A Pooled Mean Group Estimation
of Capital Inflow and Growth
in sub Saharan Africa

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Abstract

This study empirically analysed the impact of capital inflow on growth in sub Saharan Africa employing the Pooled Mean Group estimator from the years 1985 to 2015. The study utilised Foreign Direct Investment (FDI), Official Development Assistance and Foreign Aid (ODA) and Remittance (REM) as indicators of capital inflow. Short run result indicates that the various forms of capital inflow do not have significant impact on growth but while FDI and REM were negatively related to growth, AID was positively related to growth. However, in the long run, FDI and AID have a positive and significant impact on growth while REM has a negative and significant impact on growth in sub Saharan Africa. The study concludes that planning and legislative lags are inferential from the insignificance of capital inflows on growth in the short run, while growth falls in the long run as a result of increase in labour's income earned in diaspora. The study recommends that in the short run, economic policies should be tailored towards the development of technological based services while in the long run, government should create schemes for citizens in diaspora to participate in, to endear sector-specific economic activities as well as targeting FDI and AID as policy options to spur growth. Finally, specific capital inflow policy options should be employed as not all forms of capital inflow precipitates growth.

Keywords: Capital Inflow, Growth, Panel Cointegration, Pooled Mean Group.

JEL Classification: B23, B27, C10, C23

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1. Introduction

It is well known that capital inflow has become an important source of finance in most developing countries including those in the sub Saharan African region. Capital inflow represents additional resources a country needs to improve its economic performance as it enables the provision of physical capital as well as employment possibilities. Capital inflow has a special ability in dealing with a major obstacle such as shortages of financial resources, technology and skills (Komlan, 2016). Capital inflows can be split into different categories which includes but not limited to Foreign Direct Investment (FDI), Remittance, Net Official Development Assistance and Foreign Aid (ODA) as well as Portfolio Investments.

In sub Saharan Africa, the amount of capital inflow has considerably increased over decades. Reports from the World Bank, World Development Indicators, WDI (2016) shows that FDI inflow in current US $ into the region was about 251 million US$ in the year 1980. By the year 1990, FDI inflow had increased to 1.2 billion US$, and in the year 2010, FDI inflow into sub Saharan Africa was more than 28 billion US$. FDI inflow stood at 31 billion US$ in the year 2015. With regards to FDI contribution to GDP, in 1980, FDI contributed 0.04 percent to GDP; this increased to 0.4413 percent in 1990. By the year 2010, FDI contributed about 2.1 percent to GDP in the region. The contribution of FDI to GDP in the year 2014 stood at 2.07 percent. Net official development assistance and foreign aid received as at the year 1980 was over 18 billion US$. It increased significantly to over 28 billion US$ in 1990 and reduced to about 20 billion US$ in the year 2000. In the year 2015, ODA stood at 41 billion US$. Remittance has also contributed 0.60 percent to GDP in the region in the year 1980, by the year 1990, the contribution of remittance to GDP was 0.68 percent. In the year 2000 and 2010, remittance contribution to GDP was 1.52 percent and 2.34 percent respectively. In the year 2015, remittance into the sub Saharan continent was valued at about 8.4 billion in current US$.

According to Asiedu (2002), poverty and low levels of income and domestic savings in Africa spurred external capital to stimulate investment and growth. Reinikka and Swensson (1999) noted that the low level of infrastructure hinders the development of Africa as a whole as there are suggestions that unreliable electricity supply deter firm-level investment in most sub Saharan African countries. Other economic plagues such as poor transport infrastructure, high transport cost and obsolete technology also stifles agricultural development (Renkow, Hallstrom and Karanja, 2004). These are some of the reasons countries in sub Saharan Africa seek external funding in a bid to solve deficit infrastructure. But as much as capital inflow is desirable, it has been argued that global capital flows could have a destabilising role in developing economies and in particular

when a financial crisis causes a sudden reversal of such flows (Neumann *et al*, 2009).

According to Broner *et al* (2012), capital flows have been generally volatile and subject to overshooting, reversal and sudden stops (Boudias, 2014; Calderon and Kubota, 2011). Theoretically, capital inflows are beneficial to developing countries but empirical findings have exhibited mixed results. While studies as Narayan (2013) and Auranged & Hag (2012) had observed a positive impact on growth, other studies as Nuzhat (2009), Prasad, Rajan & Subramanian (2007) and Lensink & Morrisey (2001) observed a negative impact on economic growth.

This study therefore re-examines the impact of capital inflow on growth in sub Saharan Africa with recent data, based on a panel of 16 countries from the years 1985 to 2015 (31 years). The rest of the study includes a brief overview of capital inflow into sub Saharan Africa, literature review, the methodology, presentation and analysis of the result and conclusion with relevant policy recommendations.

2. Brief Overview of Capital Inflow into sub Saharan Africa

This study conceptualizes capital inflow into three separate groups. Foreign Direct Investment (FDI) inflow in current US$, Net Official Development Assistance and Foreign Aid (ODA) received in current US$ and Private Remittance (REM) in current US$.

Table 1 shows that ODA into sub Saharan Africa in 1980 was highest among the three forms of capital inflow in the analysis. FDI inflow into sub Saharan Africa was lowest in the year 1980 with a value of about 251 million US$ across time. The table also shows that ODA was the largest form of capital inflow into sub Saharan Africa from 1980 to 2014. ODA was over 46.5 billion US$ in the year 2014.

Table 1

Capital inflow into Sub Saharan Africa in current US$ (1980-2015)

YEAR	FDI	ODA	REM
1980	251,665,312	7,721,580,000	1,397,757,149
1990	1,227,500,744	17,841,890,000	1,792,273,251
2000	6,806,769,012	13,010,250,000	4,834,700,474
2010	28,309,286,450	44,267,670,000	29,852,381,445
2014	44,213,364,793	46,545,910,000	34,700,703,304

Source: World Bank, World Development Indicator, WDI (2016)

The year 2000 saw a massive increase in FDI and REM into the region as against the year 1990. FDI increased from 1.23 billion US$ to 6.8 billion US$, while REM increased from 1.8 billion US$ to 4.8 billion US$. This could be

attributed to many countries in sub Saharan Africa opening their economy to foreign trade and improvement in their external policy for the case of FDI and a higher mobility of labour from African countries to other parts of the world, coupled with African citizens overseas sending their earnings back home for the case of REM. ODA reduced slightly from 17.8 billion US$ in 1990 to 13 billion US$ in the year 2000. Between the year 2010 and 2014, capital inflow increased considerably, as FDI rose from 28 billion US$ to 44 billion US$, ODA rose from 44 billion US$ to 46.5 billion US$ and REM from 29.9 billion US$ to 34.7 billion US$.

3. Literature Review

Over the last few decades, the frontier market economies of sub Saharan Africa have received huge influx of foreign capital inflow. Indeed, this is required as the need for external source of financing is nowhere more pressing than in sub Saharan Africa where income levels are inadequate to generate substantial domestic resources for the attainment of modest rates of investment and growth as well as aiding the reduction in unemployment and income poverty.

In the opinion of Kanu (2015), foreign capital inflow is the influx of usable funds that comes from a source or sources outside the country. It specifically refers to monies received from foreign countries. More likely than not, the capital comes from developed countries and is invested in developing countries. The International Monetary Fund (IMF, 2012) explains that increases in capital flows allow countries with inadequate savings reap from the global pool which has tendency to improve the efficacy of resource allocation, spur management and technology transfer especially as with the case of FDI, empower countries in the funding of welfare-enhancing current account imbalances as in the case of consumption smoothening or productive investment and finally to enable portfolio diversification. Other benefits include macroeconomic policy disciplines, trade and economic efficiency and the financial sector development. For the transition countries, capital inflow is useful in carrying out the reforms necessary to metamorphose into an open economy (Edwards, 2004), to cross the past long term problems thus creating conditions for stable and continuous growth of GDP (Razin, 2001), and as well integrate into the world economy (Boskovska, 2006).

As suggested in literature, there are certain factors whose role significantly determines capital inflow; some of which includes the quality of institutions. Wei and Wu (2001) agree that good institutions aid in the promotion of capital inflows into respective economies. This view is corroborated by the opinion of Alfaro *et al* (2003). They suggest that countries ranking higher in law and order have greater tendencies of attracting more capital inflows. Garibaldi *et al* (2002) are also of the view that a well-developed financial market is precursory to portfolio inflows, as

deeper financial markets may enable foreign firms finance short term as well as long term transactions with more ease, thus meeting capital needs in the local market. Kamaly (2002) notes that international long-term interest rates are crucial for FDI as FDI is also a long-term variable, however, money market rates may play a larger role as a huge chunk of portfolio flows are short-term. Macroeconomic performance also determines the level of capital inflow into regions across the globe. Easy global financial conditions along with sustained high growth has led to a significant increase in private capital inflows to sub Saharan Africa.

Katushi *et al* (2012) outlined three different ways in which capital inflow [in this case remittance] impact growth. One is via its impact on the rate of capital accumulation where remittance increases the rate of accumulation of both physical and human capital and thus lowering the cost of capital in the recipient country. Two, is through its impact on the growth of labour force participation as workers substitute remittance income for labour income. Three is through its impact on total factor productivity which may be positive or negative depending on those making the investment decision. If the investment decision is made by a skilled domestic financial intermediary, its impact on total factor productivity is meant to be positive but if the recipient makes investment decision on behalf of the remitter, its impact on total factor productivity could be negative (Adusah-Poku, 2016). Remittances explains the inflow of capital from migrants living in diaspora into their home economy. This is mostly funded by the incomes of these migrants in the foreign economy. Various theories have been explained as to the motives for remittance. These motives include the Portfolio Motive which explains how migrants make remittances so as to diversify their earnings while accounting for risks in returns; the Altruistic Motive which stems from the benevolence of the migrant to his relatives in his local economy; and the Loan Repayment Motive with reasons of the repayment of loans incurred by the migrant's home-based family in sending him out of the country (Somalino 2003). In most cases the interest at which these loans are repaid are not usually spelt out.

A study by Chigbu, Ubah and Chigbu (2015) examined the impact of capital inflows on the economic growth of developing economies using Nigeria, Ghana and India as population of study from 1986-2012. Augmented Dickey Fuller unit root test was employed to evaluate the stationarity of the data, while Johansen Co-integration was used to estimate the long-run equilibrium relationship among the variables. The casual relationship was tested using Granger Causality, and Ordinary Least Square method was used to estimate the country-specific models. The finding reveals that capital inflows have significant impact on the economic growth of the three countries. In Nigeria and Ghana, foreign direct and portfolio investment as well as foreign borrowings have significant and

positive impact on economic growth. Workers' remittances significantly and positively influence economic growth of the three countries. This study is supported by Gourinchas and Jeanne (2011). Their study revealed that capital flows correlates with growth and countries with slower growth attract more flows than their counterparts with faster growth.

Anthony, Akachukwu and Elijah (2014), used the Seemingly Unrelated Regression Estimation (SURE) technique to examine the implications of four different types of foreign capital inflows, namely; Foreign Direct Investment (FDI), Official Development Assistance (ODA), Foreign Private Investment (FPI) and Remittances (REM) on output growth of the West Africa Monetary Zone (WAMZ) economies over the period 1981-2010. Their results showed that there are differences in the growth impact of the various forms of foreign capital inflows in the WAMZ countries. The result also shows that more than one form of capital inflow contributed positively to output growth in Nigeria. Again, they discovered that ODA positively contributed more to output growth in Sierra Leone and Ghana, whereas, FDI fostered more output growth in Nigeria and Gambia. Remittances was found to have the highest contribution in Liberia and finally none of the inflows had positive impact on Guinea's economic growth.

Obiechina and Ukeje (2013) examined the impact of capital flows (specifically FDI), exchange rate, export and trade openness on economic growth of Nigeria for data spanning 1970 to 2010. The unit root test confirmed the series to be integrated of order one, while the Johansen Co-integration test suggested the existence of at least one Co-integrating vector among the variables. Using the Engle-Granger 2-Step procedure, it was observed that all the variables used, except for FDI were statistically significant and influence economic growth in the short-run. Exogeneity test confirmed that FDI has weak exogeneity with economic growth. In addition, the Pairwise Granger causality revealed the existence of unidirectional causality between economic growth and FDI, and unidirectional and bi-directional causality among some of the variables.

Also, Bailliu (2000), on examination of the role of capital flows on economic growth using data on 40 developing countries, finds that the impact of capital flows on the economy depends on the level of financial market development: capital inflows have positive effect on growth when the country is financially developed.

4. Methodology

This study draws majorly from the Solow growth model which explains economic growth for various countries based on the exogeneity of capital and labour. Since it also assumes the diminishing returns of input, the model takes the Cobb-Douglas mathematical form of explicit specification. The study applies the

Levin, Lin and Chu (LLC) (2002) unit root test and the Im-Pesaran-Shin (IPS) (2003) unit root test in a bid to ascertain the order of integration of the variables in the model. The LLC test assumes a common autoregressive parameter for all cross sections while the IPS test is based on the assumption of variation of the autoregressive parameter for all cross sections. The Pedroni residual-based cointegration test and the Kao residual cointegration test would be applied to ascertain the existence of a long run relationship amongst the variables in the model and finally, we estimate our model using the Pooled Mean Group (PMG) estimation technique introduced by Pesaran, Shin and Smith (1999).

4.1 Model Specification
To establish the impact of capital inflow on economic growth in Sub Saharan Africa, we specify a model where;

$$GDP_{it} = \alpha_0 + \alpha_1 FDI_{it} + \alpha_2 REM_{it} + \alpha_3 AID_{it} + \beta \sum X_{it} + \varepsilon_{it} \qquad (1)$$

Where, GDP is Gross Domestic Product per Capita (Constant US\$); FDI is Foreign Direct Investment, net inflows (% of GDP); REM is Private Remittances, received (% of GDP); AID is Net Official Development Assistance and Official Aid received (Constant US\$); $\sum X_{it}$ is a vector of control variables which composes of Capital and Labour force for the representative countries. We adopt the Gross Fixed Capital Formation (GFCF) in constant US\$ as a proxy for capital while Population ages 15-64 (% of total) as proxy for labour force. Equation (1) can hence be re-expressed as;

$$GDP_{it} = \alpha_0 + \alpha_1 FDI_{it} + \alpha_2 REM_{it} + \alpha_3 AID_{it} + \alpha_4 GFCF_{it} + \alpha_5 LF_{it} + \varepsilon_{it} \quad (2)$$

Based on economic theory, *a priori* expectation suggests that FDI has a positive relationship with growth. This fact has been backed by empirical findings of studies as Johnson (2006), Agosin & Mayer, (2000) and Borensztein *et al* (1998). However, some studies of FDI-Growth relationship have also shown a negative relationship between both variables (Nuzhat, 2009; Dutt, 1997; Saltz, 1992) while others reveal no strong link existing between FDI and growth (Choe, 2003; Carkovic and Levine, 2003). Again, Iheonu (2016), have also shown that FDI crowds domestic investment in sub Saharan Africa which might not favour the overall growth prospect in the region.

Remittance based on economic theory is also meant to have a positive relationship with growth. Studies by (Fayissa and Nsiah, 2010; Azam and Khan, 2011) corroborates this relationship while Barajas et al (2009) revealed in their study that remittance do not make positive contribution to economic growth.

AID according to Karras (2006), has a positive influence on economic growth in sub Saharan Africa. This finding supports economic theory of a positive relationship between AID and growth. The Solow's Neoclassical Growth Model postulates that capital and labour are the main drivers of economic growth and as such, a positive relationship is expected to exist between capital and growth, and then labour and growth. For ease of interpretation of our econometric result, we transform GDP, AID and GFCF to their natural logarithm, thus having elasticity coefficients as opposed to instantaneous rates of change.

5. Presentation and Analysis of Result

We begin this section with the summary statistics of the variables in the model. Result in table 2 shows that the average value of GDP is 1168.23 US$ in the sample. The minimum is 130.43 US$ with a maximum of 7234.23 US$. The result shows a large is disparity between the highest and minimum value which is due to differences in the economy of the various countries in the model. While the minimum value of FDI is -6.89, the maximum is 41.81. This disparity could also arise due to the differences of the individual countries economy and external policy in the sample. Remittance has a mean value of 5.68, a minimum of 0.0085 and a maximum of 95.59.

Table 2

Summary statistics of Variables

Variables	Mean	Minimum	Maximum
GDP	1168.235	130.4367	7234.234
FDI	2.8714	-6.897680	41.8096
REM	5.68538	0.0085	95.59
AID	771046115.5881	18750000	12665800000
GFCF	2613331985.4166	71596382	85736719423.0810
LF	52.6696	46.9543	64.40393

Source: Authors' Computation (2017)
Note: The summary statistics was computed before taking the natural logs of GDP, AID and GFCF.

Official Development Assistance and Foreign Aid received has a minimum value of 18.75 million US$ and a maximum of 12.67 billion US$ for the entire sample period. While capital has an average value of 2.61 billion US$, labour has an average value of 52.67% of the total population in the region. The table also shows that the maximum value of capital is 85.74 billion US$ and a minimum of 71.60 million US$. Labour has a maximum value of 64.40% and a minimum of 46.95%. Both the minimum and maximum are not too far away from the mean value. This could mean that there are similarities in the amount of labour force in the Sub Saharan African countries.

The analysis proceeds to examining the stationarity properties of the data. Two classes of test were employed as earlier mentioned. The LLC and IPS unit root test is adopted in investigating the order of integration of the variables in the model.

The findings of the panel unit root test result show that GDP, REM, AID and GFCF are I(1) stationary for both unit root test. The result also reveal that while FDI is I(1) for the LLC unit root test, it is I(0) for the IPS unit root test. For AID, stationarity was induced after first difference when the IPS test was applied but was stationary in levels when the LLC unit root test is applied.

Table 3

Panel Unit Root Test Result

Variables	Levin *et al* (2002)		Order of Integration	Im *et al* (2003)		Order of Integration
	Levels	First Diff.		Levels	First Diff.	
GDP	0.64126	-4.85501*	I(1)	2.61662	-7.34883*	I(1)
FDI	-0.9973	-9.3540*	I(1)	-2.0571**	-	I(0)
REM	-016259	-9.23678*	I(1)	1.85155	-10.5986*	I(1)
AID	-1.37475	-11.0272*	I(1)	3.61095	-13.8263*	I(1)
GFCF	0.38333	-7.06945*	I(1)	3.61095	-10.0646*	I(1)
LF	-5.1288*	-	I(0)	0.5840	-2.9323*	I(1)

Source: Authors' computation, 2017
Notes: Values reported are t-statistics value.
*, ** denote significance at 1 and 5 percent respectively.
The test was conducted with the assumption of intercept and no trend in both Levin et al (2002) and Im et al (2003) specification.

From the result, we can see that it is not very clear if FDI and LF are I(0) or I(1) as both unit root methods provided varying results. It then becomes econometrically plausible to conduct a panel cointegration test for the selected Sub Saharan African countries. This is in a bid to ascertain the existence of long run relationship in the model. We employ the Pedroni cointegration test and Kao cointegration test. According to Adusah-Poku (2016), both tests are based on residuals resulting from estimating long run static regression.

The result in the Table 4 shows that the existence of a long run relationship cannot be fully established in within-dimension, while the v-statistic and the rho-statistic probability value are greater than the conventional level of significance, the PP-statistic and ADF-statistic shows that their probability values are less than 1 percent level of significance. In the between-dimension, the rho-statistic probability value proved insignificant but the PP-statistic (between-dimension) is significant at 10 percent, ADF-statistic is significant at 1 percent.

Table 4

Pedroni Panel Cointegration Test Result

	Within-Dimension (Panel)	**Between-Dimension (Group)**
v-Statistic	0.2194930 (0.4131)	-
rho-Statistic	-0.002708 (0.4989)	2.826425 (0.9976)
PP-Statistic	-4.554372 (0.0000)*	-1.408150 (0.0795)***
ADF-Statistic	-5.149881 (0.0000)*	-3.589618 (0.00002)*

Source: Authors' Computation, 2017
Note: P-values are in parenthesis.
Null Hypothesis: No cointegration.
*, *** denote significance at 1 and 10 percent respectively.
Pedroni test was computed with individual intercept.

This result doesn't firmly establish a long run relationship among the variables in the model. This necessitates the application of the Kao test in a bid to affirm or disagree with the existence of a long run relationship in the model.

Table 5 shows the result of the Kao residual based cointegration test. The result affirms to the existence of cointegration among the variables in the model as the ADF t-statistic probability value is less than 5 percent level of significance. We therefore reject the null hypothesis and conclude that a long run relationship exists.

Table 5

Kao Residual Cointegration Test Result

ADF t-statistic	**Probability**
-2.192187	0.0142**

Source: Authors Computation, 2017
Note: Null Hypothesis: No cointegration.
** denotes significance at 5 percent

In analysing the impact of capital inflow on growth in Sub Saharan Africa, we rely on the work of Pesaran, Shin and Smith (1997, 1999) which provided two important techniques in estimating non-stationary dynamic panels in which the parameters are heterogeneous across groups, they include the Mean Group (MG) estimator and the Pooled Mean Group (PMG) estimator. In this paper, we place more emphasis on the PMG estimator. According to Pesaran, Shin and Smith (1999), PMG is a combination of pooling and averaging of coefficients. The PMG constrains the long run elasticity to be equal across all panels which yields efficient and consistent estimates only when homogeneity restriction is true (Casni, Badurina and Sertic, 2014). PMG also has the advantage of allowing for the heterogeneous short run dynamics for each cross section (Kang, 2006). The short run adjustment is allowed to be country specific. This is due to different impact of vulnerabilities to external shocks, monetary policy and others.

This is quite different from the MG estimator which estimates separate regressions for each country while calculating the coefficients as unweighted means of the estimated coefficients for the individual cross sections. It allows for all coefficients to vary and be heterogeneous in the long run and short run.

A precondition for the PMG technique lies on the result of the unit root test. This technique can be applied when all variables in the model are I(1) stationary, I(0) stationary or a mixture of I(1) and I(0). PMG being an ARDL model is sensitive to the choice of lag length and hence we utilise the Hannan-Quinn criteria to obtain our optimal lag length with result indicating that ARDL (1,1,1,1,1,1) is optimal.

The result in the Table 6 shows the result of the PMG and MG dynamic heterogeneous panel procedure. The result exhibits notable variations subject to the method of estimation. The PMG estimation result shows that in the long run, FDI drives growth in Sub Saharan Africa. This result is significant at 5 percent. A percentage increase in FDI leads to a 0.01 percentage increase in growth. REM in the long run retards growth in Sub Saharan Africa. A percentage increase in REM leads to a 0.047 percentage decrease in growth. At the one percent level of significance, the result shows that AID has a positive impact on growth in sub Saharan Africa region.

Table 6

Baseline Estimate, ARDL (1,1,1,1,1,1)

Dependent Variable: GDP	PMG	MG
Convergence coefficient	-0.0776	-0.3302
	(0.0311)**	(0.0603)*
Long-run Coefficients		
FDI	0.0100	-0.0164
	(0.0047)**	(0.0209)
REM	-0.0471	0.0266
	(0.0092)*	(0.0548)
AID	0.2271	-0.00932
	(0.0328)*	(0.0810)
GFCF	0.1027	0.2839
	(0.0226)*	(0.1542)***
LF	0.1369	-0.0447
	(0.0186)*	(0.0703)
Short-run Coefficients		
ΔFDI	-0.0016	-0.0017
	(0.0012)	(0.0014)
ΔREM	-0.0026	-0.0016
	(0.0052)	(0.0049)
ΔAID	0.0057	0.0040

Dependent Variable: GDP	PMG	MG
	(0.0123)	(0.0137)
ΔGFCF	0.0498	0.0072
	(0.0238)**	(0.0215)**
ΔLF	-0.0223	-0.04381
	(0.0177)	(0.0274)
Auxiliary Parameters		
Hausman Test	7.98	
	[0.158]*	
No. of Countries	16	16
No. of Obs.	480	480

Source: Authors' Computation, 2017

Note: All equations include a constant country specific term.

Standard errors are in parenthesis.

t-statistics is in square bracket.

*, **, *** denotes significance at 1 percent, 5 percent and 10 percent respectively.

The short run result is the average derived from the short run estimate for each heterogeneous cross section.

The control variables GFCF and LF also reveals positive impact on growth in Sub Saharan Africa at the 1 percent level of significance.

In the short run, FDI is seen to have a negative impact on growth but this result proves insignificant. This finding is also true for REM while AID has a positive but insignificant impact on growth in the short run. The three forms of conceptualised capital inflow exhibit insignificant impact on growth. While GFCF has a positive and significant impact on growth, LF has a negative and insignificant impact on growth.

Findings from the MG estimation technique reveals that FDI, REM, AID and LF has an insignificant impact on growth while GFCF is significant at 10 percent all in the long run. The long run result also shows that FDI and AID has a negative impact on growth while REM has a positive impact.

In the short run, only GFCF proved significant at 5 percent. All forms of capital inflow exhibit insignificance even as FDI and REM coefficients reveal a negative impact on growth. AID was found to have a positive impact while LF also proves to be negatively insignificant.

The homogeneity of the long run coefficient implied by the PMG technique cannot be assumed before estimation and as such a post estimation test is required. If the long run homogeneity holds, the PMG estimate is said to be more efficient in comparison to the MG estimates but when the long run homogeneity fails to hold, the estimates of the PMG becomes inefficient compared to the MG technique. Hausman test result proves that there exists long

run homogeneity for the selected Sub Saharan African countries and hence the PMG technique is appropriate. The Hausman test result shows that we fail to reject the null hypothesis of long run homogeneity at the one percent level of significance which indicates that a long run homogeneous relationship exists amongst the countries in the model.

The convergence coefficient has the expected sign and significant at five percent for our chosen PMG model. The result shows that the average value of the convergence coefficient is 0.077 and thus it takes about 13 years for long run equilibrium to be achieved in Sub Saharan Africa.

6. Conclusion

It is plausible as a policy inference of the findings, that capital inflow in sub Saharan Africa has no significant influence on economic growth of the region in the short run, owing to factors as the planning and legislative lags in the appropriation, utilization and evaluation of utilization of these funds. Other possible factors responsible for these insignificance include the dichotomy in expected and actual usage as it concerns the utilization of funds for agricultural versus industrial input. Furthermore, the impact of these conceptualised indicators of capital inflow are rather long run effects as self-sufficiency in food as with the acquisition of exportable industrial goods can only be attained in long term investments. With a fast and significant speed of adjustment, it can be agreed upon that the long run dynamics of the model could be approached in ample time. The capital inflow from FDI, REM and AID were found to be significant, though only remittance [being a fraction of net income from abroad] was found to negatively influence growth. This has policy implications that higher remittance would mean higher net income from abroad for which at some assumed level would be optimal enough to cause a reduction in the GNP as against the GDP as a measure of national income. Bearing this in mind, economic productivity would fall, reflecting the role the mobility of labour plays as a factor input, whose earnings abroad retards economic growth of the local region. Labour and Capital were found to be significant determinants of economic growth in the long run, both, positively influencing growth as pre-supposed. This implies by inference that these remain requisite factor inputs for growth in the region.

Recommendations of this study include that in the short run, to make capital inflow account significantly for economic growth, countries' governments within the region could focus these funds on promoting technological based services whose output are not long term based. Services such as the promotion of e-marketing, telecommunications and internet infrastructural broadband widening and electronic compliant payment systems for an improved financial sector, are all grey areas lacking fund in sub Saharan Africa. Government should also redirect

remittances via developing schemes for natives in diaspora to participate in. This would ensure that the economic activities funded by remittances are sector-specific. Finally, specific capital inflow policy option should be applied as not all forms of capital inflow improves growth in the Sub Saharan Africa region.

References

Adusah-Poku, F., 2016. Which form of Foreign Capital Inflows enhance Economic Growth? Empirical evidence in sub Saharan Africa. *Asian Economic and Financial Review,* 6(10), pp. 557-570.

Agosin, M.R. and Mayer, M., 2000. Foreign Investment in Developing Countries: Does it Crowd in Domestic Investment? UNCTAD Discussion Paper, 146.

Alfaro, L., Kalemli-Ozcan, S. and Volosovych, V., 2008. Why doesn't Capital flow from rich to poor Countries? An Empirical Investigation. *The Review of Economics and Statistics*, 90(2), pp. 347-368.

Anthony, O., Akachukwu, S.U. and Ilori, A.E., 2014. Foreign Capital Inflows and Growth: An Empirical Analysis of WAMZ experience. *International Journal of Economics and Financial Issues,* 4(4).

Asiedu, E., 2002. On the determinants of Foreign Direct Investment to Developing Countries: Is Africa different? *World Development,* 30.

Aurangeb, and Haq, A., 2012. Impact of Foreign Capital Inflows on Economic Growth in Pakistan. *European Journal of Economics, Finance and Administrative Sciences,* ISSN 1450-2275(46).

Azam, M. and Khan 2011. Workers' Remittances and Economic Growth. *Global Journal of Human Social Science,* 117.

Bailliu, J.N., 2000. Private Capital Flows, Financial Development and Economic Growth in Developing Countries, Bank of Canada Working Paper 2000-15.

Barajas, A., Chami, R., Fullenkamp, C., Gapen, M. and Montiel, P., 2009. Do Workers Remittances Promote Economic Growth? IMF Working Paper 09/153.

Borensztein, E.J., de Gregorio, and Lee, J.W., 1998. How does Foreign Direct Investment affect Economic Growth? *Journal of International Economics*, 45, pp. 115-135.

Boskovska, D., 2006. The role of the Foreign Capital in the Integration process of republic of Macedonia. *The Amfiteatru Economic Journal,* 8(19), pp. 114-121.

Boudias, R., 2014. Capital Inflows, Exchange rate regimes and Credit Dynamics in Emerging Market Economies. Working Paper 2014-17, CEPII Research Centre.

Broner, F., Didier, T., Erce, A. and Schmukler, S.L., 2012. Gross Capital Flows: Dynamics and Crises. CREI, Mimeo.

Calderon, C. and Kubota, M., 2008. Sudden stops are global and local investors alike? World Bank Policy Research Working Paper, No. 5569.

Carkovic, M. and Levine, R., 2005. Does Foreign Direct Investment accelerate Economic Growth? *Journal of Development Studies,* 34(1), pp. 1-34.

Casni, A.C., Badurina, A.A. and Sertic, M.B., 2014. Public Debt and Growth: Evidence from Central, Eastern and South Eastern European Countries. *Zb.rad.Ekon.fak.Rij,* 32(1), pp. 35-51.

Chigbu, E. E., Ubah, C.P. and Chigbu, U.S., 2015. Impact of Capital Inflows on Economic Growth of Developing Countries. *International Journal of Management Science and Business Administration,* 1(7).

Chloe, J., 2003. Do Foreign Direct Investment and Gross Domestic Investment promote Economic Growth? *Review of Development Economics,* 7, pp. 44-57.

Dutt, A.K., 1997. The pattern of Direct Foreign Investment and Economic Growth. *World Development,* 25(11), pp. 1925-1936.

Edwards, S., 2004. Financial Openness, Sudden Stops and the Current Account Reversal, *American Economic Review,* 94(2), pp. 54-64.

Fayissa, B. and Nsiah, C., 2010. Can Remittances spur Economic Growth and Development? Evidence from Latin America Countries. Department of Economics and Finance, Middle Tennessee State University, Working Paper Series.

Garibaldi P., Mora, N., Sahay, R. and Zettelmeyer, J., 2002. What moves Capital to Transition Economies, International Monetary Fund IMF Working Paper 02/64.

Gourinchas, P. and Jeane, O., 2007. Capital Flows to Developing Countries: The allocation puzzle. NBER Working Paper Series, 13519.

Iheonu C.O., 2016. Does FDI Crowd Out or Crowd In Domestic Investment? Evidence from Sub Saharan Africa. *African Journal of Social Sciences*, 6(1), pp.69-77.

Im, K.S., Pesaran, M.H. and Shin, Y., 2003. Testing for Unit Roots in Heterogeneous Panels. *Journal of Econometrics,* 115(1), pp.53-74.

IMF, 2012. *Macroeconomic Policy Frameworks for Resource-Rich Developing Countries.* International Monetary Fund.

Johnson, A., 2006. The effects of FDI Inflows on host Country Economic Growth. CESIS *Working Paper Series.* Royal Institute of Technology, Sweden.

Kamaly, A., 2002. Behind the surge in FDI to Developing Countries in the 1990s: An Empirical Investigation. *Unpublished;* College Park, MD: University of Maryland.

Kang, Y.T., 2006. A Pooled Mean Group analysis on Aid and Growth. CSAE WPS/2006-14.

Kanu, S. I., 2015. Foreign Capital Inflows and Economic Growth in Sub-Saharan Africa: A study of selected Countries. *Research Journal of Finance and Accounting,* 6(1).

Karras, G., 2006. Foreign Aid and Long-run Economic Growth: Empirical evidence for a Panel of Developing Countries. *Journal of International Development,* 18(7), pp. 15-28.

Katushi, S.I., Gaiha, R. and Abdilahi, A., 2012. Remittances, Growth and Poverty: New evidence from Asian Countries. IFAD Discussion Paper, 15.

Komlan, F., 2016. Quality of Institutions, Natural Resources and Foreign Direct Investment (FDI) in Sub-Saharan Africa: Dynamic approach. *Journal of Economic and Development Studies*, 4(2), pp. 28-55.

Lensink, R. and Morrissey, O., 2001. Foreign Direct Investment: Flows, Volatility and Growth in Developing Countries. CREDIT Research Paper 01/06.

Levine, A., Lin, C. and Chu, C., 2002. Unit Root Tests in Panel Data: Asymptotic and Finite Sample Properties. *Journal of Econometrics,* 108(1), pp. 1-24.

Narayan S., 2013. Causal Relationship between Foreign Capital Inflows and Economic Growth: Empirical evidence from India. *International Journal of Economics, Finance and Management*, 2(1).

Neumann, R.M., Penl, A. Tanku, A., 2009. Volatility of Capital Flows and Financial Liberalization: Do specific flows respond differently? *International Review of Economics and Finance*, 18.

Nuzhat, F., 2009. Impact of Foreign Direct Investment on Economic Growth in Pakistan. *International Review of Business Research Papers*, 5(5), pp. 110-120.

Obiechina, M.E and Ukeje E.U., 2013. Economic Growth, Capital Flows, Foreign Exchange rate, Export and Trade openness in Nigeria. *International Journal of Economics and Management* Sciences, 2(9).

Pesaran, M.H., Shin, Y. and Smith, R.P., 1997. Pooled Estimation of Long-run relationships in Dynamic Heterogeneous Panels. DAE Working Papers Amalgamated Series, No 9721, University of Cambridge.

Pesaran M.H., Shin, Y., Smith, R.P., 1999. Pooled Mean Group Estimation of Dynamic Heterogeneous Panels. *Journal of the American Statistical* Association, 94, pp. 621 - 634.

Prasad, E., Rajan, R. and Subramanian, A., 2007. Foreign Capital and Economic Growth. NBER Working Paper Series, 13619.

Razin, A. and Sadka E., 2001. Country Risk and Capital Flow Reversals. *Economic Letters,* 72.

Reinikka, R. and Svensson, J., 1999. How inadequate provisions of Public Infrastructure and Services affects Private Investment. World Bank Policy Research Working Paper Series, 2262.

Saltz, S., 1992. The Negative correlation between Foreign Direct Investment and Economic Growth in the third world: Theory and evidence, *Revista Internazionale di Scienze Economiche e Commerciali,* 39, pp. 617-633.
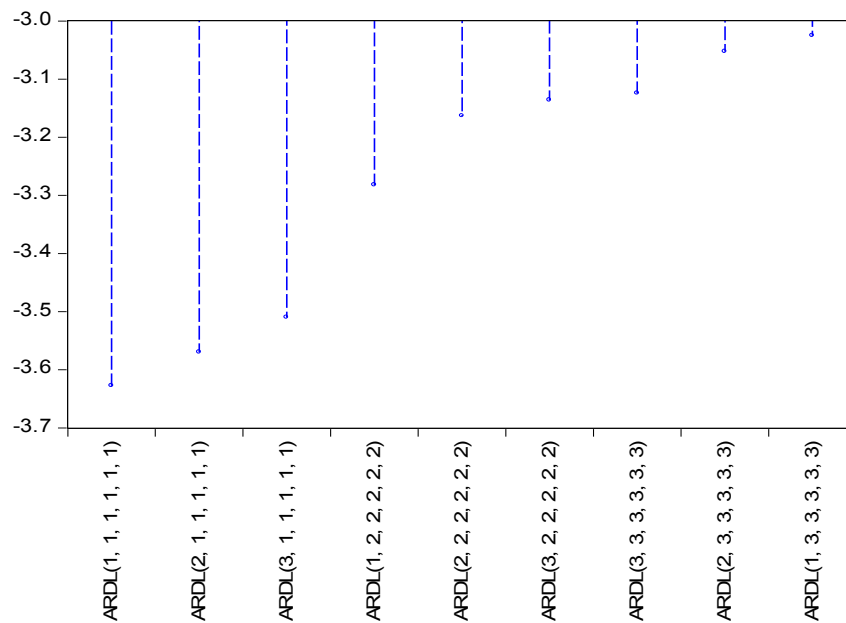
Wei, S. and Wu, Y., 2001. Negative alchemy? Corruption, Composition of Capital flows, and Currency Crises. National Bureau of Economic Research, NBER Working Paper, 8187.

Appendix

Table A1. List of Countries

Benin	Botswana	Cameroon	Cote d'Ivoire
Ghana	Kenya	Lesotho	Madagascar
Mali	Mozambique	Niger	Nigeria
Rwanda	Senegal	Swaziland	Togo

Figure A1. Hannan-Quinn Lag Length Selection

Source: Authors' computation, 2017