poverty headcount ratio is the percentage of the population living on less than $1.90 a day at 2011 international prices. The study by Boone (1996); Foster *et al.* (1981); Rao (1981); Wrangberg (2018) use various measures to proxy poverty, these are poverty headcount ratio, poverty gap, infant mortality, life expectancy, and primary schooling. Using only the poverty headcount ratio creates certain limitations. For example, it ignores the distribution of those who are poor but only considers everyone below the poverty line to be equally poor. Hence, this study augments the poverty headcount ratio with human capital consumption expenditure to measure poverty in terms of the extent of the consumption capacity of households (Woldekidan, 2015) as household consumption better explains the household's ability to meet their basic needs. Human capital consumption expenditure is the household final consumption expenditure per capita. Also, per capita income which accesses poverty with the extent of the availability of income for investment and consumption purposes is used as a measure of poverty (Kankwannda *et al.*, 2000). The poverty headcount ratio measures the relative spread of deprivation and the inability to meet up with daily basic needs of life. Other core explanatory variables included in the model to modify Equation (4) as in Nakamura and McPherson, (2005) and Mahembe and Odihiambo (2018) and following the three-gap model are public expenditure on education and health, labor force instead of population, direct investment, domestic credit to the private sector and price level. Incorporating these variables into Equation (4) and ignoring the changes in the random-walk ex-

planatory variables as well as their lead and lagged values generates Equations (5) to (7). The model measuring poverty in terms of per capita income is then stated as:

$$\begin{aligned} PCI_{m,i,t} = {} & \zeta_0 + \zeta_1 FA_{m,i,t-1} + \zeta_2 FPE_{m,i,t-1} + \zeta_3 FPH_{m,i,t-1} + \zeta_4 (FPE_{m,i,t-1} \\ & * FA_{m,i,t-1}) + \zeta_5 (FPH_{m,i,t-1} * FA_{m,i,t-1}) + \zeta_6 LF_{m,i,t-1} + \zeta_7 PLE_{m,i,t-1} \\ & + \kappa_1 FA_{m,i,t+1} + \kappa_2 FPE_{m,i,t+1} + \kappa_3 FPH_{m,i,t+1} + \kappa_4 (FPE_{m,i,t+1} * FA_{m,i,t+1}) \\ & + \kappa_5 (FPH_{m,i,t+1} * FA_{m,i,t+1}) + \kappa_6 LF_{m,i,t+1} + \kappa_7 PLE_{m,i,t+1} + \varepsilon_{m,i,t} \end{aligned} \tag{5}$$

where *PCI* is per capita income, *FA* is foreign aid, *FPE* is fiscal policy on education, *FPH* is fiscal policy on health, *LF* is labour force, *PLE* is price level effect (the annual percentage change in the cost to the average consumer of acquiring a basket of goods), m = 1, 2, 3, 4, 5 are indicators for the regions: 1 = West Africa region, 2 = East Africa region, 3 = North Africa region, 4 = South Africa region and 5 = Central Africa region; i are indicators for countries in the respective m region and t indicates the time period.

The model considering poverty in terms of their extent of consumption capacity is specified as:

$$\begin{aligned} HCE_{m,i,t} = {} & \alpha + \xi_1 FA_{m,i,t-1} + \xi_2 FPE_{m,i,t-1} + \xi_3 FPH_{m,i,t-1} + \xi_4 (FPE_{m,i,t-1} \\ & * FA_{m,i,t-1}) + \xi_5 (FPH_{m,i,t-1} * FA_{m,i,t-1}) + \xi_6 LF_{m,i,t-1} + \xi_7 DI_{m,i,t-1} \\ & + \xi_8 EXCH_{m,i,t-1} + v_{m,i,t} \end{aligned} \tag{6}$$

Similarly, *FA, FPE, FPH, LF*, m, i and t are as defined earlier while *HCE* is human capital expenditure, *DI* is direct investment and *EXCH* is exchange rate. The final model that measures poverty according to the relative spread of deprivation and inability to meet up with daily basic needs of life is specified in Equation (7)

$$\begin{aligned} PHCR_{m,i,t} = {} & \alpha + \psi_1 FA_{m,i,t-1} + \psi_2 FPE_{m,i,t-1} + \psi_3 FPH_{m,i,t-1} + \psi_4 (FPE_{m,i,t-1} \\ & * FA_{m,i,t-1}) + \psi_5 (FPH_{m,i,t-1} * FA_{m,i,t-1}) + \psi_6 LF_{m,i,t-1} + \psi_7 PLE_{m,i,t-1} \\ & + \psi_8 DCP_{m,i,t-1} + \varepsilon_{m,i,t} \end{aligned} \tag{7}$$

Also, *FA, FPE, FPH, LF, PLE*, m, i and t are as defined earlier while *PHCR* is poverty

headcount ratio and *DCP* is domestic credit to private sector. The measurement and description of variables employed is presented in Table 2.

Table 2: Variable definition, measure and a priori expectation

Code	Definition	Measure	A priori Expectation
HCE	Household Consumption Expenditure	Household final consumption expenditure per capita (constant 2010 US$)	Dependent Variable
PCI	Per Capita Income	GDP per capita (constant 2010 US$)	Dependent Variable
PHCR	Poverty Head Count Ratio	Percentage of the population living on less than $1.90 a day at 2011 international prices.	Dependent Variable
FA	Foreign Aid	Net Official Development Assistance and Official Aid received (Constant 2016 US $)	(+) for equations 5 and 6, (-) for equation 7
FPE	Fiscal Policy on Education	Government expenditure on education, total (% of GDP)	(+) for equations 5 and 6, (-) for equation 7
FPH	Fiscal Policy on Health	Domestic general government health expenditure (% of GDP)	(+) for equations 5 and 6, (-) for equation 7
LF	Labour Force	Labor force participation rate, total (% of total population ages 15-64) (modeled ILO estimate)	(+) for equations 5 and 6, (-) for equation 7
PLE	Price Level Effect	The annual percentage change in the cost to the average consumer of acquiring a basket of goods.	(+) for equations 5 and 7, (-) for equation 6
EXCH	Exchange Rate	Official exchange rate (LCU per US$, period average)	(+) for equations 5 and 6, (-) for equation 7
DI	Direct Investment	Foreign direct investment, net inflows (% of GDP)	(+) for equations 5 and 6, (-) for equation 7
DCP	Domestic Credit to Private Sector	Domestic credit to the private sector (% of GDP)	(+) for equations 5 and 6, (-) for equation 7

Data are all sourced from the World Bank's world development indicators (2019)

3.3 Estimation Procedure

The problem of endogeneity constitutes a major obstacle in studying the effect of foreign aid on poverty. Foreign aid may affect poverty and it can also be the case that poverty affects foreign aid, thus, resulting in endogeneity bias (Dollar & Burnside, 2000; Olofin, 2013; Rajan & Subramanian, 2008; Ugwuanyi, Ezeaku & Ibe, 2017). It is also possible that there are other variables that affect poverty. To account for this, other variables such as fiscal policy measures on education and health are introduced in the model. To correct for the endogeneity bias, the panel dynamic ordinary least squares (DOLS) is employed for estimation. The DOLS includes lags and leads of the explanatory variables, thereby removing any inconsistencies that are likely to be associated with such regression results. Also, the DOLS as developed by Stock and Watson (1993) is useful in estimating regression models that contain some stochastic trends but there exists cointegration among them. Stock and Watson (1993) propose that to make a cointegrating equation with stochastic trend variables become asymptotically normal and efficient, it is necessary to add seemingly superfluous non-trending variables to the cointegrated regression. This involves adding the lags and leads of the explanatory variables. This makes the t-statistics and F-statistics obtained become asymptotically normal.

The study also examines the stationarity of the variables to ensure that the variables are stable in the long run. Variables are said to be stationary if they have constant means and variance over time which will help in model stability. To examine the stationarity property of the variable, the study employs the Levin *et al.* (2002) and the Im *et al.* (2003) panel unit root tests. The Levin *et al.* (2002) panel unit root test assumes a common unit root process while the Im *et al.* (2003) test assumes that it follows an individual unit root process.

The Kao residual cointegration technique as introduced by Kao (1999) is used to examine the long run stability (cointegration) of the model. The Kao (1999) cointegration test is a residual-based method of testing for cointegration using the sequential limit theory of Phillips and Moon (1999). The method examines the stationarity of the error term from the equation estimated using the ordinary least square (OLS) technique and a cointegration is established if it is stationary at level (Örsal, 2007).

The Kao (1999) cointegration technique is preferred because it covers many sub-cases of interest and allows us to have a clear picture of the global and individual specific components in the panel.

The continent is divided into five regions. The classification is based on the economic blocs that are predominant in Africa and geographically defined. Thus, the regions are i) West Africa which is made up of sixteen countries (Benin, Burkina Faso, Cabo Verde, Cote' Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo); ii) Central Africa which is made up of eight countries (Angola, Cameroun, Central African Republic, Chad, Congo Democratic Republic, Equatorial Guinea, Gabon and Sao Tome); iii) Southern Africa which is made up of five countries (Botswana, Lesotho, Namibia, South Africa and Estwani); iv) North Africa which is made up of six countries (Algeria, Egypt, Libya, Morocco, Sudan and Tunisia); and v) East Africa which is made up of eighteen countries (Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, South Sudan, Tanzania, Uganda, Zambia and Zimbabwe). This division conforms to the various economic blocs in Africa. The scope will cover the regions between the period 1980 and 2017.

4. Results and Discussion

4.1 Pre estimation Results

This section analyzes the data. The descriptive statistics of the variables are presented in Table 3. The results show that on average, the ratio of domestic credit to the private sector as a percentage of GDP for Southern Africa was the highest, standing at 41.1% while that of Central Africa region was the least with 9.17%. The inference drawn from this finding is that Southern Africa is more financially deepened than other regions. The Southern African region is followed by North Africa, East Africa and then West Africa. The ratio of foreign direct investment (DI) to GDP is relatively a single digit rate across the five regions. However, on average, Central Africa received the highest inflow of direct investment as it rallied around 5.13% of GDP and this implies that Central Africa is more opened to international trade and investment compared to other regions, which has dominated their credit flows. East

Africa, Southern Africa and West Africa on average maintained the same level of DI while the less opened economy is the North Africa.

Table 3: Descriptive Statistics of Variables

Variable	Central Africa		East Africa		North Africa		South Africa		West Africa	
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.
DCP	9.17	38.20	18.50	106.30	32.96	86.20	41.10	160	15.60	65.70
DI	5.13	161.80	3.09	57.80	1.71	9.40	3.30	30.40	3.20	103
FA*	0.41	6.50	0.70	4.00	0.98	9.10	0.20	1.40	0.50	11.30
FPE	2.56	10.70	4.50	44.30	4.39	6.80	7.30	13.20	3.90	8.14
FPH	1.24	5.80	1.90	4.15	2.20	4.98	3.90	7.12	1.50	3.79
HCE*	1,515	4620	888	7022	1326	3194	2208	48,000	0.647	2,500
LF	67.98	78.80	74.40	91.50	50.50	56.01	61.90	76.80	66.00	85.10
PCI	3246	20,445	1577	14,143	3025	12,647	3879	7584	873	3,684
PHCR	46.10	94.10	45.10	86.00	6.30	14.90	39.80	81.70	48.10	91.60
PLE	183	23773	13.60	379.80	12.40	132.80	9.10	33.80	8.90	123
No. of countries	8		18		6		5		16	

* implies that the series are in billions of US dollars. Source: World Bank (2019)

The regional exchange rate is the overall average of the prevailing exchange rate of each country within the region over the time period. The results further reveal that the exchange rate of Central Africa is the highest as it averaged 1,092 of local currency to a dollar while its maximum value reached 19,000. Another region with high exchange rate is East Africa averaging 276.4 and reaching its peak at 2,587. West Africa's exchange rate can also be said to be volatile as it averaged 443 with a peak of over 6,000. North Africa on average is the highest recipient of foreign aid with US$0.98 billion, with a maximum receipt of US$9.1 billion in 2017. East and West Africa received foreign aid of US$0.7 billion and US$0.5 billion respectively while West Africa received a maximum of US$11.3 billion in 2017. Central Africa is the least recipient of foreign aid as it averaged US$406 million.

Fiscal policy on education is stronger in South Africa with average of 7.3% as a percentage of GDP. Also, East, North, and West Africa placed almost the same attention on the education sector as 4.5%, 4.39% and 3.9% is spent in the sector respectively. The fiscal policy measures on health are very huge in Southern Africa, averaging 3.9% of GDP, while Central Africa has received less attention. These results imply that attention is placed more on investment in human capital development in the

Southern Africa while less is placed by Central Africa. The extent of consumption as a measure of poverty (HCE) reveals that Southern Africa on average was the largest in household final consumption expenditure which stood at 2,208 on average and reached its peak of above 48,000 in a 2017. This is followed by the Central Africa while West Africa is limited in terms of consumption expenditure. Labor force participation rate is higher in East Africa and least in North Africa, implying that North Africa has the largest dependent population, while East Africa has the least dependent population.

The per capita income offers more interesting results as the results reveal that South Africa has the highest per capita income followed by North Africa. West Africa has the least per capita income at an average of US$873 per individual. The number of poor people as measured by the poverty headcount ratio in Africa was the worst in West Africa while it is relatively the same in Central, East, and Southern Africa. The results further suggest that North Africa has the least poverty spread among the regions. Internal price stability appears better in West Africa than in other regions with inflation averaging 8.9% compared to other regions with 9.1% in South Africa, 12.4%, 13.6% and 183% in North, East, and Central Africa, respectively.

For West African region, the result from Table 4A shows that domestic credit to the private sector, direct investment, exchange rate, foreign aid, fiscal policy measure on education, human consumption expenditure, labour force, per capita income, poverty headcount ratio and price level effect are all stationary at first difference as their probability values are less than 10%. The result shows that fiscal policy on health, the interaction between fiscal policy on education and foreign aid as well as fiscal policy measure on health and foreign aid are stationary at level.

For the East African region, the result shows that the Levin *et al.* (2002) and the Im *et al.* (2003) statistics for the variables direct investment, fiscal policy measure on education, labour force, price level effect and the interaction between foreign aid and fiscal policy measre on education are statistically significant at level using 10% level of significance and this shows that they are stationary at level. Other variables in the model order than the ones listed above were not significant at level but was further tested and they were significant at first difference.

Table 4A: Panel unit root test results

	Levin *et al.* t* (2002)		Im *et al.* W-stat (2003)		
	Level Statistic	1st Diff. Statistic	Level Statistic	1st Diff. Statistic	Conclusion
		West Africa			
DCP	0.56	-7.37***	2.34	-10.01***	I(1)
DI	7.11	-14.21***	1.60	-15.86***	I(1)
EXCH	2.21	-7.91***	3.03	-9.25***	I(1)
FA	-1.3	-13.58***	-1.45*	-	I(1)
FPE	-2.54**	-	-1.29	-8.46***	I(1)
FPH	-3.09***	-	-11.32***	-	I(0)
HCE	1.09	-8.13***	1.59	-8.13***	I(1)
LF	-3.98***	-	0.41	-8.63***	I(1)
PCI	1.55	-9.13***	2.95	-11.08***	I(1)
PHCR	0.80	-3.22***	-1.73**	-	I(1)
PLE	7.65	-9.31***	-0.94	-7.91***	I(1)
FA*FPE	-2.53***	-	-1.64*	-	I(0)
FA*FPH	-2.62***	-	-1.32*	-	I(0)
		East Africa			
DCP	0.96	-7.85***	2.03	-9.99***	I(1)
DI	-2.40**	-	-3.20***	-	I(0)
EXCH	5.70	-3.06***	11.53	-9.44***	I(1)
FA	0.14	-8.98***	-0.97	-16.17***	I(1)
FPE	-1.84**	-	-1.93**	-	I(0)
FPH	-2.21**	-	-0.71	-20.26***	I(1)
HCE	-0.68	-4.24***	3.04	-6.60***	I(1)
LF	-5.78***	-	-2.29**	-	I(0)
PCI	1.02	-6.67***	3.98	-8.39***	I(1)
PHCR	-1.61*	-	0.90	-16.00***	I(1)
PLE	-3.58***	-	-6.07***	-	I(0)
FA*FPE	-2.25**	-	-1.84**	-	I(0)
FA*FPH	-2.93***	-	-1.06	-14.40***	I(1)
		Central Africa			
DCP	-1.96**	-	-1.2	-6.44***	I(1)
DI	-2.44**	-	-0.89	-11.17***	I(1)
EXCH	1.15	-4.10***	1.21	-6.08***	I(1)
FA	-0.97	-7.75***	-2.12**	-	I(1)
FPE	-1.62*	-	-0.18	-3.36***	I(1)
FPH	-1.14	-9.80***	-0.59	-10.36***	I(1)
HCE	0.50	-2.94***	-0.04	-4.20***	I(1)
LF	-3.82***	-	-2.25**	-	I(0)
PCI	-2.29**	-	-0.31	-5.37***	I(1)
PHCR	-3.17***	-	-1.55*	-	I(0)
PLE	-7.14***	-	-7.39***	-	I(0)
FA*FPE	-4.68***	-	-2.98***	-	I(0)
FA*FPH	-1.33	-10.06***	-0.66	-10.36***	I(1)

***, ** and * denote significance at 1%, 5% and 10% respectively. Diff. represent Difference

For the Central African region, the result shows that only labour force, price level effect and the interaction between foreign aid and fiscal policy measure on education are stationary at level. This is because their Levin *et al.* (2002) and the Im *et al.* (2003) statistics are statistically significant at level. Other variables in the model are all stationary at first difference.

Table 4B: Panel unit root test results

	Levin et al. t* (2002)		Im et al. W-stat (2003)		
	Level Statistic	1^{st} Diff. Statistic	Level Statistic	1^{st} Diff. Statistic	Conclusion
		Southern Africa			
DCP	-0.49	-5.35***	0.17	-6.48***	I(1)
DI	2.11	-8.44***	0.12	-10.15***	I(1)
EXCH	-0.31	-8.83***	2.16	-7.62***	I(1)
FA	-1.94**	-	-1.64*	-	I(0)
FPE	-0.42	-2.02**	1.13	-3.15***	I(1)
FPH	-0.95	-6.15***	-0.62	-5.76***	I(1)
HCE	-1.44	-4.44***	2.06	-5.42***	I(1)
LF	-3.04**	-	-0.64	-4.96***	I(1)
PCI	-1.63*	-	1.09	-4.08***	I(1)
PHCR	-1.43*	-	-0.54	-3.30***	I(1)
PLE	-1.34*	-	-0.69	-12.48***	I(1)
FA*FPE	-0.89	-7.15***	0.37	-7.66***	I(1)
FA*FPH	-0.43	-3.10***	-0.28	-6.60***	I(1)
		North Africa			
DCP	-0.17	-1.88**	0.35	-4.87***	I(1)
DI	-1.12	-7.58***	-1.42*	-	I(1)
EXCH	1.03	-2.79***	1.82	-4.07***	I(1)
FA	1.02	-4.17***	-0.53	-9.72***	I(1)
FPE	-1.49*	-	0.04	-3.92***	I(1)
FPH	-2.80***	-	-0.01	-4.08***	I(1)
HCE	2.32	-1.85**	4.64	-5.29***	I(1)
LF	-0.67	-3.58***	0.69	-4.68***	I(1)
PCI	0.25	-4.07***	3.12	-5.97***	I(1)
PHCR	-2.50**	-	-1.14	-7.22***	I(1)
PLE	-0.75	-4.68***	-1.02	-8.99***	I(1)
FA*FPE	-0.05	-4.15***	1.64	-7.51***	I(1)
FA*FPH	-2.33**	-	0.25	-4.25***	I(1)

***, ** and * denote significance at 1%, 5% and 10% respectively.
Diff. represent Difference

Table 4B reveals the panel unit root test results for Southern and North Africa. In Southern Africa, the results show that all the variables examined are stationary at first difference except foreign aid as the Levin *et al.* (2002) and the Im *et al.* (2003) statistics are statistically significant at level. For the other variables, they are integrated of order one. Also, for North Africa, all the variables examined are stationary

at first difference as shown by the Levin *et al.* (2002) and the Im *et al.* (2003) statistics are statistically significant at level. Having examined the unit root properties of the variables, the specified models are tested for cointegration. Table 5 presents the results of the cointegration test.

Table 5: Cointegration Test Results

Region		Poverty Measures			Decision
		Based on consumption	Based on income level	Based on relative spread	
West Africa	ADF Stat.	-2.73***	-1.65*	-2.96***	Co-integration Exists
East Africa	ADF Stat.	-2.23**	-2.28**	-2.42**	Co-integration Exists
Central Africa	ADF Stat.	-2.38**	-1.81**	-1.79**	Co-integration Exists
Southern Africa	ADF Stat.	-1.70**	-3.34***	-2.58**	Co-integration Exists
North Africa	ADF Stat.	-2.27**	-3.33***	-2.19**	Co-integration Exists

***, ** and * denote significance at 1%, 5% and 10% respectively. Stat. denote Statistics.

The Kao residual cointegration test was employed and the results are presented in Table 5. The results from the test reveal that in all the fifteen models estimated, the residuals are all stationary at levels implying cointegration exists among the economic fundamentals and, thus, there exists a long run relationship. With this conclusion, the equations can thus be estimated.

4.2 Regression Result and Discussion

We examined the effectiveness of foreign aid interacting with fiscal policy measures in education and health on poverty based on households' income per capita (PCI), consumption (HCE), and poverty headcount ratio (PHCR). The estimation results are presented in Tables 6, 7, and 8 respectively.

The results showed that respective government's efforts towards investment in education alone did not significantly improve the rate of growth in per capita income of citizens in Africa; on the contrary, the results show that the per capita income of citizens across the regions in Africa worsened as governments' investment in education

increased except in Southern Africa where the coefficient was positive and statistically not significant. The result may be attributed to the low investment in education in the region. The investment in education has not been tailored substantially towards science, technology, engineering and mathematics (STEM) that has the potential of unlocking the human capital returns. The results showed that governments' investment in the health sector led to increase in the countries' per capita income in East, Southern and North Africa as the results were statistically significant at 1%. However, per capita income in West and Central Africa worsened as governments' effort towards improving the health sector increased.

The results showed that increases in the growth rate of foreign aid improved per capita income in East and Central Africa, but statistically not significant for Southern Africa. Despite increases in foreign aid growth rate, the per capita income of citizens in West Africa worsened. The results further showed that increase in foreign aid together with government investment in the education sector can help to improve per capita income in all the regions in Africa except Central Africa. North Africa which is the third recipient of aid among the regions in Africa was able to improve the per capita income of their citizenry by investing more in education. The result for Central Africa does not conform to the findings of Mbah and Amassoma (2014) who concluded that foreign aid is not beneficial in stimulating growth in income in Africa economies. The inflow of foreign aid in some regions increased the potency of fiscal policy measures on the educational sector as the results revealed among others that foreign aid interacting with fiscal policy measures on education in West, East, South and North Africa were able to increase their income level significantly. Further results from Table 6 showed that governments' expenditure in health together with foreign aid significantly improved per capita income in West and Central Africa while it has a negative impact in East, Southern and North Africa.

Table 6: Effectiveness of foreign aid interacting with fiscal Policy measures on income level

Variables	West Africa	East Africa	Central Africa	Southern Africa	North Africa
FPE	-0.567***	-0.664***	-2.227*	0.003	-1.234*
	(-3.481)	*(-3.453)*	*(-1.931)*	(0.245)	(-2.000)
FPH	-0.860**	3.305***	-6.623***	2.653***	2.498***
	(-1.986)	(8.672)	(-4.276)	(5.569)	(3.129)
FA	-0.116***	0.338***	0.307**	0.128	-0.133
	(-4.394)	(20.948)	(2.329)	(0.682)	(-0.884)
LF	-0.006**	-0.009***	-0.036*	0.033	0.083**
	(-2.080)	(-2.798)	(-1.882)	(1.034)	(2.607)
EXCH	-0.005	0.070***	-0.043***	0.141	0.006
	(-0.548)	(3.288)	(-2.839)	(1.590)	(0.147)
DI	0.005*	0.007	-0.003	0.015***	0.076***
	(1.845)	(0.886)	(-0.687)	(4.361)	(3.555)
FA*FPE	0.031***	0.039***	-0.309***	0.092***	0.066**
	(3.582)	(3.446)	(-5.014)	(5.430)	(2.134)
FA*FPH	0.050**	-0.170***	0.321***	-0.148***	-0.116***
	(2.200)	(-8.837)	(3.857)	(-6.169)	(-3.113)
R-squared	0.972	0.989	0.997	0.996	0.994
Adjusted R-squared	0.895	0.960	0.985	0.971	0.973
SSR	3.680	3.457	1.260	0.286	0.497
Jarque-Bera Prob.	0.000	0.000	0.000	0.227	0.003
Cross-sections included	14	13	7	4	5
Periods included	35	35	35	34	35
Total panel (unbalanced) observations	486	455	241	132	171
Lags and Leads spec. using AIC criterion	(1, 1)	(1, 1)	(1, 1)	(1, 1)	(1, 1)

Note: Per capita income (PCI) is the dependent variable. ***, ** and * denote significance at 1%, 5% and 10% respectively.

The finding from this result aligns with the study of Yohannes *et al.* (2011) who examined the effect of foreign aid on economic growth in Ethiopia and concluded that foreign aid significantly increases the output growth of Ethiopia if it is assisted by strong monetary, fiscal and trade policies. The negative impact of foreign aid interacting with fiscal policy measures in the form of health expenditure on poverty reduction aligns with the findings of Seedee (2018) who examine the impact of for-

eign aid on extreme poverty in Liberia and found that foreign aid does not in any way lead to poverty reduction despite the billions of dollars received as aid.

Other results from Table 6 showed that labour force negatively affect income level in West, East and Central Africa unlike the Southern and North Africa, where it is positive. The results for West, East and Central Africa however, do not conform to the study of Schoenmaeckers and Schoenmaeckers (2005) who noted that labour force productivity increases per capita income. The implication of this is that labor productivity in Southern and North Africa can contribute to the income level of their citizens unlike the other regions. Exchange rate depreciation can improve income per capita in East Africa, but worsened it in Central Africa. Foreign direct investment significantly improved income level only in North and Southern Africa.

Examining the statistical properties of the models as presented in Table 6 reveals that at least 96% of variations in per capita income is explained by the model for all regions, except in West Africa where 89.5% is explained. The Jarque-Bera (J-B) test revealed that the residuals of the models estimated for West, East, Central and North Africa are not normally distributed, which justifies the use of the dynamic OLS while those for Southern Africa are normally distributed.

The results in Table 7 revealed that government expenditure on education has negative impact on household consumption in all the regions except North Africa. In West and Central Africa, foreign aid has negative impact on household consumption expenditure, suggesting that foreign aid increased poverty in these regions. The results revealed that foreign aid interaction with fiscal policy measures on education is statistically significant in West and Central Africa, but statistically not significant in East and Southern Africa. In North Africa, foreign aid increased household consumption expenditure. The implication of this is that West and Central Africa need foreign aid and if received with their current fiscal policy measures in the educational sector, foreign aid could have positive effect on consumption.

Table 7: Effectiveness of foreign aid interacting with fiscal Policy measures on household consumption

Regions/Variables	West Africa	East Africa	Central Africa	Southern Africa	North Africa
FPE	-0.590*	-0.147	-1.130*	-0.956	1.955***
	(-1.852)	(-0.664)	(-1.770)	(-0.726)	*(5.233)*
FPH	-2.160***	1.738	2.122**	3.005*	1.333**
	(-3.349)	*(3.298)*	*(2.167)*	*(1.977)*	*(2.218)*
FA	-0.239***	0.360	-0.034	0.423	0.468***
	(-3.227)	*(20.288)*	*(-0.433)*	*(0.689)*	*(10.459)*
LF	-0.013***	-0.015	1.442	0.020	-0.027
	(-2.722)	*(-3.545)*	*(1.575)*	*(0.898)*	(-1.644)
PLE	-0.001**	-0.001	-0.009	-0.081***	-0.020***
	(-2.383)	*(-2.710)*	*(-0.678)*	*(-3.317)*	(-8.929)
FA*FPE	0.033**	0.010	0.067**	0.048	-0.106***
	(2.057)	*(0.794)*	*(2.001)*	(0.690)	*(-5.654)*
FA*FPH	0.110***	-0.079	-0.107**	0.160**	-0.060**
	(3.423)	(-3.054)	*(-2.133)*	*(2.029)*	(-2.087)
R-squared	0.986	0.985	0.982	0.966	0.867
Adjusted R-squared	0.892	0.957	0.956	0.898	0.620
Jarque-Bera Prob.	0.000	0.000	0.000	0.069	0.103
Cross-sections included	14	11	7	5	5
Periods included	34	35	37	36	35
Total panel (unbalanced) observations	474	385	228	154	172
Leads and Lags spec. using AIC criterion	(2, 1)	(1, 1)	(1, 1)	(1, 1)	(1, 1)

Note: Household consumption expenditure (HCE) is dependent variable. ****, ** and ** denote significance at 1%, 5% and 10% respectively.

The results also show that increases in government expenditure in the health sector have significant and positive impact on household consumption in Central, North and Southern Africa. It was statistically not significant in East Africa, though, the impact was negative in West Africa. However, the results reveal that foreign aid augmenting fiscal policy on the health sector improved the consumption expenditure of households in West and Southern Africa, but worsened it in East, Central and North Africa.

The results imply that foreign aid in West and Southern Africa can boost the effect of fiscal policy in both education and health sectors on household consumption in the region, and thereby improving the quality of life. These results conform to the findings of Woldekidan (2015) who examined the role of foreign aid in poverty reduction in Ethiopia and finds that foreign aid reduces poverty incidence measured in terms of household consumption expenditure. Foreign aid enhances government spending in education to reduce poverty in East and Central Africa, but this is not the case if channeled towards the health sector.

Results from Table 7 also showed that the increase in labor force does not have significant impact on househods' consumption in all the regions except West Africa where it is negative and statistically significant. The results, as expected show that increases in prices reduce the extent of household consumption in West, North and Southern Africa.

The statistical properties of the results showed that the models estimated are robust. The coefficient of determination indicated that at least 90% of the variations in household consumption expenditure is explained by the explanatory variables in all regions except North Africa. The normality test revealed that the residuals of the Western, Eastern, Central and Southern regions are not normally distributed while that of the Northern region is normally distributed, given the Jarque-Bera test. The varying distribution of the residuals is expected and justified the method employed in estimation.

Table 8 showed that increasing foreign aid has not been able to significantly reduce the percentage of the population living below US$1.90 per day. The result indicated that increasing foreign aid worsened significantly the proportion of the population living below US$1.90 per day in West, East and North Africa while the same effect occurred in other regions but is statistically not significant. Fiscal policy on education significantly reduced the percentage of the population living below the poverty line in East Africa but increased it in the Central region. In North and South Africa, fiscal policy measures on health increased the percentage of the population living below the poverty line but reduced it in the Central region.

The interaction of foreign aid with fiscal policy measure on health significantly re-

duced the poverty headcount ratio in West, Southern and North Africa. The result suggests that the interaction of foreign aid with health expenditure enhances the impact of the former on poverty.

Interacting fiscal policy measures in health with foreign aid reveals that foreign aid can help West, East, Southern and North Africa to leapfrog and reduce the spread of poverty in those regions, but the same cannot be said for the Central region.

This means that fiscal policy measures in health and education interacting with foreign aid inflows into the West, Southern and North African regions can effectively reduce the widespread of poverty, but the foreign aid inflow and fiscal policy measures in the education sector can only effectively reduce the widespread of poverty in West and Central Africa. The results conformed to the findings of Yohannes *et al*. (2011), Alvi and Senbeta (2012), and Lensink and White (2000) who conclude that foreign aid significantly increases the output growth of economies if supported by strong monetary, fiscal and trade policies. The results also agree with the finding in Olofin (2013) who showed that foreign aid is significant in reducing the prevalence of poverty in eight West African countries.

Other results from Table 8 showed that labor force in all the regions except Southern Africa increases widespread poverty. While this is significant in West, East, and North Africa, it is not in others. Also, increases in the price level significantly reduce the widespread poverty in all the regions except in West Africa. Increase in prices is an incentive for producers to produce more and this increases output as supported by the Neoclassical theory (Ajide & Lawanson, 2012). Rise in prices results in increased cost of living and reduces the standard of living, which worsens poverty. However, if the growth rate in income is higher than the growth rate in inflation, then increases in inflation does not necessarily imply a fall in the standard of living (increase in poverty). The extent of financial development measured with the domestic credit to the private sector (DCP) is significant in reducing widespread poverty in the West, East and Southern regions of Africa, while it worsened it in the Central and Northern regions.

Table 8: Effectiveness of foreign aid interacting with fiscal Policy measures on poverty head count ratio

Variables	West Africa	East Africa	Central Africa	South Africa	North Africa
FPE	1.131*	-1.565***	1.418**	0.037	0.642
	(1.932)	*(-4.326)*	(2.462)	(0.106)	(1.013)
FPH	1.557	5.714***	-2.421**	1.039***	3.665***
	(1.547)	(5.631)	(-2.560)	(3.242)	(3.094)
FA	0.481***	0.142***	0.089	0.179	0.486***
	(4.332)	(7.236)	(1.137)	(0.981)	(3.615)
LF	0.017***	0.016***	1.084	-0.0002	0.175***
	(2.879)	(3.511)	(1.316)	*(-0.017)*	(3.886)
PLE	0.002	-0.008	-0.007	-0.019***	-0.010***
	(1.185)	*(-0.039)*	(-0.670)	(-2.974)	(-3.743)
DCP	-0.015***	-0.028***	0.052	-0.012***	0.004
	(-3.014)	*(-6.064)*	(0.834)	*(-4.997)*	(0.890)
FA*FPE	-0.060**	0.079***	-0.078**	-0.004	-0.031
	(-2.043)	(4.273)	*(-2.564)*	*(-0.203)*	*(-1.009)*
FA*FPH	-0.092*	-0.274***	0.131**	-0.041**	-0.204***
	(-1.809)	*(-5.577)*	(2.672)	(-2.484)	(-3.517)
R-squared	0.962	0.955	0.994	0.985	0.983
Adjusted R-squared	0.857	0.832	0.971	0.918	0.918
Jarque-Bera Prob.	0.000	0.000	0.000	0.150	0.011
Cross-sections included	14	11	7	4	4
Periods included	35	35	35	35	35
Total panel (unbalanced) observations	488	385	239	133	140
Leads and Lags spec. using AIC criterion	(1, 1)	(1, 1)	(1, 1)	(1, 1)	(1, 1)

Note: Poverty head count ratio (PHCR) is the dependent variable. ***, ** and * denotes 1%, 5% and 10% significance levels respectively.

The statistical properties of the models reveal that about 85.7% of variations in poverty headcount ratio is explained by the explanatory variables in the model for West Africa; 83.2% in East; 97.1% in the Central; and 91.8% in Southern Africa.

5. Conclusion and Policy Recommendation

This study examined the effectiveness of foreign aid in reducing poverty in Africa given the respective regions' fiscal stance. Literature suggests that fiscal policy

measures in health and education sectors alone are inadequate in reducing poverty, thereby creating the need for foreign aid. This study concludes that foreign aid is effective and significant in increasing income level in East and Central Africa. When the inflow of foreign aid is augmented with fiscal policy on: education, income significantly improved in all regions, except Central Africa where the interaction reduces households income; health, it enhanced income in all regions except West and East Africa where the interaction dampened households' income.

The policy implication of this study is that Africa needs foreign aid together with her fiscal policy measures in alleviating widespread poverty. The study recommends that for foreign aid to be beneficial in Africa, there is a need to improve governments' allocation to the health and education sector. The findings serve as a policy direction for regions in Africa; this becomes imperative as the results revealed the varying effectiveness of foreign aid and fiscal policy on Africa's poverty level.

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