

Is foreign aid an antidote for human poverty in Sub-Saharan Africa?
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Abstract: This paper uses an unbalanced panel data covering the period from 2003-2009, to assess the impact of foreign aid i.e. net official assistance per capita on the incidence of poverty in sub-Saharan Africa. Human Poverty index (HPI-1) computed by UNDP is used as the dependent variable. Fixed effects regression model is employed in order to account for country invariant characteristics and time effects. The main finding is that, there is an inverse relationship between foreign aid and human poverty. However, this effect is marginal. This suggests that the recent call for a "big push" in foreign aid without tapping into other sources of finance will probably not bring sub-Saharan Africa out of its vicious cycle of poverty.

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“Without aid, cumulatively the countries of the bottom billion would have become much poorer than they are today. Aid has been a holding operation preventing things from falling apart.” (Collier, 2007)

1). Introduction:

Is a “big push” in foreign aid what is needed for developing countries to meet the eight outlined Millennium Development Goals (MDGs)¹ reached at UN Millennium Declaration on 8, September 2000? This question has certainly generated a row of debates in recent years. The pro-aid camp led by notable economist Jeffrey Sachs certainly believes that the key element to achieving these goals is to raise aid from about \$135 to \$195 billion a year by 2015 (UN report, 2005). In contrast, the anti-aid camp led by New York University Economics professor William Easterly believes otherwise. He argues that more aid to developing countries is not what is needed but the effective management of what is already on ground and the self-reliant efforts of the poor in these countries (Easterly, 2006).

The MDGs are the product of various conferences by the United Nations in the 1990s.² Goal number 8 highlights a role for developed countries. According to UNDP report (2005), it will be practically impossible for developing countries to achieve the 7 other goals if official development assistance from OECD member countries is not doubled. Hence, developed countries have reaffirmed their pledge of 0.7 percent of their Gross National Income (GNI) in Official Development Assistance.³ Taking into account that the MDGs are primarily focused on human development and poverty reduction, the question that this paper seeks to address is “What is the impact of foreign aid on human poverty in sub-Saharan Africa?”

In comparison with East Asia where extreme poverty has dropped as a result of promoting labor

¹ The eight goals are: to reduce extreme poverty and hunger; universal primary education (100% coverage by 2015); gender equality in primary and secondary education (in terms of achieving an equal ratio of boys to girls); to reduce child mortality by two-thirds; improvement of maternal health by reducing mortality by two-thirds; to combat HIV/AIDS, TB and malaria; to reduce the proportion of the population without clean water by half and to develop global partnership for development.

² Examples include Earth Summit in Rio de Janeiro, Brazil in 1992, World Conference on Human Rights in 1993 and etc. For a comprehensive list, see Hulme (2007)

³ This amount first was initially agreed upon at the 1970 General Assembly Resolution and recently and subsequently at various conferences: Monterrey Consensus, Mexico in 2002; World Summit on Sustainable Development Johannesburg, South Africa in 2002 and at Gleneagles, Scotland in 2005. (UNDP, 2005)

intensive production, aid dependent sub-Saharan Africa remains the poorest region in the World. According to World Bank report (2011), the proportion of people living under \$1.25 per day in East Asia was relatively higher in 1990. While, extreme poverty rate declined by over 70 per cent in East Asia, over 50 percent of the population in sub-Saharan Africa remain in extreme poverty-same level as two decades ago. In addition, Go et al. (2007) highlight that both regions had the same level of per capita income in 1980⁴. While, East Asia's income per capita quadrupled, sub-Saharan Africa's income per capita declined over the next two decades. An estimate 1 trillion dollars have been transferred in government to government aid since the 1960s, yet the average GDP per capita growth rate in the region from 1960-2005 was 2.2% (Human Development Report, 2009).

Aaron (2003) identifies human poverty⁵ as "the denial of choices and opportunities for living a tolerable life". Sub-Saharan Africa is faced with enormous human poverty like South Asia. But unlike South Asia, it is been left behind. For example, infant and maternal mortality rates declined by about 50 per cent from 1990-2009 in South Asia, while these rates only dropped by 25 per cent in sub-Saharan Africa in the same period. Also, 62 per cent of urban dwellers in sub-Saharan Africa live in slums while South Asia records about 32 per cent. Nonetheless, some progress was made in education in sub-Saharan Africa. The region had the highest improvement in primary school enrollment in the World from 1990- 2009, yet, half of the 62 million children that are out of school in the World live in the region. Also, one- eighth of children die before age five and the life expectancy at birth is 54 years. This number is 11 and 15 years lower than the average in South Asia and in the World respectively (World Bank, 2011).

In the 1960s, the focus of aid to the region was concentrated on funding infrastructure projects, while the 1970s witnessed a redirection to poverty alleviation aid funded projects. The following decade, often referred to as the "lost decade", witnessed the debt crisis when new loans were made available to countries that were already in default, provided that these countries agreed to stabilization and structural adjustment programs by IMF and World Bank. Aid in the 1990s focused on the importance of good governance. This was primarily because not much had been

⁴ This number is calculated at 1995 Purchasing Power Parity (PPP).

⁵ Poverty is traditionally defined as an individual's lack of access to an adequate minimum level of monetary resources (UNDP report, 1997).

achieved, the growth rate measured by the change in real GDP per capita from 1981-1990 was -0.9 per cent. Currently, the new wave for aid is a “big push” and it is argued that aid hasn’t worked so far because not enough has been given to poor countries (Sachs et al., 2004).

The fact that foreign aid has worked before in rebuilding a region is a key motivation for its use as a development tool. The European recovery program from 1948-1952, otherwise known as “The Marshall plan” succeeded in reconstructing Western Europe. A total of 12.5 billion dollars was made available to countries in Western Europe and divided mainly on a per capita basis. Following aid receipts, industrial production in the region increased by about 35 per cent, and the region was able to break out of starvation and poverty. Also, large amounts of aid were able to restore political stability to the war -torn region (DeLong and Eichengreen, 1991).

The purpose of this paper is to provide a quantitative analysis for the relationship between foreign aid and human poverty in sub-Saharan Africa. It seeks to check for a correlation between the net amounts of all official development assistance per capita on the Human Poverty Index (computed by the UNDP for developing countries). The remainder of this paper is organized as follows: section 2 presents a review of existing literature, while section 3 presents an analysis of data and the empirical model. Section 4 presents the main results. Lastly, Section 5 concludes.

2). Literature review:

The call for a "big-push" in foreign aid follows from three main arguments. Firstly, Africa is stuck in a poverty trap. Secondly, foreign aid can act as a catalyst for countries in Africa to "take off"⁶. And lastly, an increased amount of aid leads to high level of human development and poverty reduction. A few papers have tested the poverty trap hypothesis, while a vast number of papers have analyzed the impact of foreign aid on economic growth. However, the relationship between aid and human development, particularly on human poverty, has not yet been extensively investigated. The pro-aid camp argues that there is a causal link among poverty trap, large scale aid financed investment, high sustainable economic growth and poverty reduction. In this section, I briefly review few of the existing studies relating to these arguments.

⁶ A term due to Rostow (1959), it is a stage of high sustainable economic growth via large scale investments.

Pro-aid

The most prominent argument for a “big push” in aid is poverty trap. There are several types of poverty trap in the aid effectiveness literature. Technological poverty trap is presented in the Solow-Swan neoclassical model by allowing for non-convexities in the production function, this translates to multiple equilibria. A poor country is stuck at a stable low level equilibrium due to factors such as low domestic savings, high population growth and high depreciation of capital stock. However, there is a middle point (critical threshold) on the production function where it can exhibit increasing returns to scale. For a poor country to experience any growth, its level of capital stock has to grow past this critical threshold (Rosenstein-Rodan, 1961).

Sachs et al. (2004) draw from this theory and argue that the reason aid has not worked so far is because the amount received has not been large enough for these countries to move beyond the critical threshold. They use data from 1980-2004 for 96 countries including 33 tropical sub-Saharan countries to test the poverty trap hypothesis. The logarithm of initial GDP per capita and some other explanatory variables⁷ are estimated on the change in GDP per capita. They find a 3 per cent lower than average growth rate for countries in tropical sub-Saharan Africa. In addition, they argue that their result holds even in “well-governed” countries in the region. They conclude that Africa is stuck in a poverty trap and that the incidence of poverty cannot be explained by bad governance. Sachs (2007) also states that, “there is no margin of income above survival that can be invested for the future” (p.56). This implies that people in Africa only have subsistence income. He emphasizes that people in the countries in Africa are struggling to eat, unable to live from day-to-day, hence have no surplus capital to invest.

Collier (2007) highlights four other kinds of poverty traps in Africa namely; conflict, natural resource⁸, being landlocked with bad neighbors, and a small country with bad governance.

⁷ Other explanatory variables included: economic freedom index, corruption index and some other proxies for governance.

⁸ He explicitly recommends foreign aid for all but, the natural resource trap. Natural resource poverty trap is based on the problems of rent seeking and dutch disease. Governments in countries that are richly endowed with natural resources have little or no incentive at all to raise revenues by levying taxes. Hence, there is little motivation for government accountability. Natural resource rent can also cause an appreciation in the real exchange rate and an artificial increase in the wage rate. Such effects may reduce the profitability of all other sectors in the economy.

According to him, half of all civil wars are "post conflict relapses". The likelihood of a civil war is drastically increased for a country that has previously experienced a civil war. Collier and Rohner (2008) find that a low level income, a low growth rate and a high dependence on natural resource rent are among factors that determine the occurrence of a civil war. Also, Collier and Hoeffler (2004) confirm the conflict trap hypothesis and suggest that foreign aid targeted to this region can help prevent a reoccurrence of conflicts. They state that an estimate of US\$65 billion is lost when a country has a civil war, which in turn lowers its GDP by about 15–20 per cent. Without foreign assistance, this huge loss of capital can lead to a reoccurrence of conflict.

In addition, geographical location of some countries in Africa has contributed to their incidence of poverty. Approximately 38 per cent of the poor in Africa live in landlocked countries with bad neighbors, without implying that all landlocked countries are poor.⁹ However, he suggests that a landlocked country requires the help of its coastal neighbors to gain access to global market. Pedersen (2001) finds that transportation costs of a landlocked country are highly affected by the amount that its coastal neighbor has invested in transportation infrastructure. Therefore, it is advantageous for landlocked countries to have neighbors with good transportation infrastructure. Moreover, Radelet and Sachs (1998) find that transportation cost for landlocked countries is 50 per cent higher on average.

On a final note, Collier (2007) contends that small countries have a high level of trade openness. Therefore, they are more economically vulnerable to external shocks.¹⁰ However, if it has good governance, it is possible to build resilience against such shocks. Farrugia (1993) suggests that good governance in small states is relatively rare because governments face more conflicting pressures. However, Collier ascertains that having good policies and good governance alone will not pull a small country out of this trap, large amounts of foreign aid are essential. (Chauvet and Guillaumont (2003) find that aid effectiveness is enhanced by economic vulnerability to external shocks in small states.

⁹ For example, Switzerland is landlocked but has good neighbors like Germany and Italy.

¹⁰ See Farrugia (2004) for a list of stylized facts about small countries.

The second argument for aid is that it promotes economic growth via an increase in domestic investments. Chenery and Strout (1966) pioneer the two gap theory.¹¹ They argue that foreign aid is inevitable if poor countries want to fill the domestic savings and foreign exchange gaps that are essential for economic growth. An explicit assumption in this paper is that foreign aid will increase domestic savings and investments on a one-one ratio.

An increase in investments will in turn lead to a high sustainable growth rate. In a later study, Hansen and Tarp (2001) use a dynamic panel data set for 56 countries covering period from 1974-1993. They estimate the regression by Generalized Method of Moments (GMM) to account for simultaneity bias due to the problem of endogeneity. They find that there is a one-one relationship between an increased amount of foreign aid and an increase in investments in the recipient country. Hansen and Tarp (2001) also criticize using reduced form equation, based on endogenous growth model.¹² A similar study by Gomane et al. (2005) also finds that aid has a positive impact on growth via its increase on investments. They use a sample that consists of 25 sub-Saharan Africa countries over the period 1970-1993. They propose the technique of generated regressors to address the problem of double accounting. They argue that by including both aid and investments as done by Hansen and Tarp (2001), coefficients may be biased. They find that the growth rate increases by 0.25 per cent with every one 1 per cent increase in foreign aid.

A more recent study by Armah and Nelson (2008) use data from 21 countries in sub-Saharan Africa from 1995-2003, and fixed effects least squares estimation is employed. They find that an increase in aid promotes investment and economic growth. They reject the diminishing returns to scale argument that I will discuss as an anti-aid argument due to works by Hajidmicheal et al. (1995), Hansen and Tarp (2001) and others. Armah and Nelson (2008) conclude that "there is no end to how much aid the developed world should pump into SSA to help achieve the goals of the millennium project"(p.27)

¹¹ It is an extension of the Harod-Domar growth model.

¹² This growth model due to Barro (1991) implies that investment has an effect on growth, but investment variables are not explicitly introduced in the regression equation. Burnside and Dollar (2000) use the reduced form equation and pioneer the argument that foreign aid has a positive effect on economic growth only if the recipient country has good policies.

Anti- aid

To test for poverty trap, Easterly (2006) ranks 137 countries based on their income per capita from 1950-2001. He finds that the countries that were relatively richer in 1950 fell into the bottom list by 1985. Countries declined from above rather than being stuck below in low steady state equilibrium as suggested by Sachs et al. (2004). In addition, he tests the hypothesis that well-governed poor nations are caught in a poverty trap. He uses I.V regression to control for both initial income and quality of governance. He finds evidence for conditional convergence (the opposite of poverty trap) and reports that all measures of government quality are strongly significant predictors of growth in the sample period. One other important criticism highlighted in this paper is that there is little evidence of a "take off" in actual data. Most growth successes happen gradually and the few exceptions like the East Asia miracle happened without large receipts of aid.

In similar a study, Raddatz and Kraay (2007) calibrate aggregate growth models and argue that there is no evidence in cross country data for a low savings -technological poverty trap in sub-Saharan Africa. They argue that for the Solow model to generate a poverty trap, savings rate has to be a steep s-shaped function of capita per worker.¹³ According to them “ while saving rates and productivity do clearly increase with income levels, we find that they do not increase in the right nonlinear way required to generate stable low-level equilibria that can plausibly account for very persistent income differences across countries” (p. 333). Therefore, they conclude that there is no evidence in cross country data that a large-scale increase in aid will be more effective than moderate amounts.

There is also new evidence in the aid effectiveness literature regarding the amount of aid that should be given, while I recognize that this view does not explicitly oppose foreign aid.¹⁴ They refute the proposition that Africa is stuck in a poverty trap. Hajidmicheal et al. (1995), Hansen and Tarp (2001) and others, argue that there are diminishing returns to scale in foreign aid. This view stands in contrast to the fixed threshold of capital stock in the poverty trap hypothesis by

¹³“Savings should be low at low levels of capital per worker, increase significantly at some intermediate levels and level off at high levels”. (Raddatz and Kraay, 2007)

¹⁴ They oppose “big-push” theory.

Sachs et al. (2004). They find that the relationship between aid and economic growth is non-linear. To account for this non linearity, they include an aid-squared variable in their studies. They explain that there is an optimal amount of aid to GDP ratio due to absorptive capacity of poor countries. They calculate an optimum range to be about 15 and 25 percent of GDP.

The second argument against aid is the weak relationships among aid, investment and growth. Friedman (1958) and Bauer (1971) argue that aid receipts are fungible. They increase governments' role in economic activities, rather than to promote investments.¹⁵ Boone (1996) provides empirical evidence for their claim. He uses data for 96 countries from 1971-1990 and endogenizes aid by using political determinants of aid as instruments to correct for reverse causality. He finds that aid is fungible, and argues that foreign aid increases the size of government consumption and not investments. Government uses about 75 per cent of all aid receipts for public consumption and 25 per cent for private consumption. Similarly, Easterly and Dollar (1999) use data of a one period lagged investment rate on growth rate for 68 countries including 34 African countries from 1960-1999. They reject the hypothesis that foreign aid increase investment by a one-one ratio. They also find a near zero correlation between increased investment and economic growth for countries in Africa.

The last argument for an increase in foreign aid is the relationship between foreign aid, human development or human poverty. All three empirical studies reviewed in this section refute this hypothesis. Boone (1996) use three proxies to measure poverty namely; infant mortality, primary schooling and life expectancy to test the hypothesis that an increase in government consumption from foreign aid benefits the poor. He finds that foreign aid benefits the elitist group and not the poor. He also adds that the same results hold under either an autocratic or a democratic regime. Asra et al. (2005) use panel data covering 49 developing countries from 1960-1998. Their study differs from previous studies because they specifically introduced the headcount poverty index (i.e. poverty line is set at \$2 per day) as the dependent variable. They experiment with a number of different regression equations to test the hypothesis of decreasing returns to aid effectiveness as done by (Hansen and Tarp (2001), and the others), the hypothesis of conditional effectiveness of aid based on good policy as suggested by Burnside and Dollar(2000), and finally they assessed if aid effectiveness varies by region. They report that aid is effective when it is

relatively moderate but becomes ineffective when it is larger than the recipient country's absorptive capacity. However, they reject the hypothesis that aid effectiveness depends on either good policy or governance. They conclude that aid has not been effective in sub-Saharan African countries when compared with other regions because there are other factors beyond macroeconomic policy and governance that are be responsible for aid ineffectiveness in the region.

In addition, Arimah(2004) uses cross-country data from the 1980s and 1990s to assess the impact of human development and economic indicators on poverty reduction in Africa. He uses three measures of poverty namely; percentage of a country's population living below the national poverty line, the percentage of a country's population living below \$1 per day and the Human Poverty Index(HPI-1). Explanatory variables include public expenditure on education, primary school enrolment, female educational enrolment, expenditure on health, an index for good governance, economic growth, high external debt, the prevalence of HIV/AIDS, the geographical disadvantage of being a landlocked country, and foreign aid. His main finding is that an increase in government spending in education and health are beneficial to reducing poverty in Africa, while foreign aid has a detrimental impact on poverty.

3). DATA:

This study uses an unbalanced panel data for 28 countries in the sub-Saharan Africa from the period of 2003-2009. All data for the study is from the UNDP's Human Development Report for years 2003 to 2009, and also from the World Bank, *Africa Development Indicators* database. The key variables in this study are the Human Poverty Index (HPI-1)¹⁶ and foreign aid. HPI-I is the dependent variable; it is a composite index developed for measuring the standard of living by the United Nations Development Program (UNDP). It measures deprivations in the three basic dimensions of human development namely; a long and healthy life, knowledge, and a decent

¹⁵ They were criticized largely due to the fact they did not provide empirical evidence.

¹⁶ Human Poverty Index is derived separately for developing countries (HPI-1) and a group of select high-income OECD countries (HPI-2), to better reflect socio-economic differences and also the widely different measures of deprivation in the two groups. The Multi Poverty Index(MPI) replaced HPI-1 in 2010 to address its shortcoming, however, data for multiple years are not yet available.

standard of living. The index ranges from 0 to 100 (0 signifying a high standard of living (low poverty rate) and 100 signifying a poor standard of living (high poverty rate). It is calculated as:

$$\text{HPI-1} = [1/3 * (P_1^\alpha + P_2^\alpha + P_3^\alpha)] \quad (1)$$

Where P_1 is the probability at birth of not surviving to age 40 (times 100), P_2 is the adult illiteracy rate, and P_3 is the unweighted average of population not using an improved water source and children under weight for age and α (alpha) is equal to 3.

This index was introduced in the UNDP's Human development report in 1997. The data on HPI-1 are from the UNDP's Human Development Reports (HDR) from 2003-2009. This measure encompasses the fact that poverty is not just a financial state. HPI-1 emphasizes the importance of opportunities and freedom in order for an individual to undertake various activities and states that will improve his well-being.¹⁷ According to UNDP report (1997), HPI-1 is also a bridge between absolute and relative measures of poverty.¹⁸ This is because an individual may have relatively few activities or states he can undertake, thus leading to an absolute denial of some opportunities.

The key explanatory variable is foreign aid. It is measured as the net amount of all official development assistance received per capita (current US dollars). 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 recipient countries. It includes loans with a grant element of at least 25 percent (calculated at a rate of discount of 10 percent) (OECD, www.oecd.org). The data on foreign aid are from the World Bank, *Africa Development Indicators* database.

Nonetheless, it will be inaccurate to presume that foreign aid is the only variable that can explain poverty levels in these countries. Based on Nobel Laureate Amartya Sen's works pertaining to welfare economics and the human development, other explanatory variables are included in this

¹⁷ It is based on the capability approach developed by Nobel Laureate Amartya Sen. See (1993) for more details.

¹⁸ Absolute poverty differs from relative poverty as the former refers to those who do not have the resources to meet the basic needs for a healthy living, while the latter considers the poor to be those with significantly less access to income and wealth than others in their society

study. His study suggests several economic and societal variables other than income to judge human progress. I also follow Arimah (2004) in selecting some of these variables.¹⁹ Explanatory variables that can help explain poverty level in SSA are GDP per capita, Foreign Direct Investment (FDI), migrant remittance inflows (rem), health expenditures per capita(health), military expenditures (mil), education expenditures (educ), HIV/AIDS prevalence (HIV), labor participation rate (labor) and sustainable economic opportunity (oppor).

GDP per capita in an economy is a measure of the average standard of living of individuals in a country. Data on the real GDP per capita are from the World Bank, *Africa Development Indicators* database. Dollar and Kraay (2004) find that sustained level of economic growth reduces poverty level. Hence, I expect a country with a high GDP to have a low poverty level. Also, Moyo (2009) argues that foreign aid is the "silent killer of growth" in Africa. She contends that other sources of finance such as Foreign Direct Investments (FDI) and migrants' remittances will promote growth and reduce poverty. While it may seem obvious that FDI decreases poverty, a positive relationship is possible. This is due to the fact that FDI may have an adverse impact on the recipient's commodity terms of trade²⁰, domestic savings and domestic investments.²¹ In this paper, FDI is measured as the net capital inflows in each country (current US dollars). Data on FDI are also from the World Bank, *Africa Development Indicators* database.

According to the World Bank, migrants' remittance inflows are defined as the sum of workers' remittances, compensation of employees, and migrant's transfers as recorded in the IMF Balance of Payments. Migrants' remittances have become increasingly important for explaining the poverty level in the developing world. However, the findings of scholarly researches remain inconclusive on the sign of this relationship. For example, Stahl (1982) finds that the relationship between remittances and poverty reduction is negative, while, Adams and Page (2005) and IMF (2005) find a positive and significant impact of remittances on poverty reduction. The inconclusiveness in results stem primarily from the fact that remittance brings in the capital that is strongly needed in the region. However, migration causes a loss of educated and professional

¹⁹ Key differences in our choice of variables include the proxy he used for institutional /governance quality, and dummy variables for individual country characteristics, which FE model should control. I have also included FDI and remittances in my base model based on previous literature on their importance in explaining poverty.

²⁰ The price of exported good relative to the price of the imported good may decrease in the recipient country.

²¹ As multinationals compete with domestic firms to borrow funds, it increases the demand for funds by the foreign

people in the region to other continents (also known as brain drain). Data on migrants' remittances inflows are from the World Bank, *Africa Development Indicators* database.

Arimah (2004) finds that government spending on education and health can explain the differences in the level of cross country differences in poverty. For this empirical analysis, government spending in education is measured as expenditures per capita in primary school. All data are obtained from the World Bank, *Africa Development Indicators* database. A negative relationship between government spending and poverty reduction is expected. However, the empirical finding on this relationship is mixed. While, Gupta et al. (2000) find a negative and highly significant result on the relationship between governments spending and poverty reduction, Leal (1999) finds a positive relationship and argues that social expenditures primarily benefit the middle and the rich in the society. In addition, Mills et al (2011) find that brain drain due to emigration of medical doctors has contributed to the poor health results in the region despite an increased amount of government spending in health.

According to the World Bank (2011), 62 per cent of the estimated 2.6 million people infected with the HIV/AIDS disease live in sub-Sahara Africa. Data for HIV prevalence are from the World Bank, *Africa Development Indicators* database, and it is measured as the percentage of adults over 15 years old infected with the disease. Kambou et al (1992) find that the disease reduces economic growth annually by 0.15 percent in the region. While, Bloom and Mahal (1995) find that there is no correlation between HIV prevalence and economic growth. However, I expect a positive relationship between HIV and poverty level.

In addition, most countries in SSA spend a substantial amount on military expenditures, therefore it is necessary to see if it explains the region's dilapidated state of poverty. As defined by the World Bank, military expenditures (MIL) include retirement pensions of military personnel and social services for personnel; operation and maintenance; procurement; military research and development; and military aid (in the military expenditures of the donor country). Military expenditures are typically unproductive, because they do not improve national income and thus, economic growth (Henderson, 1998). Data for military expenditures are from the World Bank, *Africa Development Indicators* database.

firm, which increases interest rates and decreases domestic investments (Carbaugh, 2001).

The unemployment rate is an indicator of well-being and as such, still represents the principal risk factor for poverty (Goebel, Krause and Jürgen Schupp, 2005). In an attempt to capture the importance of work to poverty reduction due to a lack of a complete data set for unemployment rate in SSA, labor force participation rate is included. It is the proportion of the population between ages 15 and 64 as a per cent of the total population. They supply labor for the production of goods and services during a specified period thus; I expect an inverse relationship with the dependent variable. However, it is common in countries in this region to find people that are working but still poor due inadequate minimum wage, labor standards, institutional frameworks and several other factors. Data for labour participation rate are from the World Bank, *Africa Development Indicators* database.

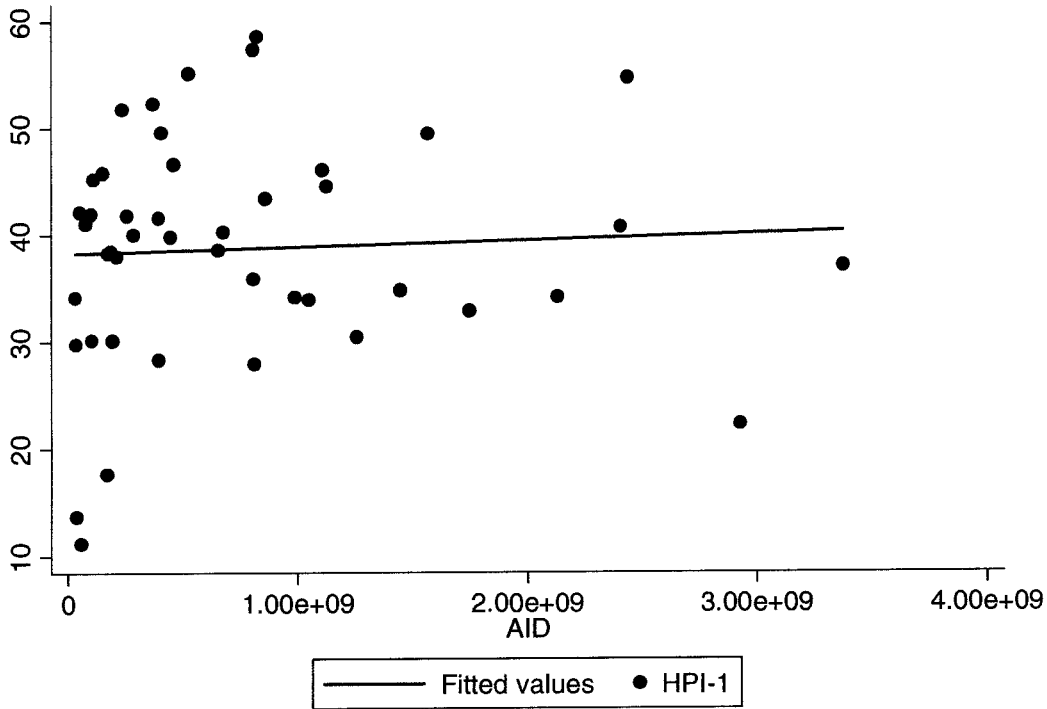
Burnside and Dollar (2004) emphasize that the impact of foreign aid largely depends on the quality of institutions in SSA. Sustainable economic opportunity is a composite index developed for measuring the quality of institutions. It ranges with 0 being the lowest and 100 the highest. Data for this variable are obtained from the World Bank, *Africa Development Indicators* database. This variable is calculated from four indicators namely: (1) public management which comprises of quality of public administration, quality of budget management, currency inside banks, ratio of total revenue to total expenditure, ratio of budget deficit or surplus to GDP, management of public debt, inflation, and the ratio of external debt service to exports, (2) private sector which comprises of the investment climate, bureaucracy, red tape, and etc. (3) infrastructure which comprises of quality of physical infrastructure, reliability of electricity supply, mobile phone subscribers, computer usage and lastly, (4) environment and the rural sector which composes of factors such as the availability of land and water for agriculture use, rural financial services development and etc. I expect this variable to have a negative relationship with the dependent variable, i.e. the higher the number, the lower the level of human poverty.

Descriptive Statistics:

Figure 1 reveals a weakly positive linear relationship between foreign aid and HPI-1 Index in the sample. As shown below on Table 1, the average HPI- I for the region for the time period 2003-2009 is 38.9. Exceptions in this sample include Mauritius with an average HPI-1 index of 11.2

and Burkina Faso with an average HPI-1 index of 58.6. Average aid received in the region is about \$773,000,000 with a high dispersion of about \$1,044,000,000. Mauritius received the lowest value at an average of \$31,413,333, while Nigeria received the highest value at an average of about \$33,750,000,000.

Figure 1: Correlation (HPI-1 and Foreign aid)



Source: Data from World Bank, *Africa Development indicators* database.

Also, Gabon has the highest average GDP per capita at \$8,129 and Burundi ranks the lowest at an average of \$125.14 in this sample. \$508,000,000 is the average amount received as Foreign Direct Investments in the region. South Africa and Sudan received the largest amount in FDI at about \$2,310,000,000 each.

Table 1 presents the averages and the dispersions of all variables included in the full sample.

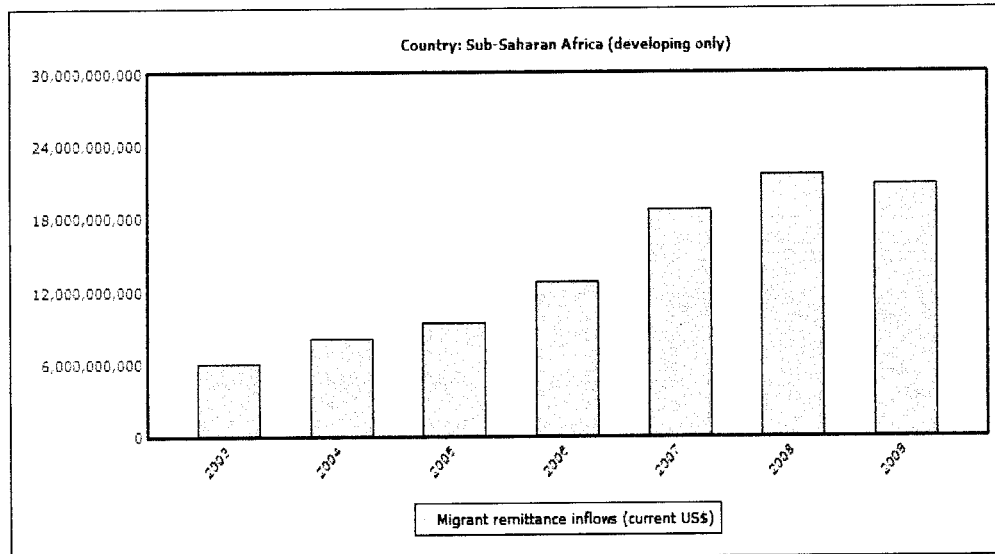
| Table 1. Descriptive statistics. | | |
|--|---------------|-----------------|
| Variable | Mean | Std. Dev. |
| Human Poverty Index (HPI-1) | 38.97% | 10.9268 |
| Net official development assistance (aid) | \$773,000,000 | \$1,044,000,000 |
| Real Gross Domestic Product per capita (GDP) | \$1565.32 | \$2900.75 |
| Health expenditures per capita (health) | \$75.88 | \$118.00 |
| Education expenditures per capita (educ) | \$14.49 | \$7.11 |
| Foreign Direct Investments (FDI) | \$508,000,000 | \$1,380,000,000 |
| Migrants remittance inflows (rem) | \$156,000,000 | \$194,000,000 |
| HIV/AIDS prevalence (HIV) | 6.05% | 6.98% |
| Military expenditures per capita(mil) | \$6058.38 | 11,607.60 |
| Labour participation rate(labour) | 73% | 10.11% |
| Sustainable economic opportunity(oppo) | 44.19% | 11.19% |

Government spending in health and education are at an average of \$75.88 and \$14.49 respectively. Eritrea has the lowest health per capita at an average of \$8.71, while Botswana spends about \$454.71 on average. Cameroun has the lowest value in primary school expenditures at only \$6.79, while Botswana ranks the highest at an average value of \$31.40. As shown on the graph below (figure 2), migrant remittances inflows rose from \$5,968,816,942 in 2003 to \$20,791,256,702, exceeding the increase in foreign aid in the same period at an estimate of just 15.9 billion as of 2009.

On average about 6 per cent of the people aged 15 and above are infected with the HIV/AIDS virus in this sample. Countries in the Southern part of SSA face the highest risk, 23 per cent of the people aged 15 and older in Lesotho are infected with the disease. In addition, the average spent on military expenditure per capita in the region is \$6,058, which is about four times its average GDP per capita. In this sample, Zambia ranks highest at over \$62,000 on average on military expenditures per capita, while Ghana ranks lowest in the group with only \$3.9 spent on average. Moreover, the number of people over the age 15 but less than 65 years old as a percentage of total population averages at over 70 per cent while, the average for sustainable economic opportunity

reveals a low quality of institutions in my sample.

Figure 2: Migrant remittance inflows



Source: World Bank, *Africa Development indicators database*.

The correlation coefficients matrix is presented in table 2 in the appendix. It checks for the existence of a linear relationship between the variables. High correlation between variables may indicate the problem of multicollinearity. For this study, a high correlation level has been established to be approximately 0.8 and above as suggested by Arimah (2004). An examination of the results reveals that sustainable economic opportunity is highly correlated with health expenditures per capita. These variables are not significantly alike. Therefore, both variables are included in the base regression.

Empirical Model:

In this paper, I estimate the model by fixed effects regression method in order to take into account that countries in sub-Saharan Africa have time invariant characteristics like culture, religion, race, political structure and history that are unique to the individual countries in the region. Time effects are also included in order to account for any significant temporal changes in

the 7 year sample.²² I follow the empirical framework by Arimah (2004).²³ Hence, the empirical equation to be estimated is a simple linear equation:

$$(HPI-1)_{it} = \beta_0 + \beta_1 aid_{it} + \beta_2 GDP_{it} + \beta_3 FDI_{it} + \beta_4 remit_{it} + \beta_5 educ_{it} + \beta_6 health_{it} + \beta_7 HIV_{it} + \beta_8 mil_{it} + \beta_9 labor_{it} + \beta_{10} Oppor_{it} + \alpha_i + \mu_t + \varepsilon_{it} \quad (2)$$

Where α_i is the unobserved individual effect, μ_t is the time effect and ε_{it} is the error term.

Equation 1 is the base regression, which is used to determine whether it is appropriate to ignore the high correlation between the proxy for institutional quality (oppor) and the variable for health expenditures per capita (health). The presence of multicollinearity can cause the standard errors to be relatively high, resulting to wrong signs on the estimated coefficients as well as, a lot of insignificant results. As shown on table 4 in the appendix, signs on most of the variables are not as expected.²⁴ Consequently, I have dropped the variable oppor from the main regression equation. In addition, two other variables: educ and health are dropped in order to increase the statistical power of the regression. This is because data for several years are missing for these variables. If both variables are included in the regression, the total number of observations in the sample reduces to only 71. Therefore, the linear equation for the final regression is:

$$(HPI-1)_{it} = \beta_0 + \beta_1 aid_{it} + \beta_2 GDP_{it} + \beta_3 FDI_{it} + \beta_4 remit_{it} + \beta_6 HIV_{it} + \beta_7 MIL_{it} + \beta_8 Labor_{it} + \alpha_i + \mu_t + \varepsilon_{it} \quad (3)$$

With panel data, pooled OLS is appropriate when there is neither significant country nor significant time effects, as it assumes that both the slope and intercept are constant. This assumption is very restrictive, because there are considerable differences across these countries which could result in omitted variable bias.²⁵ With fixed effects, the error and constant terms capture the differences in the individual countries' characteristics. Hence, each country has a unique intercept. However for fixed effects model to be used, each of the country-specific

²² An F-test was carried out, with a null hypothesis that dummies for years in the sample are jointly equal to zero. $F(6, 30) = 8.61$ Prob > F = 0.0000. Therefore, I rejected the null hypothesis that no time fixed effects are needed.

²³ He uses cross country data and estimated the regression via OLS. However, he included some dummy variables to take into account time invariant characteristics such as disadvantageous geography and external debt burden.

²⁴ Labor and Oppor should be inversely related to HPI-1.

²⁵ Table 5 in the appendix reports pooled OLS estimation results.

intercepts and the error term have to be uncorrelated with one another. If they happen to be correlated, then random effects model becomes the appropriate regression method. To test for the correlation and choose the appropriate regression method, the Hausman test is conducted.²⁶ Based on this result, fixed effects model is the better choice for estimating the sample.

Simultaneity bias due the effects of endogeneity is also a potential threat to the validity of the sample data. An example in this study is the fact that the explanatory variables foreign aid and GDP may be determined together. This is because even though foreign aid may boost GDP, the fact that you have a low GDP per capita can make a country a suitable candidate for more foreign aid, likewise for remittances and GDP. There may also be reverse causality between foreign aid and poverty level i.e poverty level can possibly explain foreign aid. Several studies in the aid-growth relationship have attempted to correct for the problem of endogeneity by using Instruments variables (I.V) technique and structural equation modeling.²⁷

In addition, given that this paper uses panel data, I have conducted a test for heteroskedasticity. The result from the modified Wald test for group wise heteroskedasticity indicates that the sample is affected by the problem.²⁸ To control for this problem, only robust estimates of the standard errors are reported in my main regression results (table 5). Lastly, it is also possible that my data sample is measured with error. This is because sub-Saharan Africa mainly consists of low income countries that lack the institutional framework required to monitor and assess countrywide macroeconomic data. Consequently, most of the data that are reported are based on estimates and not on actual numbers. To correct for potential measurement error in the explanatory variables, I.V technique is a possible solution. However, it is very difficult to find appropriate instruments.

4.) Results :

From table 3 below, the coefficient of the key variable in the model suggests a negative relationship between HPI-1 index and foreign aid. A one unit increase in foreign aid will result in a 0.013 decrease in the HPI-1 index holding all other variables in the model constant. This result

²⁶ The null hypothesis that the random effects model is preferred is rejected: $\chi^2 = 23.2$.

²⁷ For example, Boone (1996), Burnside and Dollar (2000), Gournamee et al.(2005) and others

²⁸ The null hypothesis of constant variance is rejected: $\chi^2 = 0.00034$.

supports the pro-aid camp that foreign aid helps to reduce poverty and the result is statistically significant at the 5 per cent level. However, this effect is marginal.

Table 3: Fixed effects model.

| Dependent variable : Human Poverty Index(HPI-1) | |
|---|----------------------|
| Variable | |
| Foreign aid | -0.013** (0.007) |
| Real GDP per capita | -0.001* (0.001) |
| Migrant remittances inflows | -0.042 (0.055) |
| HIV/AIDS prevalence | 2.919*** (0.145) |
| Labour participation rate | -1.153** (0.621) |
| Military expenditures per capita | -0.0001* (0.0004) |
| Foreign Direct Investments | 0.003 (0.005) |
| Constant | 105.0 45.85 |
| N | 152 |
| R ² | 0.932 |
| Adjusted R ² | 0.908 |
| F-ratio | 10.08 |

Standard errors in parentheses.

Absolute *t*-values are in parentheses

***Significant at the 0.01 level and above (one-tail test).

** Significant at the 0.05 level (one-tail test).

*Significant at the 0.1 level (one-tail test)

Other important findings in this study include the relationship between GDP per capita and HPI-1 index. A one unit increase in GDP will reduce the HPI-index by 0.001 units, holding all other variables constant in the model and it is statistically significant at the 5% level. This result is in line with economic theory. Nelson (1956) suggests with his theoretical model on poverty trap that an increase in national income via various transmission channels (for example, an increase in investment) should reduce poverty. As GDP increases, the poverty level in these countries

decreases. Also, Arimah(2004) finds a similar but, statistically insignificant result.

Another interesting but not surprising result, is the relationship between the control variable (mil) and the dependent variable (HPI-1). It suggests that a one unit increase in foreign aid will result to a 0.0001 unit decrease in the HPI-1 index holding all other variables in the model constant. Henderson (1998) used data for the United States between the period of 1959 and 1992 concludes that only wartime military spending reduces poverty, while military spending for personnel training, research and etc. actually increases the incidence of poverty. While, this study has made no attempt to differentiate between war time spending and the latter, a channel through which military spending effect could have trickled down to curbing poverty level is employment.

One other variable that is worth mentioning is rem, a one unit increase in remittances per capita will decrease HPI-1 index by 0.042, holding all other variables in the model constant. Although insignificant even at the 10 per cent significance level, the result establishes an inverse relationship between remittances and poverty. Jongwanich (2007) use data for countries in Asia and finds that a 10 per cent increase in remittances leads to a 2.8 per cent decrease in poverty. He concludes that remittances can directly increase income of poor people, smooth household consumption and ease capital constraints. Also, FDI has a statically insignificant relationship with human poverty. A one unit increase in FDI increases poverty by 0.003 units, holding all other variables in the model constant.

However, as expected, the more the people that are active in the population, the lower the level of poverty. A one unit increase in the labor participation rate will decrease HPI-1 index by 1.153, holding all other variables in the model constant and it is significant at the 1% level. The last finding that is also in line with prior expectation, the higher the prevalence of HIV in a country, the higher the poverty level. A one unit increase in HIV will increase HPI-1 index by 2.919, holding all other variables in the model constant and it is significant at the 1 per cent level.

5). Conclusion:

This paper investigates the correlation between foreign aid i.e. net official assistance per capita and the incidence of poverty in sub-Saharan Africa. Fixed effects regression model is employed to account for country invariant characteristics and any unexpected variations in the 7 year sample used in this study. The main finding is that there is an inverse relationship between foreign aid and human poverty. However, this effect is marginal. Other findings suggest that FDI and Migrants remittance inflows have a statistically insignificant relationship with human poverty. However, an increase in labor supply and government military spending tend to reduce human poverty level. Also, poverty level increases with a rise in the people that are infected with HIV/AIDS in the region. This suggests that in order to meet the Millennium Development Goals (MDGs) by 2015, international development agencies such as the World Bank and the United Nations may have to equally promote other sources of finance.

This paper expects to contribute to the vast number of aid effectiveness literature by using a recent data set from 2003 -2009 for countries in sub-Saharan Africa. However, sub-Saharan Africa comprises of 48 countries but due to data limitations, this study uses data for only 28 countries. Hence, this empirical study may not be internally valid. In addition, due to the problem of endogeneity as a result of simultaneity bias and reverse causation, the results may be inefficient. Future empirical study linking aid directly to human poverty level can add more to this study by adopting other functional forms, and a more advanced regression technique other than the fixed effects regression model to correct for these potential biases.

Appendix

Table 2. Correlation coefficient matrix

| | HPI | AID | GDP | FDI | REMIT | HEALTH | EDUC | HIV | MIL | LABOR | OPPOR |
|--------|--------|-------|---------|---------|--------|--------|--------|--------|--------|--------|--------|
| HPI | 1 | 0.061 | -0.051 | -0.18 | -0.16 | -0.49 | 0.32 | 0.026 | 0.05 | 0.069 | -0.58 |
| AID | 0.061 | 1 | 0.39 | 0.15 | 0.24 | -0.19 | -0.15 | -0.13 | 0.56 | 0.22 | -0.07 |
| GDP | -0.051 | 0.39 | 1 | -0.0039 | -0.092 | -0.081 | 0.12 | -0.032 | 0.14 | 0.21 | 0.027 |
| FDI | -0.18 | 0.15 | -0.0039 | 1 | 0.25 | 0.34 | -0.031 | 0.2 | 0.0071 | -0.16 | 0.2 |
| REMIT | -0.16 | 0.24 | -0.092 | 0.25 | 1 | 0.3 | 0.073 | 0.17 | 0.13 | -0.066 | 0.26 |
| HEALTH | -0.49 | -0.19 | -0.081 | 0.34 | 0.3 | 1 | -0.061 | 0.58 | -0.23 | -0.53 | 0.77 |
| EDUC | 0.32 | -0.15 | 0.12 | -0.031 | 0.073 | -0.061 | 1 | 0.13 | -0.32 | -0.17 | -0.041 |
| HIV | 0.026 | -0.13 | -0.032 | 0.2 | 0.17 | 0.58 | 0.13 | 1 | -0.024 | -0.25 | 0.32 |
| MIL | 0.05 | 0.56 | 0.14 | 0.0071 | 0.13 | -0.23 | -0.32 | -0.024 | 1 | 0.24 | -0.11 |
| LABOR | 0.069 | 0.22 | 0.21 | -0.16 | -0.066 | -0.53 | -0.17 | -0.25 | 0.24 | 1 | -0.36 |
| OPPOR | -0.58 | -0.07 | 0.027 | 0.2 | 0.26 | 0.77 | -0.041 | 0.32 | -0.11 | -0.36 | 1 |

Table 4. Fixed effects model –Base regression

| Dependent Variable :Human Poverty Index(HPI-1) | |
|--|----------------------|
| Variable | |
| Foreign aid | 0.005 (0.021) |
| Real GDP per capita | -0.012*** (0.005) |
| Migrant remittance inflows | -0.004 (0.098) |
| HIV/AIDS prevalence | 2.791*** (1.304) |
| Labour participation rate | 0.199 (0.864) |
| Military expenditures per capita | 0.0005 (0.0003) |
| Foreign Direct Investments | 0.009 (0.009) |
| Health expenditures per capita | 0.120*** (0.0613) |
| Education expenditures per capita | 1.336*** (0.495) |
| Sustainable economic opportunity | 0.414* (0.292) |
| Constant | -33.68 (64.99) |
| N | 71 |
| R ² | 0.5236 |
| Adjusted R ² | 0.936 |
| F-ratio | 14.25 |

Table 5. Pooled OLS regression

| Dependent Variable: Human Poverty Index(HPI-1) | |
|--|------------------------|
| Variable | |
| Foreign aid | -0.0055 (0.017) |
| Real GDP per capita | -0.005*** (0.001) |
| Migrant remittances inflows | -0.043 *** (0.013) |
| HIV/AIDS prevalence | 0.603*** (0.091) |
| Labour participation rate | -0.426*** (0.072) |
| Military expenditures per capita | -0.0001*** (0.0003) |
| Foreign Direct Investments | 0.004 (0.009) |
| Constant | 75.619 (6.001) |
| N | 152 |
| R ² | 0.54 |
| F-ratio | 31.85 |

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