

# Welfare implications of external debt and capital flight in Sub-Saharan Africa (Evidence using panel data modelling)

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## ABSTRACT

The countries in Sub-Saharan Africa (SSA) have experienced a positive growth rate of over five per cent per year, on average, since their transition from the Heavily Indebted Poor Countries Initiative in 1996 and the Multilateral Debt Relief Initiative in 2006. Despite this growth, poverty and inequality are still very high. Employing the Driscoll – Kraay standard panel estimation method and dataset from 1990 to 2015, this paper sets out to examine the implications of external debt and capital flight on the general welfare of the people. The estimation results reveal that both external debt and capital flight have a welfare inhibiting effect, suggesting that increases in external borrowing or capital flight may lead to a reduction in the welfare of the people in the sub-region. The study, therefore, recommends to policymakers and government in the sub-region the need to tackle the revolving nature of external borrowing and capital flight and take steps to halt all channels through which deservingly acquired capital leaves the sub-region.

## KEYWORDS

external debt, capital flight, welfare, Driscoll–Kraay standard errors

## JEL CLASSIFICATION INDICES

F32, F34, I31

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# 1. INTRODUCTION

For several decades, Sub-Saharan African (SSA) economies have been struggling with poverty, hunger, epidemics, child and infant mortality. Access to proper sanitation, healthcare, education, energy services and potable water remains inadequate. Statistics from the [World Bank Poverty & Equity Data portal \(2018\)](#) shows that the region remains the only place in the world where the total number of people living under \$3.20 a day has increased persistently over the past two decades – from 383.2 million people in 1990 to 667 million in 2015. Nevertheless, the economic growth rate of many countries in the region within the same period was remarkable about 5 per cent on average. Even during the economic and financial crisis in the year 2007 and 2008, the region grew by 6.2 per cent, a growth rate higher than that of Latin America and the Caribbean (4.9 per cent) and Europe and Central Asia (2.4 per cent).

What is more worrying is the simultaneous occurrence of massive external borrowing and capital flight. From a level of US\$ 69 billion in 1970, total external debt stocks of SSA excluding the high-income countries rose up to US\$ 423 billion in 2015 amidst all the debt cancellation program under the HIPC Initiative in 1996 and the MDRI in 2006 ([World Bank 2017](#)).<sup>1</sup> A study by [Ndikumana – Boyce \(2018\)](#) showed that within the same period, the SSA countries alone have lost a total of US\$ 1.4 trillion through capital flight with compound interest reaching US\$ 1.8 trillion representing about 65 per cent of their combined economic size as measured by their GDP. These surges have received substantial attention in academia and the policy circles especially based on the realisation that the burden of these capital flows may hinder the region's ability to mobilize enough resources to finance the sustainable development goals. So why is capital from the region fleeing out when it is most needed to finance its development, and why are the countries in the region still borrowing when it is associated with unproductive investment remains a mystery that still attracts research interest.

More recently, the simultaneous occurrence of external debt and capital flight in the SSA region have taken centre stage in the African development studies ([Ampah et al. 2018](#); [Ndikumana et al. 2015](#)). However, the implications of these revolving door of external debt and capital flight on poverty reduction and inequality have arguably been neglected at the empirical level. It is against this background that this study examines the implication of external debt and capital flight simultaneously on welfare in the SSA-sub-region. The uniqueness of our paper is threefold. First, we used the Driscoll – Kraay standard errors, which is a more robust panel estimation technique that safeguards estimation against cross-sectional dependency, serial correlation and cross-sectional heteroskedasticity in the dataset. Secondly, multidimensional measurement of welfare that employs both monetary and non-monetary measure is used, and finally, in estimating the impact on welfare, this study allows for linear and non-linear effects of external debts to be captured. The purpose is to contribute to the literature on how external debt affects welfare functions, and consequently, economic development in the SSA region.

The remaining sections of the papers are organised as follows. Section 2 reviews the literature on what welfare is and the implication of external debt and capital flight on welfare in the SSA sub-region. The third Section focuses on the methodological framework for the paper. Section 4

<sup>1</sup>The Heavily Indebted Poor Country (HIPC) Initiative and related Multilateral Debt Relief (MDRI) programs have relieved 37 participating countries with more than \$100 billion in debt.



examines and discusses the results and other significant findings, while the final part presents the conclusion and the policy implications.

## 2. LITERATURE REVIEW

Since 1776, when Adam Smith published his *Wealth of Nations* up to the post-colonial period in the 1960s, and the early 1970s, economists and policymakers have used and treated economic growth as a proxy for welfare. Welfare and growth, however, as subjects of scholarly work are not entirely the same. The diversity between them became clearer when several third world countries in Africa, Asia and Latin America in the 1970s reached their growth targets and experienced relatively high rates of growth of per capita income but widespread poverty, inequality and mass unemployment within these regions remained unperturbed (Todaro – Smith 2015). Consequently, redistributing the gains of real per capita GDP to improve the quality of lives of people in terms of eliminating poverty and reducing the disparities in access to health, education, housing, security and employment have become the central theme of everyday discussions.

Felipe (2012) linked the definition of welfare to inclusive growth and argued that welfare is the growth that allows all members of society to participate in and contribute to the growth process on an equal basis regardless of their individual circumstances. Implicitly, this definition stresses that welfare should benefit all members of society, including the poor. It is arguably the growth accompanied by lower poverty and less inequality. Similarly, the World Bank (2012) also defines welfare as the growth rate that provides opportunities for society to become productive and creative. The OECD (2014) also describes it to be growth that brings improvements not only in income but also in living standards and people's quality of life. Based on these definitions, this study treats welfare as growth that translates to the reduction of poverty and inequality and may subsequently use poverty reduction and inequality as welfare.

Unfortunately, the theoretical predictions explaining the impact of external debt and capital flight together on welfare have not been an attractive area for researchers. However, the implications of external borrowing or capital flight on poverty reduction and economic growth have invited some theoretical propositions in the economic literature. Four main theoretical channels have been identified in the literature:

1. the investment diversion thesis,
2. the tax-depressing thesis,
3. the governance depressing thesis, and
4. the austerity thesis.

The investment diversion thesis is based on the crucial role of domestic investment. It postulates that capital flight has a negative impact on development because when capital flees, the amount of money that could have been spent on vital sectors such as agriculture, industry, education, security, healthcare and infrastructure are potentially lost as an investment. This would have earned foreign exchange and generate more revenue through the multiplier effect if the resources had been invested. By diverting to capital, this thesis indicates that capital flight keeps an economy below its domestic investment potential, which inevitably retards its growth and welfare (Ajayi 2015). For instance, in SSA, an empirical study by Ndikumana (2014)



indicates that illicit outflow of capital has a statistically significant investment-inhibiting effect and, later on, economic growth for 39 sampled countries. According to his study the affected countries would have generated an additional average growth rate of about 2.4 per cent from 1970 to 2010 or 3.0 per cent growth rate from 2000 to 2010, if the illicit capital outflows were invested. In the oil-exporting countries in the region, the study concluded that additional growth would have been 3.9 per cent on average if the capital flight was invested. A similar study of [Nkurunziza \(2015\)](#) using 35 African countries but this time on poverty reduction shows that investing flight capital could have increased the annual rate of poverty reduction by a range between 1.9 and 2.5 percentage points over the period of 1990–2010.

The tax-depressing thesis also hypothesizes that capital flight exerts a negative impact on welfare since it reduces the potential revenue available for any economy as an asset held overseas cannot be influenced by domestic tax and monetary authorities and hence cannot, be taxed. A study by [African Development Bank \(2012\)](#) using the Incremental Capital-Output Ratio (ICOR) method and datasets from 2000 to 2008 proved that the countries in SSA could have improved their income per capita by an additional 3 to 5 percentage points if they had invested the illicit outflow on profitable ventures. Also, headcount poverty would have reduced by 4–6 additional percentage points if these capital losses have been invested.

The governance-depressing thesis also shows that illicit capital outflows affect welfare negatively because it complicates the effort of governments in stabilizing the domestic macro-economy and providing good governance, quality institutions and service to the ordinary people that will improve their welfare. Examining the implications of capital flight, [Fofack – Ndikumana \(2015\)](#) and [Ajayi \(1997\)](#) indicated that when valuable resources leak out of the domestic economy, it results in a shortage of liquidity that could have been used for building investment in the domestic economy, and this may lead to an upward pressure on the domestic interest rate to rise. Also, the income that is created abroad by the flown capital cannot be taxed. As a result, government fiscal policy in the form of taxation is reduced. In the same way, when domestic capital leaks out of the country, the bank credit channel of monetary policy is destabilized, making monetary policy object challenging to realize. Also, the continuous outflow depletes the foreign reserve so governments would have to spend resources to have the exchange rate stabilize. This means that continuous outflow of capital through capital flight can obstruct government fiscal, monetary and exchange rate policy from achieving its targets.

Finally, the austerity effect of capital flight indicates that capital flight tends to have more severity effect on the poor as compared to the rich. This proposition rests on the notion that not every citizen has sufficient private capital or can misappropriate and siphon off state resources abroad. Therefore, the potential positive effect of capital flight is usually accrued to only a few privileged economic and political elite. But unfortunately, the negative consequences of higher cost of services, less foreign exchange reserve, weak governance structures, and low development, etc. are disproportionately felt among the various classes of the society with the poor and less wealthy feeling the impact the most. According to [Ajayi \(2015\)](#), [Ndikumana \(2015\)](#) and [Lope da Vega et al. \(2019\)](#), the austerity impact is further worsened when the illicit outflow of capital flight results in depreciation of the domestic currency. In such a situation, the few privileged economic and political elites who have their wealth in haven abroad are protected from its harmful effects while the poor suffer the consequences even though they played no part in causing it. [Table 1](#) provides a brief review of some recent empirical studies examining the impact of capital flight on welfare.



**Table 1.** Review of empirical studies on the impact of capital flight on welfare

Author(s)	Nature of examination	Country	Timeframe	Estimation technique	Major finding(s)
Nkurunziza (2015)	Capital flight and poverty reduction	35 African countries	2000–2010	Capital-Output Ratio (ICOR)	The average annual rate of poverty reduction could have been 1.9% higher if the capital flight had been arrested. Also, it would have generated an extra 2.5 percentage points per year above the current rate of poverty reduction.
Ndikumana (2014)	Capital flight and investment and growth	39 Sub-Saharan African countries	1970–2010	Iterated Reweighted Least Square, GMM, Fixed Effect, and ICOR	Capital flight has a negative effect on investment. Also, an additional growth rate of about 2.4% from 1970 to 2010 or 3.0% growth rate from 2000 to 2010 could have been gained if the illicit capital outflows were invested.
Nguena (2014)	External debt origin, capital flight and poverty reduction	14 African countries	1983–2013	Two-Stage Least Square-instrumental variable	An essential part of the external debt exclusively from China is going back out of the continent as capital flight and this impact positively on the level of poverty in the continents.
African Development Bank (2012)	Capital flight, GDP per capita, poverty reduction	African countries	2000–2008	Incremental Capital-Output Ratio (ICOR) method	The result indicated that the sampled countries could have improved their income per capita by an additional 3–5% if they had invested the illicit outflow on profitable ventures. Also, headcount poverty would have reduced by 4–6 additional percentage points.

Source: Compiled by the authors.



Concerning the theoretical linkages between external debt accumulation and welfare, most of the recent discussions have focused on the debt overhang theory and the crowding-out effect theory. The debt overhang theory postulates that external debt accumulation has a negative impact on growth, and hence, on welfare because as debt accrues, potential investors perceive the build-up in debt to be financed by distortionary measures such as heavy taxes, seigniorage or cut in productive public investment. In response to the fear of economic distortion of such distortionary measures, investors are motivated to withhold their investment to avoid such taxes in the future or possibly invest less or direct their investment abroad. The withdrawal of such valuable investment keeps the economy below its domestic investment potential, which consequently dampens its growth and development. Secondly, a country with high indebtedness is considered as exhibiting the signs of bad governance and as such risky to invest, so welfare-related investment, especially in education and health in such an economy is therefore reduced. The crowding-out effect theory argues that when external debt accrues, debt servicing also eat-up resources available for public investments in human capital and physical infrastructure, and thus, reduces the potential economic growth or welfare. Table 2, therefore, provides a brief review of some empirical studies examining the impact of external debt on welfare in SSA and other developing countries.

### 3. METHODOLOGY

#### 3.1. Theoretical model specification

The basic generalization from the literature presupposes that both external debt and capital flight have negative implications on welfare. However, according to Pattillo – Ricci (2011), a reasonable level of external borrowing by any developing country at the early stage of its development can enhance its growth. Based on this discussion, the theoretical framework for our study is premised on the hypothesis that external debt has both positive and negative implications on welfare within the region. Therefore, to generate any testable hypotheses about the direction of the effects of external debt and capital flight on welfare, this paper draws on a model by Lawanson (2014), Ndikumana (2014), Marchionne – Parekh (2015), Eberhardt – Presbitero (2015) and Kaulihowa – Adjasi (2018), and estimate a model where welfare is a function of external debt and capital flight and a set of other controls variables. This is specified in Eq. (1) as

$$Welfare_{it} = \alpha_0 + \beta_0 EXT_{it} + \beta_1 EXT_{it}^2 + \beta_2 KF_{it} + \beta_3 EXT_{it} * KF_{it} + \partial Z_{it} + \theta_i + \varepsilon_{it} \quad (1)$$

where welfare denotes a given welfare indicator proxy by Human Development Index (HDI),  $EXT$  represents total external debt,  $KF$  represents capital flight, and  $EXT * KF$  represents the interaction between external debt and capital flight.  $Z$  is a vector of the control variables,  $\theta$  denotes unobserved country-specific time-invariant effect and  $\varepsilon$  represents the usual stochastic error term.  $\beta$  and  $\partial$  are the coefficients to be estimated. The subscripts  $i$  stands for a particular country, while  $t$  represents the time period. This paper also includes the square of the external debt variable to capture the non-linear implication of external debt. To estimate the turning point of the quadratic relationship in Eq. (2) where the effects of external debt ( $EXT$ ) switch from positive to negative is given in Eq. (5) as:



**Table 2.** Review of empirical studies on the impact of external debt on welfare

Author(s)	Nature of examination	Country	Timeframe	Estimation technique	Major finding(s)
Zaghdoudi (2018)	External debt and human development	25 countries	2002–2015	Panel smooth threshold regression (PSTR)	The relationship between external debt and HDI is non-linear with an optimal threshold of external debt of 41.7775%.
Zaghdoudi – Hakimi (2017)	External debt – poverty relationship	25 developing countries	2000–2015	System GMM	In the long-run when external debt increases by 1 % can increase poverty by 0.35 per cent. Also, 1% increase in GDP per capita raises poverty by 1.76%.
Akram (2016)	Public debt and pro-poor economic growth	South Asian countries (Bangladesh, India, Pakistan and Sri Lanka)	1975–2010	OLS, 2SLS and GMM	Public external debt has an adverse impact on economic; however, in relation to pro-poor growth, the impact is not significant.
Siddique – Selvanathan – Selvanathan (2015)	External debt and growth	40 Heavily indebted poor countries	1970–2007	Panel ARDL	External borrowing has an adverse influence on GDP both in the short- and the long- run.
Marchionne – Parekh (2015)	Growth, debt, and inequality	27 countries	1994–2010	OLS RE and FE	A non-linear inverted U-shape between growth and debt.
Lawanson (2014)	External debt accumulation and capital flight on economic growth	14 West African countries	1970–2008	Fixed effects and GMM	A percentage increase in the initial debt-to-GDP ratio is associated with a slowdown in per capita GDP growth between 0.12% and 0.19% per year. The debt overhang hypothesis with per capita GDP becoming negative for debt levels above 60%–74%.

Source: Compiled by the authors.



$$\frac{\partial(Y_{it})}{\partial(EXT_{it})} = \beta_0 + 2\beta_1 EXT_{it} + \beta_3 KF_{it} = 0 \quad (2)$$

The slope which represents the turning point is given as:

$$EXT_{it} = \frac{-(\beta_0 + \beta_3 KF_{it})}{2\beta_1} \quad (3)$$

In the event that external debt has a positive impact on welfare,  $\frac{-(\beta_0 + \beta_3 KF_{it})}{2\beta_1}$  will be positive while  $\frac{-(\beta_0 + \beta_3 KF_{it})}{2\beta_1}$  is negative when the impact becomes negative.

Several measures have been introduced in the empirical literature in SSA to assess the countries' growth progress towards welfare. Most often, only the income aspects of welfare are considered as most of the studies use the GDP per capita and other poverty incidence indicators, ignoring the non-monetary measures of welfare. In this study, HDI, which in addition to GNI per capita, measure economic welfare by including two other essential aspects of human development, namely health and education. Health is measured by the HDI as life expectancy at birth while education or knowledge is measured by a combination of the adult literacy rate and the combined primary, secondary and tertiary school gross enrolment ratio. The choice of the variables included in total productivity is based on both theoretical and empirical evidence on the relationship between external debt, capital flight and welfare, and these factors represent the general macroeconomic environment, the quality of political and governance institution, and the general wellbeing. This study considers capital as a measure of investment, government spending, trade openness, and governance indicator as the control variables. Table 3 lists all the variables used and their sources.

### 3.2. Data source

We used data drawn from the World Bank (World Development Indicators), the United Nations Development Programme (online database) for the Human Development indicator (HDI) variable, and the Polity IV database. The capital flight data is sourced from the database of Political Economy Research Institute (PERI) at the University of Massachusetts. The dataset consists of time-series running from 1990 to 2015 for 25 SSA countries<sup>2</sup>.

Table 4 provides descriptive statistics of the variables used.

The correlation matrix in Table 5 indicates that correlation among the variables is generally low (below 0.50) except the interaction of external debt and capital flight (0.71). Also, the square of external debt correlates with external debt (0.91). This correlation is logical since the interaction of external debt and capital flight has capital flight values incorporated in its values. The same is the reason behind the correlation between the square of external debt and external debt.

### 3.3. Model estimation

The data series employed is subject to the properties of non-stationarity, cross-sectional heteroskedasticity, group-wise specific AR (1) serial correlation, and cross-section dependence. The

<sup>2</sup>These countries include Angola, Botswana, Burundi, Burkina Faso, Cameroon, Côte d'Ivoire, Democratic Republic of Congo, Republic of Congo, Ethiopia, Gabon, Ghana, Kenya, Madagascar, Malawi, Mauritania, Mozambique, Nigeria, Rwanda, Sierra Leone, Sudan, South Africa, Tanzania, Uganda, Zambia and Zimbabwe.





**Table 3.** Variables' definitions and measurements as well as their sources

Variable	Definition	Data sources
Capital flight (KF)	Capital flight is measured as the real capital flight of a country as a ratio of GDP.	Political Economy Research Institute
External debt (EXT)	External debt used in this study is measured as the total stock of external debt as a ratio of GDP.	<a href="#">World Bank (2017)</a>
Human Development Index (HDI)	The HDI, as defined by the UNDP, is a composite summary index that measures a country's average achievements in three fundamental aspects of human development, namely health, knowledge, and standard of living.	UNDP database
Governance indicator (GOV)	The governance indicator was measured by the Polity 2 data series from the Polity IV database. The indicator measures the competitiveness and openness of the country's elections, the level of its political participation, and the nature of checks on its administrative and supervisory authority.	<a href="#">Polity (2016)</a>
Trade openness (TO)	This is trade openness as a proportion of GDP, and it is measured as the sum of imports and exports of goods and services as a share of the gross domestic product.	<a href="#">World Bank (2017)</a>
Capital	Gross fixed capital formation.	<a href="#">World Bank (2017)</a>
Government spending	General government final consumption expenditure as a ratio of GDP.	<a href="#">World Bank (2017)</a>

Source: Constructed by the authors.

latter has been a significant worry recently in the empirical literature as the traditional panel data estimation methods such as the Fixed Effects, Random Effects, Mean Group, Pooled Mean Group and GMM estimators all impose a strong assumption that panel members are cross-sectionally independent. According to [Pesaran \(2006\)](#), [Hoechle \(2007\)](#) and [Ncanywa – Masoga \(2018\)](#), due to common shock such as recessions, oil price hikes, spill-over effects, etc. most panel members especially countries in a particular jurisdiction are dependent and erroneously ignoring this possible correlation may lead to biased estimates or even the identification problems.



**Table 4.** Descriptive statistics of the study

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
HDI	650	0.4394	0.1102	0.1330	0.7060
Capital flight (KF)	650	0.0467	0.1695	-0.5572	1.7492
External debt (EXT)	650	0.8288	0.7068	0.0390	5.8112
External debt square (EXTSQ)	650	1.1857	2.3368	0.0015	33.767
Capital	647	18.400	8.1615	-2.242	60.128
Interaction term (EXT*KF)	650	0.0471	0.1714	-0.4657	1.8742
Governance indicator (GOV)	650	0.3354	5.1798	-9.0000	9.0000
Trade openness (TRA)	650	63.7483	28.614	10.8307	165.65
Government spending (GS)	650	0.1587	0.0989	-0.0794	0.8898

Source: Computed using Stata 15.

**Table 5.** Correlation matrix

Variable	HDI	KF	EXT	EXTSQ	EXT*KF	CAP	GOV	TRA	GS
HDI	1								
KF	-0.07	1							
EXT	-0.41	0.08	1						
EXTSQ	-0.24	0.07	0.91	1					
EXT*KF	-0.25	0.71	0.33	0.3	1				
CAP	0.30	-0.09	-0.18	-0.44	-0.04	1			
GOV	0.35	-0.03	-0.32	-0.19	-0.1	-0.01	1		
TRA	0.44	0.06	0.08	0.15	0.04	0.03	0.11	1	
GS	0.09	-0.05	-0.17	-0.11	-0.03	-0.06	0.15	0.17	1

Source: Computed using Stata 15.

To guarantee a valid statistical inference, the estimation process was done following three main stages. In the first stage of the analysis, the time series, cross-sectional heteroskedasticity, group-wise specific AR (1), serial correlation, and cross-sectional dependence of the data were tested. The aim is to ensure that all the variables used for the estimation are integrated of order relevant for the estimation method and also devoid of any diagnosis problems to avoid any spurious regression. The second stage then tests the existence of cointegration among the variables to see if a long-run relationship exists among the variables. The third stage examines the empirical estimation of the model, followed by the robustness check analysis.

**3.3.1. Cross-section dependence and unit roots.** The cross-sectional dependence (CD) is tested by employing the Pesaran (2004) CD test. This test is computed by taking a variable series for a particular country  $i$  (or residuals from an estimating equation for a particular country  $i$ ) and correlating it with the variable series (or residual) for the other  $N - 1$  country. Doing that for all countries in the sample, we end up with  $N(N - 1)$  correlation coefficients from which we can obtain the average correlation and the average absolute correlation coefficients. The test is therefore based on a simple average of all pair-wise correlation coefficients of the OLS residuals from the individual regressions in the panels. Alternatively, these  $N(N - 1)$  correlation coefficients can be used to obtain a more formal test statistic (for example, the Pesaran CD statistic) which is given as:

$$CD = \sqrt{\frac{2T}{N(N-1)}} \left( \sum_{i=1}^{N-1} \sum_{j=i+1}^N P_{ij} \right) \quad (4)$$

where  $P_{ij}$  is the average pairwise correlation of the variable series (or residuals) and under the null of cross-section independence,  $CD$  is distributed  $N(0, 1)$  for sufficiently large  $T$  and  $N \rightarrow \infty$ . At the 5% significance level, the null hypothesis of cross-sectionally independent errors is rejected if  $|CD| \geq 1.96$ . The results, in addition to the test of serial correlation and heteroscedasticity, are reported in Table 6.

Based on the result of the cross-sectional dependence, this study analyses the stationarity properties of the variable using the CIPS test developed by Pesaran (2007). The choice of the CIPS test is based on the fact that the first generational panel unit test like the Levin – Lin – Cho (LLC) (1992), the Im – Pesaran – Shin (IPS) (1997) and Maddala – Wu (1999) as well as the Fisher-Type Chi-square panel unit root tests erroneously overlooked the issue of cross-sectional dependence and using them can lead to misleading inferences. This is, because, these first generational panel unit tests run the Augmented Dickey-Fuller (ADF) test on Eq. (1) separately for each country in the sample, and the panel ADF test statistic is obtained as an average of the  $t$ -statistics from the  $N$  country ADF regressions. As the distribution of the average  $t$ -statistic is non-standard, the critical values have to be simulated. Therefore, Pesaran (2015) indicated that the problem of cross-sectional dependence could be corrected by augmenting the regressions with the cross-section averages of the lagged levels and first-differences of the individual series. These cross-section averages are then presented as a proxy of the assumed single unobserved common factor. The CIPS test is a unit root test technique introduced by Pesaran (2007) to accommodate the cross-sectional dependence among the variables in the regression and it accounts for the cross-sectional dependence through an unobserved common factor.

The CIPS test tackles the problem of cross-sectional dependence by augmenting the ADF regressions with the cross-section averages of lagged levels and first-differences of the individual series. These cross-section averages are then presented as a proxy of the assumed single unobserved common factor. Table 7 provides the results from conducting the ‘CIPS’ test. The results are reported with the  $Ztbar$  statistic (and its corresponding  $p$ -value). The estimates from the unit root test in Table 7 confirms that the null hypothesis of no stationarity could not be rejected at the levels for most of the variables even with the trend. However, the nonstationary assumption is rejected for all variables in the first differences, indicating that almost all the variables are  $I(1)$ .



**Table 6.** Serial correlation, heteroskedasticity and cross-sectional dependence

Variable	Pesaran CD test-value	Test-p value	Inference
HDI	73.9492	0.0000	Cross-sectional dependence is valid
KF	4.6293	0.0000	
EXT	46.0279	0.0000	
EXTSQ	38.6081	0.0000	
EXT*KF	6.4097	0.0000	
CAP	21.6370	0.0000	
GOV	39.5365	0.0000	
TRA	20.4653	0.0000	
GS	29.2120	0.0000	
Group			
Serial correlation			
Wooldridge test for autocorrelation	244.629	0.0000	First-order serial correlation is present
Heteroskedasticity			
Modified Wald test for GroupWise heteroskedasticity	233.88	0.0000	The variance of the error term is not constant
Cross-sectional dependence			
Pesaran CD (2004) test for cross-sectional dependence	15.905	0.0000	Cross-sectional dependence is valid

Source: Computed using Stata 15.

**3.3.2. Cointegration tests.** Based on the cross-sectional nature of the series, the long-run cointegrating relationships between external debt, capital flight and welfare are determined via a panel cointegration test proposed by Westerlund – Edgerton (2007). This Westerlund error-correction-based panel cointegration tests with bootstrap p-values simultaneously allow for cross-sectional dependence and a significant degree of heterogeneity among the series. The test provides four error-correction-based panel cointegration tests,  $p_\alpha$  and  $p_\tau$  are panel statistics which present on pooling the information regarding the error correction along all the cross-sectional units, and they test the null hypothesis of no cointegration for all of the cross-section unit, while,  $G_\alpha$  and  $G_\tau$ , the group mean statistics, are the other two tests the alternative that at least one unit is cointegrated. The error correction model for the estimation of cointegration for Eq. (4) is given as:



Table 7. Pesaran (2007) unit root test

Variables	CIPS (intercepts only)				CIPS (intercepts with trend)			
	Levels		First differenced		Levels		First differenced	
	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.
HDI	1.844	0.967	-3.72	0.0000	0.597	0.725	-3.520	0.0000
KF	-3.521	0.0000	-11.7	0.0007	-2.397	0.008	-8.990	0.0007
EXT	-2.486	0.0006	-8.97	0.0000	-0.943	0.173	-7.140	0.0000
EXTSQ	-0.872	0.192	-9.61	0.0000	1.601	0.945	-8.212	0.0000
EXT*KF	-6.405	0.0000	-13.0	0.0000	-3.762	0.000	-10.695	0.0000
CAP	-3.558	0.0000	-9.61	0.0000	-1.817	0.035	-6.792	0.0000
GOV	-2.248	0.0120	-9.53	0.0000	-0.974	0.1650	-8.212	0.0000
TRA	-1.856	0.0320	-9.16	0.0000	0.255	0.600	-7.547	0.0000
GS	-2.017	0.0220	-10.3	0.0000	-0.496	0.310	-8.323	0.0000

Source: Computed using Stata 15.

$$\begin{aligned}
 \Delta Welfare_{it} = & \alpha_o + \beta_1 CAP_{it-1} + \beta_2 EXT_{it-1} + \beta_3 EXT_{it-1}^2 + \beta_4 KF_{it-1} + \beta_5 EXT_{it-1} * KF_{it-1} \\
 & + \beta_6 GOV_{it-1} + \beta_7 TO_{it-1} + \beta_8 GS_{it-1} + \sum_{j=1}^p \alpha_{1j} \Delta Welfare_{it-j} + \sum_{j=1}^p \alpha_{2j} \Delta CAP_{it-j} \\
 & + \sum_{j=1}^p \alpha_{3j} \Delta EXT_{it-j} + \sum_{j=1}^p \alpha_{4j} \Delta EXT_{it-j}^2 + \sum_{j=1}^p \alpha_{5j} KF_{it-j} + \sum_{j=1}^p \alpha_{6j} EXT_{it-1} * KF_{it-j} \\
 & + \sum_{j=1}^p \alpha_{7j} GOV_{it-j} + \sum_{j=1}^p \alpha_{8j} TO_{it-j} + \sum_{j=1}^p \alpha_{9j} GS_{it-j} + u_i + v_{it}
 \end{aligned} \tag{5}$$

where  $\Delta$  denotes the first difference operator,  $P$  is the lag order selected by Akaike's Information Criterion (AIC) and  $v_{it}$  is the white noise error term, which is  $\sim N(0, \delta^2)$ . GOV represents the governance indicator; TO is the trade openness, CAP is capital and GS represents government expenditure. The parameters  $\alpha$  are the short-run parameters and  $\beta$  are the long-run multipliers. All the variables are defined as previously described. The tests are designed to test the null hypothesis of no cointegration by testing whether the error correction term in the conditional error correction model is equal to zero.

Table 8 reports the results of the cointegration tests. To address the cross-section interdependence, the robust p-value is computed through bootstrapping with 1,000 replications. From the estimated result in Table 8, the null hypothesis of no cointegration is rejected at 1% level of significance for all the estimates employed by the Westerlund (2007) cointegration technique. This indicates that the variables chosen for the study are cointegrated.



**Table 8.** Panel cointegration test

Statistic	Value	Asymptotic P-value	Bootstrap P-value
<i>Group-mean statistics</i>			
$G_\tau$	-5.391	0.090	0.000
$G_\alpha$	-3.779	0.008	0.000
<i>Panel statistics</i>			
$p_\tau$	-2.852	0.000	0.000
$p_\alpha$	-5.679	0.040	0.000

Source: Computed using Stata 15.

**3.3.3. Long-run regression.** Our study adopted the test method developed in [Driscoll – Kraay \(1998\)](#). This estimation process comprises of two stages. First, all variables both the dependent and the independent variables in the model are within transformed where

$Z_{it}$  which is  $\in (Y_{it}, X_{it})$  is transformed as  $\tilde{Z}_{it} = Z_{it} - \tilde{Z}_i + \bar{\bar{Z}}$ .  $\tilde{Z}_i$  is then given  $\tilde{Z}_i = T_i^{-1} \sum_{t=t_{i1}}^{T_i} Z_{it}$

while  $\bar{\bar{Z}}$  is also given  $\bar{\bar{Z}} = (\sum_i T_i)^{-1} \sum_i \sum_t Z_{it}$ . This within transformation of the variables mimics the Ordinary Least Square (OLS) estimator of the form  $\tilde{y}_{it} = \tilde{x}_{it}\theta + \tilde{\varepsilon}_{it}$ . After that, the pooled OLS estimation with Driscoll – Kraay standard errors is applied to the within OLS estimator to obtain the parameters.

As a robustness check, the paper employs the Augmented Mean Group (AMG) estimator developed by [Eberhardt – Teal \(2012\)](#) and the Panel-Corrected Standard Error (PCSE) estimator to accommodate the panel time-series models with heterogeneous slopes. The AMG estimator modified the Common Correlated Effects Mean Group (CCEMG) developed by [Pesaran \(2006\)](#) to allow for heterogeneous slopes and cross-sectional dependence with a common dynamic process. The AMG estimator is also superior to the Mean Group (MG) estimator by [Pesaran – Smith \(1995\)](#), which does not account for cross-sectional dependence. Following [Pesaran \(2006\)](#), the empirical setting takes a form of panel models with a heterogeneous slope of  $i = 1, \dots, N$  and  $t = 1, \dots, T$  such that:

$$y_{it} = \beta_i x_{it} + \mu_{it} \quad \text{where} \quad \mu_{it} = \alpha_{1i} + \lambda_i f_t + \varepsilon_{it} \text{ and } x_{it} = \alpha_{2i} + \lambda_i f_t + \gamma_i g_t + \ell_{it} \quad (6)$$

where  $x_{it}$  and  $y_{it}$  represent the independent and dependent variables, respectively,  $\beta$  represents a country-specific slope of the regressors,  $\mu_{it}$  encompasses the unobservable and the stochastic residual components is  $\varepsilon_{it}$ .  $\alpha_{1i}$  denotes time-invariant heterogeneity within groups, and  $f_t$  captures unobserved common factors with heterogeneous factor loading  $\lambda_i$  that captures time-variant heterogeneity and cross-sectional dependence. Moreover, factors  $\gamma_i$  and  $g_t$  can be linear, non-linear and non-stationary.

## 4. EMPIRICAL RESULTS AND DISCUSSION

### 4.1. Hausman specification test

In order to establish the consistency of this study's estimates, the Hausman test was used to examine the suitability of a fixed or random effect within the Driscoll – Kraay standard errors. The result in Table 9 confirms that the estimated results from the random effect is inconsistent. Therefore, the study uses a fixed effect model within the Driscoll – Kraay standard error estimates.

### 4.2. Long-run estimates using the Driscoll – Kraay standard errors panel estimation

Table 10 presents the result of the welfare implications of external debt and capital flight in SSA. As indicated in the model specifications, HDI is used as an indicator of welfare. To validate the results, this paper also computes the welfare implication using the HIPC countries in the dataset

**Table 9.** Hausman specification test

Test: Ho: difference in coefficients not systematic			
chi2(10) =	(b - B)'[(V <sub>b</sub> - V <sub>B</sub> ) <sup>-1</sup> ](b - B)		
	=	29.44	
	Prob>chi2 =	0.0011	

Source: Computed using Stata 15.

**Table 10.** Driscoll – Kraay model for welfare impact of external debt and capital flight (1990–2015) using HDI as the measure of welfare

	SSA			HIPC countries		
	Coefficient	Std. Err.	Prob.	Coefficient	Std. Err.	Prob.
EXT	-0.095	0.009	0.000	-0.099	0.012	0.000
EXTSQ	0.014	0.003	0.000	0.019	0.004	0.000
KF	-0.014	0.008	0.072	-0.017	0.008	0.041
EXT*KF	-0.015	0.007	0.035	-0.020	0.007	0.012
GOV	0.003	0.001	0.000	0.002	0.001	0.008
CAP	0.001	0.000	0.001	0.001	0.000	0.005
TR	0.000	0.000	0.001	0.001	0.000	0.001
GS	-0.082	0.023	0.001	-0.035	0.017	0.055
Cons	0.471	0.012	0.000	0.421	0.011	0.000

Source: Computed using Stata 15.



to check whether splitting the data will have any significant effect on the results. As shown in [Table 10](#), the data for both SSA and HIPC countries, all support the hypothesis that external debt and capital flight have a negative relationship with welfare measured by the HDI. The coefficient for external debt indicates that a percentage increase in external debt accumulations reduces welfare by approximately 9.5 per cent for the SSA countries and 9.9 per cent for the HIPC countries. This result means that as the various countries in the sub-region keep borrowing from abroad, the general welfare situation of the people becomes worse as compared to the previous year. This negative relationship supports the hypothesis of the debt overhang theory and the crowding-out effect theory. The debt overhang theory indicates that as external debt accrues, potential investors perceive the build-up in debt to be accompanied by distortionary measures, and hence, are motivated to withhold their investment to avoid such measures in the future. The crowding-out effect theory argues that high debt servicing associated with borrowing eat-up resources available for public investments, which eventually forces the government to compete with the private sector for few resources in the domestic economy. This move by government cripples the private sector and forces them out. This result is also consistent with the findings by [Pattillo – Ricci \(2011\)](#), [Lawanson \(2014\)](#), [Siddique et al. \(2015\)](#), [Fiagbe \(2015\)](#), among others that the relationship between external borrowing to pro-poor growth is negative. However, it contradicts the findings by [Ayadi – Ayadi \(2008\)](#) in their comparative study of Nigeria and South Africa and [Bentum-Ennin \(2009\)](#) for Ghana. The result by [Ayadi – Ayadi \(2008\)](#) showed a positive and statistically significant long-run relationship between external debt and economic growth for South Africa and an insignificant long-run relationship between external debt and economic growth for Nigeria.

The statistically significant negative effect of capital flight on welfare using both the SSA and HIPC dataset means that over the years, capital flight remains one of the main factors that have significantly contributed to the low level of welfare in SSA. Specifically, the results reveal that a percentage increase in illicit capital outflow leads to about 1.4 and 1.7 per cent reduction in welfare in the SSA and HIPC countries respectively. This result implies that the observed improvement in economic growth in the region during the last decade could have translated to better improvement in welfare if the African countries had been able to keep all their capital onshore. This confirms the result by [Nkurunziza \(2015\)](#) that investing the flight capital in the region could have increased the annual rate of poverty reduction by 1.9 and extra 2.5 per cent per year above the current rate of poverty reduction. Also, as indicated by the [African Development Bank \(2012\)](#) that the countries in SSA could have improved their income per capita by an additional 3 to 5 per cent if they had invested the illicit outflow on profitable ventures.

In addition to the decrease in welfare from external debt and capital flight, the coefficient of the interaction term between external debt and capital flight is negative and statistically significant for both datasets. Specifically, the results in [Table 10](#) indicates that a percentage increase in external debts and capital flight leads to a reduction in welfare by 1.5 units in SSA and 2.0 for the HIPC countries, all other things being equal. This result supports the hypothesis that the simultaneous occurrence of external debt and capital flight have a negative relationship on the general welfare of the people in the SSA sub-region. The reason is that both capital flight and external debt accumulation constitute diversions of valuable resources from the domestic economy and this may result in a shortage of liquidity that could have been used for building investment in the domestic economy. Also, as discussed in the literature, external debt and





capital flight both complicate the effort of the governments in stabilizing the domestic macroeconomy and providing good governance, quality institutions and service to the ordinary people that will improve welfare. The positive and statistically significant quadratic term of external debt for both datasets confirms that the relationship between external debt and welfare is a non-linear one. However, the relationship is rather concave contrary to the theoretical expectation and other earlier studies such as Fosu (1996), whose study concludes that external borrowing impacts growth positively at lower levels of investment until investment to GDP ratio reaches a minimum threshold of 16 per cent. In this study, the result implies that as external borrowing increases, welfare decreases until it becomes positive in the long-run, but this finding also confirms the results obtained by Fiagbe (2015) for the SSA sub-region. Fiagbe's result is not significant in the long-run.

Capital, governance and trade were all found to be positive as expected and statistically significant across all the datasets. The coefficient of government spending was negative contrary to the expectation in both datasets and is statistically significant across all the datasets.

### 4.3. Robustness check analysis

Due to the cross-sectional dependence and the possibility of heterogeneity in the slope parameter, this paper employs the AMG estimator developed by Eberhardt – Teal (2012) and the PCSE estimator. The results are presented in Table 11. The results indicate that both AMG and PCSE results are not too different from the estimates obtained with the Driscoll – Kraay standard errors for both datasets, especially in the case of SSA. The only minor changes occurred with capital and government spending, and they are mainly related to the significance of these variables as used in the study. The findings are, therefore, robust across all the three techniques and all the datasets.

**Table 11.** AMG and PCSE model for the welfare impact of external debt and capital flight in SSA

	AMG			PCSE		
	Coefficient	Std. Err.	Prob.	Coefficient	Std. Err.	Prob.
EXT	-0.010	0.002	0.000	-0.036	0.008	0.000
EXTSQ	0.002	-0.001	0.000	0.005	0.001	0.000
KF	-0.007	-0.002	0.001	-0.003	0.007	0.670
EXT*KF	-0.005	-0.003	0.043	-0.005	0.006	0.476
GOV	0.000	0.000	0.000	0.002	0.000	0.000
CAP	0.000	0.000	0.529	0.000	0.000	0.529
TR	0.000	0.000	0.000	0.000	0.000	0.000
GS	-0.001	-0.010	0.170	-0.024	0.018	0.170
Cons	0.031	-0.011	0.000	0.445	0.013	0.000

Source: Computed using Stata 15.



Also, annual GDP *per capita* growth rate and annual GDP growth rate, which are one-dimensional economic measure of welfare are used to cross-check when changes in the measure of welfare can significantly influence the result. The evidence presented in Table 12 clearly indicates that both external debt and capital flight posits a daunting effect on welfare irrespective of how it is measured. The changes in the result are the significance of the square of external debt and trade openness. Apart from that, using either HDI, annual GDP *per capita* growth rate or annual GDP growth rate, the results indicate that both external debt and capital flight and their interaction term posit a negative impact on the SSA development.

## 5. CONCLUSIONS AND POLICY RECOMMENDATIONS

We examined the implication of the simultaneous occurrence of external debts and capital flight on welfare in SSA employing the Driscoll – Kraay standard errors panel estimation method. The analysis shows that both external borrowing and capital flight represent an essential constraint to the general welfare of the people in the SSA sub-region using the HDI and dataset from 1990 to 2015. We also found that the relationship between external debt and welfare is not always linear as assumed by the literature.

We strongly believe that both external borrowing and capital flight should be reduced. Furthermore, governments in the sub-region should be mindful that growth in per capita income is not the only components of welfare, therefore if general well-being of the people is deteriorating regularly, it might not be related to the decline or growth in per capita income but rather some other related factors. The study recommends that these policies should be identified and adopted together with strategies that curb massive external borrowing and capital outflows in the sub-region.

**Table 12.** Driscoll – Kraay model for welfare impact of external debt and capital flight (1990–2015) using annual GDP per capita growth rate and annual GDP growth rate as the measure of welfare

	Annual GDP per capita growth rate			Annual GDP growth rate		
	Coefficient	Std. Err.	Prob.	Coefficient	Std. Err.	Prob.
EXT	-0.028	0.010	0.008	-0.027	0.010	0.011
EXTSQ	0.003	0.002	0.159	0.003	0.002	0.252
KF	-0.046	0.013	0.002	-0.047	0.013	0.002
EXT*KF	-0.030	0.012	0.015	-0.030	0.014	0.038
GOV	0.132	0.045	0.007	0.173	0.050	0.002
CAP	0.082	0.030	0.011	0.099	0.032	0.005
TR	0.010	0.014	0.483	0.013	0.015	0.388
GS	-0.056	0.020	0.010	-0.047	0.018	0.016
Cons	3.301	1.164	0.009	5.807	1.339	0.000



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