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Impact of Bilateral and Multilateral Aid on Domestic Savings in Low and Middle-Income Sub Sahara African Countries: Mediating Role of Institutional Quality

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Abstract

The purpose of the study was to examine the impact of bilateral and multilateral aid on domestic savings in SSA countries, and assess whether the impact depends on the quality of institutions. Using a panel data set of 28 selected SSA countries from 1996 – 2015, a model was specified and estimated using the techniques of random effects based on results of the Hausman test. The results show that only bilateral aid has a significant negative impact on domestic savings of SSA countries, implying a crowding-out effect. However, the impact of multilateral aid was found insignificant. After interacting bilateral and multilateral aid with institutional quality, it turns out that the negative impact of bilateral aid persists whereas multilateral aid shows a positive impact on domestic savings. It is interesting to note that aid regardless of the composition crowds out domestic savings in middle income SSA countries even after interacting with institutions, while for the case of low income countries, foreign aid particularly multilateral aid complements domestic saving if accompanied with improvement in the quality of institutions.

Keywords: bilateral aid, multilateral aid, domestic savings, middle-income, low-income, Sub Sahara Africa

1. Introduction

The importance of foreign aid as an ingredient of economic development of developing countries cannot be over-emphasized. Development theorists argue that such countries are underdeveloped because they lack the necessary development-enhancing resources manifested in the form of revenue-expenditure, savings-investment, and foreign exchange gaps; therefore, they need aid (Tarp & Hjertholm, 2000; Lancaster, 2008). Sub-Sahara Africa (SSA) is one of the poorest regions in the world. The region has been receiving foreign aid since the 1960s to promote development outcomes including enhancing domestic savings. In fact, compared to other aid recipient regions such as South Asia, East Asia and Pacific, Europe and Central Asia, and Latin America and Caribbean, SSA countries have been the largest beneficiaries of foreign aid. For instance, between 1960 and 2015, the average Net Aid receipts as a percentage of Gross National Income attributed to SSA countries was 3.635 compared to 0.72 for South Asia, 0.1 for East Asia and Pacific, 0 for Europe and Central Asia, and 0.235 for Latin America and Caribbean (World Bank, 2017). In spite of the relatively high amounts of aid receipts, SSA countries have registered the poorest performances in terms of domestic savings compared to other aid-recipient countries. For instance, from 1996 – 2015, domestic savings (% of GDP) attributed to SSA averaged 18.4%, compared to 27.8% FOR South Asia, 42.1% for East Asia and Pacific, 25.9% for Europe and Central Asia, and 19.8% for Latin America and Caribbean (World Bank, 2017).

Recent research focusing on the impact of foreign aid on domestic savings in aid recipient countries is largely mixed. Some studies find a positive and significant relationship between foreign aid and domestic savings (Kapingura, 2018; Abu & Karim, 2016); others find a negative and significant relationship between foreign aid and domestic savings (Ssemanda & Karamuriro, 2020; Lubbad, 2019; Ozekhome, 2017); while still others find no significant relationship between foreign aid and domestic savings (Ndikumana & Bankson, 2015). Such mixed results may be attributed to the use of aggregate foreign aid predictors in regression models, which do not specify which form of foreign aid impacts domestic savings. This study sought to disaggregate foreign aid in form of bilateral and multilateral aid, and examine its impact on domestic savings in middle and low-income

countries, and to determine whether the impact is contingent of institutional quality.

Disaggregating foreign aid into bilateral and multilateral aid and studying its impact on domestic savings in middle and low-income SSA countries, and whether the impact is contingent on institutional quality, is important for theoretical, empirical and practical reasons. Theoretically, proponents of bilateral aid vouch for it on account that it is easy to enforce accountability and oversight on resource utilization (Findley et al., 2011; Dreher et al., 2011); while its opponents renounce it on account of its propensity to promoting donors' strategic and political interests at expense of the recipient countries' interests (Rommel & Schaudt, 2020). On the other hand, supporters of multilateral aid contend that it is less susceptible to fragmentation tends to focus more on initiatives with a higher potential to transform the recipient countries (Nunnenkamp et al., 2017; Gulrajani, 2011; Addison et al., 2015); while its opponents argue that it is difficult and complex to negotiate, thereby posing access and utilization challenges (Kharas & Blomfield, 2013). Such theoretical differences can only be resolved through further empirical studies, making this study imperative. Second, although research exists showing that the effectiveness of aid in recipient countries depends on the quality of institutions existing in those countries (Hassan, 2021; Xiaosong & Siyuan, 2020; Maruta et al., 2020; Iqbal & Daly, 2014), there remains a research gap concerning the impact of bilateral and multilateral aid on domestic savings in middle and low-income SSA countries, and whether such an impact depends on quality of institutions existing in those countries. The above reasons clearly warranted this study. Thus, the purpose of this study was to examine the impact of bilateral and multilateral aid on domestic savings in middle and low-income SSA countries, and whether the impact is contingent on institutional quality.

It has been observed that aid effectiveness depends on recipient countries' level of development (Biscaye et al., 2017); however, empirical evidence in relation in relation to SSA middle-income and low-income countries remains scanty. It is for this and the above reasons that this study was conducted to determine the impact of bilateral and multilateral aid on domestic savings as a development trigger in middle and low-income SSA countries, and whether this impact depends on the quality of institutions in those countries. The classification of SSA countries into middle-income and low-income closely followed the World Bank (2017) classification. Middle-income countries included: Mauritius, Congo, Ivory Coast, Cameroon, South Africa, Ghana, Kenya, Nigeria, Swaziland, Namibia, Gabon and Sudan. Low-income countries included: Uganda, Burkina Faso, Benin, Togo, Mali, Tanzania, Chad, Rwanda, Guinea, Senegal, Mozambique, Malawi, Gambia, Madagascar and Niger. Accordingly, the overall objective of the study was to compare the impact of bilateral and multilateral aid on economic growth in middle and low-income SSA countries, and to determine whether the impact is contingent on institutional quality.

2. Methods and Materials

2.1 Theoretical Framework

Harrod-Domar advanced a theory, which development economists often use to explain the relationship between an economy's growth rate in terms of the level of savings and the stock of capital (Eltis, 1987). The model was later modified by Shield (2007) and Taslim and Welwita (2000) and used to explain the relationship between foreign aid and domestic savings. It is these authors' modification of the Harrod-Domar model that provides the theoretical basis of this study. To the authors, foreign aid is needed in order to fill a country's savings-investment gap. That is,

$$A_0 = I_0 - S_0 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where A_0, I_0 and S_0 represent initial foreign aid, investment, and savings respectively. The Keynesian income hypothesis presupposes that savings is a linear function of income. That is,

$$S_t = sY_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

In the Harrod-Domar model, the capital-output ratio is constant, which means that,

$$\frac{K}{Y} = k \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

Where K and Y are capital and output respectively. Equation (3) can be re-written as,

$$\frac{\Delta K}{\Delta Y} = k \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (4)$$

Where ΔK ***and*** ΔY are change in capital and change in output respectively. Furthermore, the target growth rate

of the economy is defined as change in output, that is,

$$\frac{\Delta Y}{Y} = g \ldots\ldots\ldots \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Investment on the other hand is defined as change in capital stock, that is,

$$\Delta K = I \ldots\ldots\ldots\ldots\ldots\ldots\ldots \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Using the definitions contained in equations (2), (3), (5) and (6), equation (1) is re-written as:

$$F_0 = (kg - s)Y_0 \ldots\ldots\ldots\ldots \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

From equation (7), the higher the savings rate relative to the product of capital-output ratio and the target growth rate of the economy, the lower the foreign aid requirements. On the other hand, the lower the savings rate relative to the product of capital-output ratio and the target growth rate of the economy, the higher the foreign aid requirements. Integrating a time factor, the new investment at time *t* becomes $I_t = kgY_t$ and savings at time *t* becomes$S_t = Y_0 + s'(Y_t - Y_0)$. Accordingly, the net flow of foreign aid required at time *t* will be:

$$F_t = (kg - s')Y_t + (s' - s)Y_0 \ldots\ldots\ldots \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

Where *s*' is the new marginal rate of savings with time. Equation (8) implies that, with time, foreign aid requirements decrease with increase in savings rate. Subtracting equation (7) from equation (8) yields:

$$F_t - F_0 = (kg - s')(Y_t - Y_0) \ldots\ldots\ldots \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

Equation (9) implies that less foreign aid will be required if the new marginal savings rate exceeds the product of capital-output ratio and the growth rate of the economy. Alternatively, more foreign aid will be required if the new marginal savings rate is lower than the product of capital-output ratio and the growth rate of the economy. This underscores the importance of countries using foreign aid to cover their savings-investment gaps. From equation (9), the marginal savings rate becomes:

$$s' = kg - \left(\frac{F_t - F_0}{Y_t - Y_0}\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (10)$$

$$\text{Where} \quad \frac{\partial s'}{\partial F_t} = -\frac{1}{Y_t - Y_0} < 0 \quad \text{and} \quad \frac{\partial s'}{\partial Y_t} = \frac{1}{(Y_t - Y_0)^2}$$

From equation (10), it is clear that there is an inverse relationship between marginal rate of savings and additional foreign aid, and there is a direct relationship between marginal rate of savings and additional income as indicated by the partial derivatives. Equation (10) is consistent with the arguments advanced by Shields (2007) and Svensson (2000). The authors contend that foreign aid crowds-out domestic savings particularly in developing countries because it creates incentives for unproductive public spending through rent-seeking activities such as corruption and/or outright theft. Thus, bilateral and multilateral aid and domestic savings in middle and low-income SSA countries is expected to bear a negative sign.

2.2 Empirical Model Specification

To determine the impact of bilateral and multilateral aid on domestic savings in middle and low-income SSA countries, and whether the impact is contingent on institutional quality, the study adopted Howard's (1992) foreign aid-savings model and modified it suit the current study. Besides, the model is consistent with equation (10). From the simple savings function,

$$S = \propto + \beta A + \theta Y \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (11)$$

Where S, A, and Y are total savings, total aid and output respectively. Disaggregating aid into bilateral and multilateral aid and integrating a variable representing other predictors of domestic savings yields a relatively more specified estimation model. In addition, since panel data is employed for this study, the estimation model is specified in accordance with panel data structural requirements. That is,

$$GDS_{it} = \propto + \varphi BA_{it} + \delta MA_{it} + \beta' V_{it} + \mu_i + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (12)$$

Where GDS, BA, MA, V respectively, are gross domestic savings, bilateral aid, multilateral aid and a vector of other domestic savings predictors including income growth, financial development (M2/GDP), inflation, trade

openness, capital stock, and population growth. That is,

$$V'\left(GDPG, \frac{M2}{GDP}, INFL, TOPEN, GFCF, POPG\right) \ldots\ldots \quad \ldots\ldots\ldots\ldots\ldots (13)$$

By letting$x' = (BA, MA, V')$, $y_{it} = GDS_{it}$ and$\theta' = (\alpha, \varphi, \beta')$, equation 12 can be reduced to:

$$y_{it} = \alpha + \theta' x_{it} + \mu_i + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (14)$$

From equation (14), it is hypothesized that bilateral aid and multilateral aid are both inversely related to domestic savings in middle and low-income SSA countries.

2.3 Definition, Measurement and Expected Signs of Variables

Gross Domestic Savings (GDS): This is a measure of the difference between gross domestic product and consumption expenditure, and it includes household savings, private sector corporate savings as well as public sector savings.

Bilateral Aid (BAID): This refers to assistance given by a Government of one country directly to a Government of another country. It comprises of bilateral aid inflow from Development Assistance Countries (DAC0, and it is expressed as a percentage of GDP. Its coefficient is expected to bear a negative sign because according to Shields (2007) and Svensson (2000), foreign aid crowds-out domestic investment particularly in developing countries because it creates incentives for unproductive public spending through rent-seeking activities such as corruption and/or outright theft.

Multilateral Aid (MAID): This refers to assistance given by one or more countries but delivered through international financial institutions such as World Bank and International Monetary Fund. It is calculated as the difference between total aid and bilateral aid, and it is expressed as a percentage of GDP. Its coefficient is expected to bear a negative sign because according to Shields (2007) and Svensson (2000), foreign aid crowds-out domestic investment particularly in developing countries because it creates incentives for unproductive public spending through rent-seeking activities such as corruption and/or outright theft.

Inflation: The effect of inflation on savings can be either positive or negative. According to Loayza et al (2000), inflation creates uncertainty and therefore, risk-averse consumers tend to set some resources aside as a precaution against possible adverse changes in future income, leading to positive savings. On the other hand, inflation could lead to negative savings through its effect on income. Inflation serves as a tax, and thus, reduces the amount of disposable income, which discourages savings.

Financial development: Financial development is measured by the degree of monetization of the economy captured by the ratio of broad money (M2) to national output (GDP) (Ozcan et al., 2003). Financial depth or financial market development shows the range and availability of financial assets, accessibility to banking facilities, and extent of credit opportunity. The range and availability of different financial assets that suit savers interest, expansion of bank branches and improvement in the accessibility to banking facilities motivates individuals to save. However, saving can be discouraged by the availability of more credit as availability of more credit relaxes domestic liquidity constraints, particularly credit given for consumption (Loayz et al., 2000).

Openness: Openness is measured as the ratio of the sum of import and exports to GDP. Trade openness is thought to increase savings since it increases income from exportation and opportunities that come with economic integration (Lionel and Ubi, 2012). However, in case of high marginal propensity to import, openness may instead lower savings.

Population growth: Generally, increase in population growth rate increase dependence burden which in turn reduces savings. Consequently, a negative relation between population growth and saving is hypothesized.

Gross fixed capital formation: Gross capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories (WDI, 2017). Bigger capital stock, when effectively transformed into productive investment, leads to increased income which may encourage savings. Consequently, a positive relationship is expected.

2.4 Data Sources

The study uses data collected from 28 SSA countries that have time series data on bilateral and multilateral aid and real GDP growth rates and savings. Data were obtained from the World Bank's World Development Indicators for the period 1996 - 2015.

2.5 Estimation Procedure

In the dynamic panel data model specified in equation (10), Y_{it-1} is correlated with μ_{it} by construction. This creates an endogeneity problem that renders OLS, Fixed Effects and Random Effects model estimators biased and inconsistent (Baltagi & Baltagi, 2008). To overcome this problem, researchers are advised by econometrics experts to employ two types of dynamic panel estimators—difference GMM and system GMM (Arellano & Bond, 1991; Arellano & Bover, 1995; Blundell & Bond, 1998). Both estimators appropriately apply where there are few time periods corresponding to many countries, there exists a linear functional relationship, there exists one dynamic left-hand-side variable, there are independent variables that are not strictly exogenous, there exists fixed individual effects, and there exists heteroskedasticity and autocorrelation within individuals but not across individuals (Arellano & Bond, 1991; Arellano & Bover, 1995). However, the shortcoming attributed to difference GMM is that lagged levels tend to be poor instruments for first differences especially for variables that tend towards a random walk (Arellano & Bond, 1991). This necessitated the use of system GMM. Besides, system GMM is credited for being more efficient compared to difference GMM as long as the instruments are valid and exogenous (Jung & Kwon, 2007), as was the case in this study.

2.5.1 Panel Unit Root Tests

The study conducts a panel data unit root test to determine whether the panel data for study variables are stationary or not since panel data contains both the cross-section and the time components. The study employs the two panel unit root tests; Levin, Lin and Chu (LLC) which assumes that the autoregressive parameters are common across countries that is, it assumes homogeneous coefficients and Im, Pesaran and Shin (IPS) which assumes heterogeneous coefficients of the study variables in order to test for panel data stationarity. Both tests have been used for confirmation of the stationarity of variables due to the differences in the alternative hypotheses of the two tests. Using both tests also solves the power and size problems of each of the tests.

2.5.2 LLC Unit Root Test

Levin, Lin and Chu (2002) introduced different panel unit root tests having different specifications dependent upon the assumption about entity specific intercepts terms and time trends. LLC test imposes homogeneousness on the autoregressive coefficient, which shows the presence of a unit root. This test is based on ADF regression for examining unit root problem. The common form of LLC test may be written as the following ADF specification;

$$\Delta y_{it} = \alpha y_{i,t-1} + \sum_{j=1}^{p_i} \beta_{ij}\, \Delta y_{it-j} + \chi_{it}'\delta + \varepsilon_{it} \quad (15)$$

Where$\alpha = \rho - 1$, but allow the lag order for the difference terms, ρ_i, to vary across cross-sections. The test assumes hypotheses as written below;

$$H_0 = 0 \quad (15a)$$

$$H_1 < 0 \quad (15b)$$

The null hypothesis suggests that there is a unit root, while the alternative says otherwise (there is no unit root). The LLC test derives estimates of α from proxies for Δy_{it} and y_{it} that are standardized and free of autocorrelations and deterministic components.

For a given set of lag order, we begin by estimating two additional sets of equations, regressing bothΔy_{it}, and $\Delta y_{i,t-1}$ on the lag terms $\Delta y_{i,t-j}$ for $(j = 1, \dots, \rho_i)$ and the exogenous variables. The estimated coefficients from these two regressions will be denoted $(\hat{\beta}, \hat{\delta})$ and $(\dot{\beta}, \dot{\delta})$, respectively.

$\Delta \bar{y}_{it}$ is defined by taking Δy_{it} and removing the autocorrelations and deterministic components using the first set of auxiliary estimates:

$$\Delta \overline{y_{\imath t}} = \Delta y_{it} - \sum_{j=1}^{p_i} \beta_{ij}\, \Delta y_{it-j} - \chi_{it}'\delta \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (16)$$

Similarly, the analogous $\overline{y_{\imath t-1}}$ may be defined using the second set of coefficients:

$$\overline{y_{\imath t-1}} = y_{it-1} - \sum_{j=1}^{p_i} \dot{\beta_{\imath \jmath}}\, \Delta y_{it-j} - \chi_{it}'\dot{\delta} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (16)$$

The proxies are obtained by standardizing both $\Delta \overline{y_{\imath t}}$ and $\overline{y_{\imath t-1}}$, and dividing by the regression standard error:$\Delta \overline{y_{\imath t}} = \Delta \overline{y_{\imath t}}/s_i$ and$y_{it-1} = \overline{y_{\imath t-1}}/s_i$. Where s_i are the estimated standard errors from estimating each

ADF in equation.

Finally, the estimate of the coefficient α may be obtained from the pooled proxy equation;

$$\Delta y_{it} = \alpha y_{it-1} + \mu_{it} \quad \text{……………………………………….. (17)}$$

The LLC method requires a specification of the number of lags used in each cross section ADF regression, ρ_i, as well as kernel choices used in the computation of the standard deviation ratio, s_N, which is defined as the mean of the ratios of the long run standard deviation for each cross-section. This ratio is estimated using the kernel-based techniques. In addition, include no exogenous regressors, or include individual constant items (fixed effects), or to employ individual constants and trends.

2.5.3 Im Pesaran and Shin Test

The LLC is a restrictive test in a sense that, it requires ρ to be homogeneous across cross-sections. Im Pesaran and shin (2003) (hereafter IPS) allow for a heterogeneous coefficient of $y_{i,t-1}$ and propose an alternative testing procedure based on averaging individual unit root test statistics.

The test begins by specifying a separate ADF regression for each cross section:

$$\Delta y_{it} = \alpha y_{i,t-1} + \sum_{j=1}^{p_i} \beta_{ij} \Delta y_{it-j} + \chi_{it}' \delta + \epsilon_{it} \quad \text{………………………….. (18)}$$

The null hypothesis is:

$$H_0: \alpha_i = 0, \quad for\ all\ i \tag{18a}$$

And the alternative hypothesis is written as below:

$$H_1: \begin{cases} \alpha_i = 0 & for\ i = 1,2, \dots N_1 \\ \alpha_i > 0 & for\ i = N+1, N+2, \dots, N \end{cases} \tag{18b}$$

(Where, the i may be ordered as necessary). The alternative hypothesis may be interpreted as, a non-zero fraction of the individual processes is stationary. However, the IPS unit root test is not very strict as compared to the LLC since it allows some panels to be non-stationary (Verbeek, 2008).

Table 1. Panel unit root tests

Variable	IPS		LLC	
	Coefficient	P-Value	Coefficient	P-Value
GDS	-3.4494***	0.0003	-1.0890	0.1381
GDPG	-9.4804***	0.0000	-7.2632***	0.0000
POPG	-0.5834	0.3787	-16.3379***	0.0000
AID	-5.8382***	0.0000	-3.9010***	0.0000
M_AID	-7.2364***	0.0000	-3.2361***	0.0000
B_AID	-4.9924***	0.0000	-3.7379***	0.0000
INF	-10.5786***	0.0000	-7.0422***	0.0000
OPEN	-1.4072*	0.0797	-2.5704***	0.0005
M2/GDP	1.7384	0.9589	-4.6660***	0.0000
INST	0.0408	0.5163	-1.6494**	0.0000
GFCF	-9.7136***	0.0000	-8.0901***	0.0495
*P<0.1, **P<0.05, ***P<0.01.				

Source: Author's Computations

The results of the unit root tests are presented in the table 1 above from results, it is concluded that all the panels are stationary since, for every variable, at least one test suggests stationarity (seen from the p-values that less than 0.05).

2.6 Random Effect and Fixed Effect Models

In case all the panels are stationary, traditional panel data techniques (Random Effects (FE), Fixed Effects (FE)) can be used to estimate the model in equation 14. The appropriate method for estimating the equation depends on the whether the individual specific effects $\mu_i$are correlated with the exogenous variables or not. With random effect modeling, η_i is viewed as unobserved random variable and not incidental parameter. The model is based on the assumption that μ_i is uncorrelated with the explanatory variables, that is;$cov(X_{it}, \mu_i) = 0$. In this case, fixed effects (FE) estimator is consistent but not efficient. Fixed effect modelling is based on the assumption unobserved firm heterogeneity (μ_i) is correlated with the explanatory variables, that is; $cov(X_{it}, \mu_i) \neq 0$. In this case random effects estimator is now inconsistent (Baltagi, 2005).

To decide between a fixed or random model, both FE and RE were estimated and the Hausmann (1997) specification test was conducted in order to determine the appropriate model. The test assumes that the RE is correct model, with the null hypothesis:

H_0: $cov(X_{it}, \mu_i) = 0$ against the alternative H_0: $cov(X_{it}, \mu_i) \neq 0$(i.e. the FE is correct). The Hausmann test statistics is constructed from the estimated parameters of the random effect and within estimator of FE as shown below

$$H = \left(\hat{\beta}_{re} - \hat{\beta}_w\right)'\left[V\left(\hat{\beta}_{re}\right) - V\left(\hat{\beta}_w\right)\right]'\left(\hat{\beta}_{re} - \hat{\beta}_w\right)$$

The test is asymptotically distributed with a chi-square (χ^2) distribution.

3. Results and Discussion

The results are presented systematically in three different ways. First, is the descriptive statistics? This is followed by correlational analysis, panel unit roots and panel estimates.

3.1 Descriptive Analysis

The table below presents descriptive statistics for selected determinants of domestic savings including gross domestic savings (GDS), foreign aid (AID), bilateral aid (B_AID), Multilateral aid (M_AID), population growth (POPG), GDP growth rate (GDPG), financial development (M2/GDP) gross fixed capital formation (GFCF), openness (OPEN), and inflation (INF).

Table 2. Descriptive Analysis of selected Determinants of Domestic Savings

Variable	Obs	Mean	Std.Dev.	Min	Max
GDS	560	14.31	12.03	0.192	60.43
B_AID	560	5.336	4.428	-0.307	35.77
M_AID	560	2.532	2.339	-3.408	11.41
GDPG	560	4.769	3.824	-12.67	33.74
POPG	560	2.618	0.775	0.132	7.989
INF	560	7.064	8.976	-8.975	132.8
M2/GDP	560	0.130	0.154	0.00479	1.478
GFCF	560	13.31	14.38	0	112.0
OPEN	560	0.710	0.305	0.158	2.094
INST	560	-0.535	0.522	-1.619	0.853

Source: Author's computations

A deeper examination of the values of mean and standard deviation of he selected variables reveals that, apart from inflation and GFCF, there was no other case of a variable where the standard deviation was greater than the mean, which implies that the mean values were considered good estimators of the parameters. The high standard deviations for inflation and gross capital formation depict some outlier cases in these series. For the case of inflation, the maximum of value of 132 was recorded in Sudan in the 1996. This is however not surprising since that time there were political unrest in the country.

3.2 Correlation Analysis

Gross domestic savings (GDS) and the selected determinants such as; bilateral aid (B_AID), Multilateral aid (M_AID), population growth (POPG), GDP growth rate (GDPG), financial development (M2/GDP), gross fixed capital formation (GFCF), openness (OPEN), inflation (INF), institutions (INST) were subjected to correlation analysis to establish their linear relationship, and therefore uncover any possibilities of multicollinearity. Table 3 below presents a summary of correlation analysis results of key selected determinants of gross domestic savings.

Table 3. Correlation Matrix of Selected Determinants of Domestic Savings

	GDS	INST	B_AID	M_AID	GDPG	POPG	INF	M2/GDP	GFCF	OPEN
GDS	1									
INST	-0.1489*	1								
B_AID	-0.3790*	0.00650	1							
M_AID	-0.4334*	0.00950	0.6934*	1						
GDPG	-0.0337	-0.0323	0.2178*	0.1716*	1					
POPG	-0.1699*	-0.3927*	0.4454*	0.4737*	0.1716*	1				
INF	-0.1712*	-0.1127*	0.0866*	0.0931*	0.4737*	-0.0273	1			
M2/GDP	-0.00990	0.5278*	-0.3042*	-0.2527*	0.0931*	-0.5411*	-0.0281	1		
GFCF	0.00440	-0.1021*	0.1208*	0.1042*	-0.2527*	0.1787*	0.1264*	-0.1334*	1	
OPEN	0.3078*	0.1536*	-0.2841*	-0.2926*	0.1042*	-0.3914*	-0.1432*	0.2539*	0.0720	1

Source: Author's computations

The results in table 3 above show that, with exception of GDP growth, gross fixed capital formation, and M2/GDP, all the other variables show significant correlation with gross domestic saving. The correlation between all the other determinants of savings are less than 0.8 therefore suggesting that multicollinearity is not an issue to worry about in this analysis (Gujarati, 2005). Accordingly, a panel unit root test for all variables above was conducted before finally estimating the gross domestic savings models including the predictors identified above.

3.3 Panel Estimates

Given that the panels are stationary, the traditional fixed effect and random effect regressions were estimated and Hausman test was applied to identify the best model. Since the p-values for the test were greater than 0.05, the decision was made to use Random Effects as the preferred technique for analyzing the panel data. Accordingly, the results of panel estimation are presented in the table below.

Table 4. Impact of aid on domestic savings in SSA

VARIABLES	**RE(1)**	**RE(2)**	**RE(3)**
GDP_GROWTH	0.309***	0.302***	0.307***
	(0.063)	(0.064)	(0.063)
POP_GROWTH	-0.435	-0.529	-0.412
	(0.508)	(0.510)	(0.507)
INF	-0.122***	-0.129***	-0.124***
	(0.030)	(0.031)	(0.030)
M2/GDP	1.820	2.083	1.648
	(2.579)	(2.595)	(2.576)
GFCF	-0.019	-0.019	-0.019
	(0.017)	(0.017)	(0.017)
OPPEN	7.631***	8.262***	7.640***
	(1.646)	(1.643)	(1.639)
INST	-2.906**	-3.237**	-3.015**
	(1.286)	(1.295)	(1.279)
M_AID		-0.189	
		(0.170)	
B_AID			-0.253***
			(0.084)
CONSTANT	9.325***	8.029***	9.149***
	(2.710)	(2.674)	(2.722)
Wald/F-stat	91.78	84.23	98.28
Prob(Wald/F)	0.000	0.000	0.000
Observations	560	560	560
R-squared			
Number of pid	28	28	28

Standard errors in parentheses; *** p<0.01; ** p<0.05; * p<0.1

Source: Authors Computation

After disaggregating foreign aid into bilateral and multilateral aid, the study finds that multilateral aid doesn't significantly influence domestic savings in SSA. It is bilateral aid which is found to have a negative and significant impact on domestic savings in SSA. The coefficient of bilateral aid implies that for every unit increase in bilateral aid, domestic savings reduces by 0.25 units, keeping other factors constant.

Among the factors controlled for in the analysis, GDP growth, inflation and openness are the variables that have a significant impact on gross domestic savings throughout the models. Regarding GDP growth, the results of all the models support the Keynesian hypothesis "that increase in income increases savings" since saving is assumed to be a fixed proportion of income. Furthermore, the results are consistent with life cycle/permanent income hypothesis which predicts that countries with higher GDP growth rates are expected to have higher savings than countries with lower growth rates. In this particular case, increase in GDP growth by one percentage point increases domestic saving by about 0.3 percentage points in all the three models, keeping other factors constant. These empirical results are not in isolation as similar results have been obtained by scholars such as; Kidane (2010), Tesha (2013), Ahmed (2011), Simleit et al. (2011), and Khan et al. (2017).

In terms of openness, the study finds that it has a positive impact on gross domestic savings. Across the models, the impact of a unit increase in the degree of openness increases domestic savings by a range 7.6 to 8.4 percentage points. These results support the theoretical argument that openness is associated with growing

internationalization of production and marketing of goods and services, which increases income and consequently, increases savings. Other studies that have found similar results include; Lionel and Ubi (2012) who found openness to have a positive impact on domestic saving in the long run although the impact was mixed in the short run. The results contradict Sabra (2016) who after using dynamic panel estimation found that openness has a negative impact on savings in selected Mena countries.

Regarding inflation, the study finds that it has a negative impact on domestic savings in the SSA region. The results of the estimation show that, for every one percent increase/decrease in inflation rate, gross domestic savings decreases/increases by about 0.12 percentage points. Note that the results are consistent across all models. Such findings support the theoretical argument that inflation reduces the real incomes of individuals and also deters developments in the financial sector which hinders gross domestic savings in an economy (Girma, 2017). The results rhyme with similar results that have been obtained by a number of studies such as; Balde (2011), Samantaraya et al. (2014), Arok (2014), and Girma (2017) among others.

To assess whether the impact of aid on gross domestic savings is conditional on the quality of institutions, interactive terms where created where, in the first case the quality of institution index was interacted with bilateral aid after which the index was interacted with multilateral aid. The results of this analysis are presented in table 5 below.

Table 5. Impact of aid on domestic savings conditional on institutional quality

VARIABLES	**RE(1)**	**RE(2)**	**RE(3)**
GDPG	0.308***	0.305***	0.301***
	(0.064)	(0.064)	(0.063)
POPG	-0.444	-0.410	-0.481
	(0.513)	(0.513)	(0.510)
INF	-0.121***	-0.138***	-0.117***
	(0.031)	(0.031)	(0.031)
M2/GDP	1.795	2.358	1.429
	(2.588)	(2.594)	(2.581)
GFCF	-0.019	-0.017	-0.021
	(0.017)	(0.017)	(0.017)
OPEN	7.632***	8.249***	7.639***
	(1.648)	(1.640)	(1.638)
INST	-2.750	-4.932***	-1.632
	(1.745)	(1.605)	(1.707)
M_AID		0.201	
		(0.275)	
M_AID*INST		-0.590*	
		(0.329)	
B_AID			-0.388***
			(0.138)
B_AID*INST			-0.210
			(0.172)
Constant	9.447***	6.619**	10.228***
	(2.863)	(2.804)	(2.850)
Wald/F-stat	91.64	87.72	94.89
Prob(Wald/F)	0.000	0.000	0.000
Observations	560	560	560
R-squared			
Number of pid	28	28	28

Standard errors in parentheses; *** p<0.01; ** p<0.05; * p<0.1

Source: Authors Computation

From the results, Hausman test suggests random effect is the most appropriate estimation for all the models. The results in model 2 table 5 above show that before interaction, multilateral aid has an insignificant impact on domestic savings, but after interacting multilateral aid with institutional quality, the coefficient of the interaction term is positive and significant at 10% level of significance. These results are in line with those of aid growth analysis where multilateral aid becomes significant (with a positive impact) after interacting with institutional quality index. This implies improving quality of institutions by one percentage point positively increases the impact of multilateral aid on domestic savings in SSA by 0.59 percentage points. On the other hand, whereas the coefficient bilateral aid before interaction is positive and significant, the coefficient of the interaction term

between bilateral aid and institutional quality is insignificant, implying that the effectiveness of bilateral aid with respect to domestic savings in SSA does not depend on the quality of institutions.

Regarding other determinants of gross domestic saving, there is a high level of consistence between the results as all variables that are found significant with the same signs, although with slight changes in the magnitude of the coefficient for some variables. This implies that GDP growth, inflation, and openness are also important determinants of domestic savings in SS.

Just like the case for growth and aid, it is also important to compare the impact of aid on domestic saving by categorizing countries into low income and middle income countries. The results of this type of analysis are presented in the table below.

Table 6. Impact of aid on domestic savings in middle income SSA countries

VARIABLES	**RE(1)**	**RE(2)**	**RE(3)**
GDPG	0.265**	0.315***	0.253**
	(0.108)	(0.109)	(0.109)
POPG	0.879	0.501	0.993
	(1.292)	(1.304)	(1.284)
INF	-0.145***	-0.163***	-0.143***
	(0.043)	(0.043)	(0.043)
M2/GDP	-0.789	1.074	-0.851
	(4.496)	(4.590)	(4.473)
GFCF	-0.051*	-0.041	-0.052*
	(0.030)	(0.030)	(0.030)
OPEN	4.579*	4.888*	4.721*
	(2.473)	(2.513)	(2.461)
INST	-3.894	-5.502**	-3.857
	(2.718)	(2.764)	(2.638)
M_AID		-1.977***	
		(0.712)	
M_AID*INST		-3.301***	
		(0.891)	
B_AID			-1.205***
			(0.265)
B_AID*INST			-1.274***
			(0.282)
Constant	14.399**	12.733**	14.275***
	(5.748)	(6.232)	(5.408)
Observations	260	260	260
Number of pid	13	13	13

Standard errors in parentheses; *** p<0.01; ** p<0.05; * p<0.1

Source: Authors Computation

The Hausman test suggests that random effect is a better model for analyzing data concerning the impact of bilateral and multilateral aid on domestic savings in middle income SSA countries, and whether the impact depends on the quality of institutions. Going by the results of the random effect models, it is clear that the coefficients of bilateral and multilateral aid are negative and significant. This implies that bilateral and multilateral aid crowd out domestic savings in middle income SSA countries. The negative effect doesn't disappear even after interacting with the index of institutional quality. All the coefficients of aid remain negative and significant for all the models. Table 7 below presents a summary of findings regarding the impact of bilateral and multilateral aid on domestic savings in low income SSA countries.

Table 7. Aid and saving in selected low income Sub-Saharan African Countries

VARIABLES	RE(1)	RE(2)	RE(3)
GDPG	0.316***	0.283***	0.326***
	(0.070)	(0.069)	(0.071)
POPG	0.415	0.399	0.415
	(0.498)	(0.493)	(0.502)
INF	-0.071	-0.102**	-0.061
	(0.045)	(0.044)	(0.044)
M2/GDP	0.824	1.143	-0.054
	(2.841)	(2.819)	(2.868)
GFCF	-0.001	-0.008	0.002
	(0.018)	(0.018)	(0.019)
OPEN	6.449***	8.820***	5.479***
	(2.044)	(2.006)	(2.050)
INST	-4.387**	-3.059	-5.117**
	(2.171)	(1.884)	(2.207)
M_AID		0.527*	
		(0.274)	
M_AID*INST		1.043***	
		(0.324)	
B_AID			0.027
			(0.154)
B_AID*INST			0.660***
			(0.232)
Constant	2.328	0.241	2.837
	(2.530)	(2.501)	(2.417)
Observations	300	300	300
Number of pid	15	15	15

Standard errors in parentheses; *** p<0.01; ** p<0.05; * p<0.1

Source: Authors Computation

The results in the table 7 above show that the coefficients of the interaction terms between aid and institutional quality are positive and significant. This implies bilateral and multilateral aid complement domestic savings in these countries, and this impact becomes bigger if the quality of institutions improves. Again, some of the traditional determinants of domestic savings particularly GDP growth, inflation, and openness are significant and bear the expected theoretical signs across the three regression models.

4. Conclusion

As already stated, the study examined the impact of bilateral and multilateral aid on domestic savings in SSA countries, and assess whether the impact depends on the quality of institutions. With the aid of a panel data set of 28 selected SSA countries from 1996 – 2015, a model was specified and estimated using the techniques of random effects based on results of the Hausman test. The findings indicate that only bilateral aid has a significant impact on domestic savings of SSA countries. Moreover, the impact is negative, implying bilateral aid has a crowding-out effect on domestic savings. However, the impact of multilateral aid was found insignificant. After interacting bilateral and multilateral aid with institutional quality, it turns out that the negative impact of bilateral aid persists whereas multilateral aid shows a positive impact on domestic savings, which is significant at 10 percent. It is interesting to note that aid regardless of the composition crowds out domestic savings in middle income SSA countries even after interacting with institutions, while for the case of low income countries, foreign aid particularly multilateral aid complements domestic saving if accompanied with improvement in the quality of institutions.

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