# FOREIGN DIRECT INVESTMENT, EXTERNAL DEBTS, AND POVERTY REDUCTION IN SUB-SAHARAN AFRICAN COUNTRIES

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**Abstract**

Poverty has been one of the major setbacks to the overall social and economic development. The study examines the link between foreign direct investment (FDI), external debt, and the reduction in poverty in 30 Sub-Saharan African countries from 2006 to 2020. This research study used Principal Component Analysis (PCA) vis-à-vis panel unit root/stationarity test, correlation analysis/multi-collinearity test, Hauman test, Two-Step GMM estimation, Arellano-Bond, Wald test, and post estimation test for the analysis. The descriptive statistics indicate a statistically significant variability in economic indicators with non-normal distributions showing the multifaceted economic settings of the SSA, utilizing secondary data available from WDI (2023). The result of the Generalized Method of Moments (GMM) estimator indicates FDI, showing that poverty has a statistically negatively insignificant impact on poverty reduction in SSA. These benefits could depend on institutional quality, absorptive capacity, and sectoral allocation. The result on the external debt also indicates significant positive effects on poverty, whereas the interaction between FDI and external debt (EXT) shows a negative and weak correlation. This suggests heavy reliance on both FDI and external debts and could hinder the speed of poverty reduction. The lagged dependent variable confirms the tough persistence reduction in poverty. Outcomes of the result on trade openness and inflation revealed a significant positive effect on poverty reduction, while government size, though, but showing negatively significant effect in eradicating poverty in the regions. Thus, suggest the need for policymakers in SSA countries to adequately manage their external financing, while promoting inclusive trade and optimized public spending to ensure growth transforms into reasonable poverty reduction.

**Keywords:** External debt, FDI, Poverty reduction, Sub-Saharan Africa.

## INTRODUCTION

Looking at it from a wider perspective, poverty reduction is seen as one of the most critical issues undermining the growth and economic development of every nation. This becomes necessary where approximately 719 million people living worldwide live below the purchasing power parity line of $2.15 per day as of 2020, representing a persistent extreme poverty level in the global economic development (World Bank, 2022). The largest portion of the population goes to the sub-Saharan African countries, with approximately 648 million people. This represents the highest concentration of most vulnerable poor individuals, accounting for averagely 60% of the nations (Schoch, Kofi, Lakner & Friedman, 2022). Thus, poverty in Sub-Saharan Africa now stood at 53% in 1990, while a notable reduction was found in 2009 and 2019, respectively. The total number of poor people increased on average to 391 million in 2019 from 278 million in 1990. This implies that, whilst the individual standard of living has improved tremendously. Even though the rate of reduction is not commensurate with the rapid population growth rate in the region (Schoch, Kofi, Lakner & Friedman, 2022).

Winkler (2013) observed that a reduction in poverty can be attained through different economic and social channels, which include sustainable economic growth, human capital development, creation of job opportunities, infrastructural development, and accessibility to capital formation. Investment performs a key function in the nation's economic development, as it enhances productive capacity, stimulates employment opportunities, and raises household incomes, thereby leading to poverty reduction. However, other factors like trade openness, quality of governance, inflation, and population growth could also have a tendency to influence the poverty results, while external debt and foreign direct investment (FDI) show major direct external financing mechanisms through which capital constraints can be relaxed (Zaghdoudi, 2018).

According to Shamim et al. (2014), FDI provides a channel for development owing to its capability to create employment, facilitate technology transfer, improve managerial practices, and incorporate host economies into worldwide value chains. Foreign investment has contributed immensely to poverty reduction through the expansion of income-generating opportunities, increasing productive capacity, and improving household welfare. The net FDI inflows accounted for over 2.7% of world GDP in the 2000s

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(World Bank, 2023). This underscores its role as a source of financial development in both developed and underdeveloped nations (World Bank, 2023). In Sub-Saharan Africa, FDI inflows change over time, thereby making the execution of various policy reforms attractive and sustainable to foreign investment (Arogundade et al., 2022). Various research studies have shown that FDI can assist in poverty reduction in certain situations, its effect depends on institutional quality, structural uniqueness, and the nature of poverty policies adopted (Dada & Akinlo, 2021).

According to Shabbir and Yasin (2015), when countries source their capital for financial development through an external means, this can lead to an increase in foreign capital required for investment and developmental projects that could improve the welfare of the citizenry. In order to improve the welfare of its people, the sub-Saharan African governments have sought to develop the living standard of their people through promoting growth across all the key sectors, such as employment generation, infrastructural expansion, and the like. However, this could not be realized due to inadequate domestic financial resources that have constrained many governments as a result of reliance on external debt. External borrowing plays a major role in supplementing domestic savings deficit and financing development programmes (Sulaiman & Azeez, 2012). Hence, there is a significant positive impact on human development when external debt is maintained below an optimal threshold of 41.76% (Zaghdoudi, 2018).

According to the World Development Indicators reports, Sub-Saharan Africa's total external debt stock increased from about US$272.85 1973 to US$3,672.79 million in 1990, while debt servicing rose from US$28.87 million to US$225.87 million in the same period. By 2021, total external debt stock had reached US$16,454.07 million, with debt servicing amounting to US$1,743.30 million. South Africa and Nigeria recorded the highest debts of US$170 and US$76.2 billion, respectively, while Comoros and São Tomé and Príncipe had the lowest debt stocks at US$337 million and US$306 million (World Development Indicators [WDI], 2023).

One of the pressing methodological issues as regards empirical studies on poverty is how poverty reduction is measured. Standard approaches usually rely on single-dimensional measures such as income levels or household consumption, which reflect only the financial aspect of welfare. However, the multidimensional measure, like the Human Development Index, reflects the non-monetary measures, including education and health. Owing to the natural multifaceted nature of poverty reduction, the study adopts Principal Component Analysis (PCA) to create multiple poverty reduction measures that combine HDI and per capita consumption. PCA combines several indicators into a single index by capturing the highest proportion of variation, offering a good depiction of improvements in overall well-being across both monetary and social dimensions.

This approach enhances the observed assessment of the bond between external financial flows and poverty reduction beyond what individual indicators can provide. Thus, this study investigates how foreign direct investment and external debt influence the reduction in poverty in Sub-Saharan Africa. In particular, the multidimensional poverty reduction index created by Principal Component Analysis (PCA) to assess how foreign direct investment influences poverty reduction, investigates the role of external debt on poverty reduction, and further assesses their combined impact on poverty outcomes.

### *Research Problem*

The Sub-Sahara Africa has experienced different and relatively slow growth as regards poverty reduction despite the consistent inflows of foreign direct investment and growing dependency on external debt. The overall total of people living below the international poverty line increased from around 278 million in 1990 to over 391 million in 2019, despite the fall in poverty incidence over time. Schoch and Lakner (2020) observed that several efforts made to eradicate poverty in the region have not been successful due to an increase in population. Not only that, but the inflows of foreign direct investment also portray a major fluctuation in external debt, which rose from US$272.85m in 1973 to US$16,454.07m in 2021 (WDI, 2023). This development raises a very important question as regards the effectiveness of foreign direct investment and external debt loans on inclusive and sustainable poverty reduction outcomes. In addition, a critical analysis of the impact of FDI and external debts remains inconclusive as a result of variation in sensitivity due to model specification and poverty indicators. Therefore, it becomes a notable gap which this study aims to fill concerning the impact of (FDI and external debt in eradicating poverty using a multidimensional broad framework in sub-Saharan Africa.

## LITERATURE REVIEW

### *Theoretical Framework*

The theory is built on Ragnar Nurkse's vicious cycle of poverty theory and Harrod–Domar's investment-led growth theory. This theory found poverty to be self-acclaimed and very difficult to escape due to some interconnected factors, thereby restraining efforts toward poverty reduction. Nurkse's (1953) theory explained the factors hindering the developing nations from achieving sustainable poverty reduction. The study identified individuals and a community trapped in poverty faced by a set of obstacles hindering their improvement in socio-economic positions that dawdling poverty reduction processes. Most developing nations are faced with low income that could lead to low productivity, which invariably can result in underutilization of resources. Resource mismanagement can be seen as part of a vicious cycle of poverty, in that it can lead to low productivity and, consequently, underutilization of resources in the sub-Saharan region. Foreign direct investment can assist the SSA countries in weakening and breaking the vicious cycle of poverty through encouragement of technological transfer, job creation, and enhancement of productive capacity, and hence, reducing poverty.

The Harrod–Domar investment-led growth theory posits that investment can be used to stimulate economic growth, thereby leading to an increase in total investment demand, which could eventually boost employment generation and economic productivity (Moloi & Marwala, 2020). The investment-led growth theory, based on the Harrod–Domar model, emphasizes the need for increased investment and higher economic productivity and job creation. FDI comprises foreign firms established in SSA countries, which

brings in more capital for investments, establishing more jobs, transferring more skills and knowledge, increasing productivity that could stimulate economic growth, and reducing poverty in the SSA countries. Furthermore, when external debts are channeled towards productive activities, this could lead to a reduction in poverty through fostering economic growth and capital accumulation.

### *External debt and poverty reductions*

Several efforts have been established on the link between how external debt has been used to reduce poverty, with the submission that a high level of external debt is a major limitation for development performance and frustrates attempts to eliminate poverty. Shabbir and Yasin (2015), observed that government spending, in allocating social service having adverse effects on the rising external debt and increased debt service payments in developing nations. Thus, studies suggest excessive dependence on external borrowing that could move capital away from the critical initiatives intended to reduce poverty.

In another development, Zaghdoudi and Hakimi (2017) opined that a rise in foreign debt can aggravate the poverty level. The results of the Granger causality test revealed the existence of a bidirectional effect on both external debt and poverty in the short and long runs. In furtherance of their study, Zaghdoudi (2018) used the Panel Smooth Threshold Regression (PSTR) model to analyze data collected from 95 underdeveloped nations. The results of their findings found a non-linear relationship with external debt and human development, with an optimal debt threshold of 41.76%. Although the external debts contribute positively to poverty reduction, it however, become detrimental when the outcome is negative. The result is in line with the conclusion that holds that external debt promotes poverty reduction only when maintained within the bearable limits (Saungweme & Mufandaedza, 2013). The results of the findings of Ekpo and Udo (2015) show per capita income and infant mortality rates to be negative on foreign debt servicing, whereas Sulaiman and Azeez (2012) found external debt to be a source of great significance to Nigerian economic growth. Although the study emphasized that borrowing should be effectively allocated to profitable ventures to avoid unfavourable welfare outcomes. On the whole, the literature suggests that, while external debt can support poverty reduction when effectively managed, excessive debt accumulation and servicing often weaken social spending and welfare outcomes.

### *FDI- Poverty reduction relationship*

Although studies are abounding on the effect of FDI on poverty reduction, it differs from one country or region to another. Researchers have shown that inflows of foreign direct investment on its contribution in reducing poverty in the areas of employment generation, increased incomes, and improvement in the general well-being of its people. Take, for example, the study by Tsaurai (2018), who was of the view that the mutual effects of FDI and natural resource endowments encouraged investment, thereby leading to a reduction in poverty. In the same vein, Chindengwike (2022) also observed that FDI has a significant impact on poverty reduction on the East African economies. This was further corroborated in the studies by Fauzel, Seetanah, & Sannassee (2016) and Gökmenoğlu, Apinran, & Taşpınar (2018) that attributed a positive effect on human capital development and hence stressed the need for improving the welfare of the people.

In contrast to this study, Anetor et al. (2020) observed increment on FDI does not automatically translate into the eradication of poverty as a result of institutional weaknesses in sectoral allocation across the regions. Arogundade et al. (2022) further reiterate institutional quality, absorptive capacity, which is in tandem with Magombeyi and Odhiambo (2017), who found deviation in methodology, poverty proxies, and sample selection based on large, diverse evidence on the FDI–poverty relationships.

Beyond Africa, mixed results are observed; for instance, Saleem et al. (2021) and Tsaurai (2023) found that FDI significantly promotes poverty reduction in Pakistan and BRICS countries, particularly when complemented with economic growth. While foreign investment can trim down poverty in the short run, its long-run effects can be unpleasant, if not supported by sustained economic growth (Han et al. 2023). Thus, the outcomes of the various studies suggested that the effectiveness of FDI in reducing poverty is centered on structural institutional and macroeconomic factors.

### *Methodological Approaches*

On methodology issues, previous studies employ a wide variety of econometric models to ascertain the interactions between poverty, foreign direct investment, and external debt based on the Generalized Method of Moments (GMM). The result is frequently employed on panel-based analyses to correct endogeneity issues and control for unobserved country-specific effects (Shabbir & Yasin, 2015; Ayenew, 2022; Azolibe, 2022). Most of the time-series studies relied more on the Ordinary Least Squares (OLS), Autoregressive Distributed Lag (ARDL) model, Vector Error Correction Model (VECM), and cointegration techniques to explore long-run and short-run dynamics (Sulaiman & Azeez, 2012; Jilenga, Xu, & Gondje-Dacka, 2016; Fauzel et al., 2016). More so, some of the recent studies applied advance non-linear threshold models such as panel smooth threshold regression, panel threshold regression, and dynamic panel threshold analysis to capture regime-dependent effects (Zaghdoudi, 2018; Dada & Akinlo, 2021; Arogundade et al., 2022) which lacks agreement in the literature due to wide varieties in empirical approaches and inconsistency in their findings, thereby emphasizing the necessity of using reliable and adaptable estimation techniques.

### *Research Gap and its Limitations*

A key shortcoming in the existing body of research relates to how poverty reduction is measured. The majority of studies rely on single-dimension proxies by per capita income, household expenditure, or poverty incidence, which primarily reflect the monetary aspect of welfare (Anigbogu et al., 2016; Ogunniyi & Amusa, 2018). Some researchers have used comprehensive measurements such as the Human Development Index to integrate both health and educational dimensions, which in itself failed to adequately represent the short-run changes in household well-being. Therefore, in order to forestall the deficiency this method could have generated, this study adopts a more complex approach using the human development index (HDI) and per capita consumption expenditure as a composite of poverty reduction indicators using Principal Component Analysis (PCA). This, we believe, will reduce the prejudice that could come from

using one specific method of poverty measurement by incorporating the financial and non-financial aspects of well-being. The PCA indicator will give a more inclusive and reliable representation of poverty without any element of bias, which could reduce the maximum possibility of variations across the underlying welfare measures.

Despite the widespread research studies on this issue, there are quite a lot of gaps needed to be addressed. Most of these studies centered on FDI or external debt in isolation, paying little or no interest on its mutual effect on poverty reduction. Besides, overdependence on a particular poverty measurement underestimates the multidimensional nature of poverty, which makes the results from SSA inconclusive as a result of methodological variations and contextual heterogeneity. Therefore, the study has added to existing knowledge on the correlation between FDI, external debt, and the double effects of foreign direct investment and external debt on poverty eradication using Principal Component Analysis.

## MATERIALS AND METHODS

Drawing from the theoretical framework of Nurkse's vicious cycle of poverty and Harrod-Domar's investment-led growth theory, the key variables of external financing in capital-constrained economies are FDI and external debt. Even though the external debt servicing allows the government to boost domestic savings and financial projects through foreign direct investment, FDI offers a steady and debt-free capital that can boost productivity through employment generation, technology transfer, and output expansion. However, studies have shown that its effects in reducing poverty are conditional; while excessive or poorly managed external debt allowed high debt-servicing obligations that can hamper poverty reduction (Shabbir & Yasin, 2015; Zaghdoudi & Hakimi, 2017).

From the available studies in the literature, it could be observed that inflation, government size, and trade openness are used as control variables in poverty reduction due to the direct and indirect influence it has on the welfare results. Inflation affects poverty reduction through purchasing power and real incomes, particularly for low-income earners. Trade openness impacts poverty reduction through income distribution, employment generation, and market accessibility, while government size reflects the scale of public expenditure and intervention, which influences poverty reduction through social spending, public service delivery, and the effectiveness with which external financial inflows translate into inclusive growth. The vicious cycle of poverty and its persistent effect on welfare over time shows current improvements in poverty reduction, which are closely related to previous living conditions. These are supported by both theory and data-driven research, justifying the use of lagged poverty reduction measures.

In order to determine the poverty reduction index, which combines per capita consumption along with the Human Development Index (HDI) to cover all aspects of poverty measurement, the study utilized the Principal Component Analysis (PCA) model to achieve that. In addition, most of the previous studies focus more on a single poverty indicator, which is either based on monetary or non-monetary aspects of well-being. The PCA-based method provides a more comprehensive poverty measurement by combining both financial and non-financial aspects of poverty into a single composite measure. Due to constraints in data availability, emphasis on income or consumption, traditional global poverty measurements such as international poverty lines and poverty headcount ratios are not used in this study. These measures are extremely sensitive to price changes and institutional differences between countries; hence, they failed to account for non-monetary aspects of well-being. Even though the PCA-based index offers a more flexible and robust measure suitable for cross-country analysis, it is sensitive to variable selection and weighting structure that could affect comparability across countries.

In spite of its relevance to selected variables, this method still has its limitations. Foreign direct investment may be concentrated in capital-intensive sectors with weak local links, thus reducing its poverty-reducing impact. When a significant portion of public funds is devoted towards debt repayment, external debt may restrict the resources available for social and development programs. Likewise, inflation may not fully reflect the uneven effects of rising prices on different income groups, particularly the poor, even if it is a good indicator of general macroeconomic stability. Trade openness may expose weak sectors to external shocks, which may reduce their poverty-reducing ability. Government size reflects the level of public spending; it may not accurately capture how well the resources are used because a larger government does not necessarily imply improved welfare conditions

### *Model Specification*

Ragnar Nurkse's vicious cycle of poverty and Harrod-Domar's investment-led growth theories form the theoretical basis for this study.

$$POV = f(FDI, EXT) \quad \ldots\ldots 1$$

Where: POV, FDI, and EXT represent poverty reduction, foreign direct investment, and external debt, respectively. The model's regression equations, along with its explanatory variables, are presented as follows:

$$POVit = f(FDIit, EXTit, CPIit, TOPit, GOVit, POVt\text{-}1it) \quad \ldots\ldots 2$$

Where: POVit = Poverty reduction (Per capita consumption and HDI were compressed using PCA to form a composite poverty reduction variable); FDIit = Foreign direct investment; EXTit = External debt; CPIit = Consumer price index; TOPit = Trade Openness; GOVit = Government Size; POVt-1it = lag of the dependent variable; i = Country; t = Time (in years). When a lag variable is built into the model, it will automatically change the model into a dynamic one as presented in the econometric form as follows:

$$POVit = 0 + 1FDIit + 2EXTit + 3CPIit + 4TOPit + 5GOVit + 6POVt\text{-}1it + \mu \quad \ldots\ldots 3$$

Table 1: Expected Signs (Theory-based)

| Notation | Expected Sign | Justification |
|---|---|---|
| **FDI** | + | Job creation, an increase in income enhance poverty reduction |
| **EXT** | ± | Reduces poverty when effectively managed, debt burden hinders poverty reduction |
| **CPI** | - | Reduces the real income and purchasing power of the poor, weakening poverty reduction |
| **TOP** | + | Growth derived from trade supports poverty reduction |
| **GOV** | + | Government spending on social services facilitates poverty reduction |
| **POVt-1** | + | Vicious cycle of poverty |

Source: Authors' Computation, 2023

### *Data source and variable description*

The study covers 30 countries in Sub-Saharan Africa, with annual observations from 2006 to 2020, utilizing a balanced panel approach. These countries were chosen based on their data accessibility on both dependent and explanatory variables for the period under consideration. The variables used include poverty reduction, external debt, foreign direct investment, consumer price index, trade openness, and government size. Poverty reduction is measured using a composite index derived from per capita consumption, and the Human Development Index was compressed using Principal Component Analysis to capture the multidimensional poverty indexes. The study covers the following countries: Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Democratic Republic of Congo, Côte d'Ivoire, Eswatini, Gabon, Gambia, Ghana, Guinea-Bissau, Kenya, Madagascar, Mali, Mauritania, Mauritius, Niger, Nigeria, Rwanda, Senegal, Seychelles, South Africa, Sudan, Tanzania, Togo, and Zambia. Most of the data used for this study were obtained from the World Development Indicators bulletin on different issues.

Table 2: Overview of variable, measurement, and data source

| Variable Notation | Definition | Measurement | Unit of measurement | Source |
|---|---|---|---|---|
| **POV** | Poverty reduction | Principal Component Analysis (PCC and HDI) | Index | World Development Indicators. |
| **FDI** | Foreign direct investment | Foreign direct investment, net inflows (% of GDP) | Percentage | World Development Indicators. |
| **EXT** | External debt | External debt stocks (%) | Percentage | World Development Indicators. |
| **CPI** | Consumer price index | Consumer price index (2010 = 100) | Index | World Development Indicators |
| **TOP** | Trade openness | Trade (%) | Percentage | World Development Indicators |
| **GOV** | Government size | General government final consumption expenditure (% of GDP) | Percentage | World Development Indicators |

Source: Developed from WDI Reports, 2023

### *Techniques of Analysis*

A composite index evaluating poverty reduction was created via Principal Component Analysis in order to verify the reliability of the empirical findings. PCA is particularly useful for reducing dimensionality, addressing multicollinearity, and enhancing model efficiency when multiple indicators measure a similar concept (Vyas & Kumaranayake, 2006). A correlation analysis between the Human Development Index and per capita consumption was carried out prior to the PCA. Therefore, when the level of the human development component increases, the rate of poverty reduction will decrease and vice versa (indicating shortfalls in consumption-based poverty reduction). According to the analysis, there was a significant negative correlation of -0.5495. The justification for combining both indicators into a single composite measure of poverty reduction is strengthened by this strong connection.

Table 3: Principal Components/Correlation

| **PCC** | | | **Number of obs** | **= 450** |
|---|---|---|---|---|
| | | | Number of comp. | =2 |
| | | | Trace | =2 |
| **Rotation: (unrotated = principal)** | | | Rho | = 1.0000 |
| Component | Eigenvalue | Difference | Proportion | Cumulative |
| Comp1 | 1.38869 | 777379 | 0.6943 | 0.6943 |
| Comp2 | .611311 | | 0.3057 | 1.0000 |

Source: Computed by the Authors, 2023

PCA was therefore applied to PCC and HDI to generate a unified poverty reduction variable (POV). Table 3 results show the first principal component (Comp1) having an eigenvalue of 1.3887, exceeding the Kaiser criterion of unity (eigenvalue

> 1), and explains 69.43% of the total variation in the combined indicators. In contrast, the second component (Comp2) accounts for only 30.57% of the variation with an eigenvalue below one. Therefore, Comp1 is retained as the composite poverty reduction index because it captures the largest proportion of information contained in PCC and HDI. This component is subsequently used as the poverty reduction variable (POV) in the regression analysis to ensure robustness and reduce potential multicollinearity bias.

### *Correlation Analysis/Multicollinearity Test*

The study conducts a pairwise correlation analysis to establish the existence of linear correlation among variables and detect the potential multicollinearity among the explanatory variables. A correlation coefficient of 0.80 or above is considered indicative of serious multicollinearity and suggests that such variables should not be included simultaneously in the same model.

### *System GMM estimation*

Drawing from the methodologies outlined in Arellano and Bover (1995), modified by Blundell and Bond (1998) and Gossel (2022), on a two-step system GMM approach. This study exploits cross-country variations, addresses issues regarding unobserved heterogeneity in view of time-invariant omitted variables, various internal instruments to discuss issues relating to reverse causality and endogeneity of expounding variables.

### *Post Estimation Test*

The study employs the Sargan test, particularly for overidentifying restrictions, and the Arellano-Bond test to check for second-order serial correlation in the error term, with the sole aim of authenticating the reliability of the model tools used. The Sargan test is widely used as a validity check, especially the two-step system GMM technique, to guarantee the credibility of GMM results (Ullah et al., 2018). The study applies two conditions of the Sargan test: that is, the p-value must be greater than 5%, and also exercising caution when p-values are excessively high because this could indicate having too many instruments, which weakens estimation reliability (Ujunwa, 2020).

## RESULTS AND DISCUSSION

Table 4: Descriptive Statistics of the Variables used

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| **POV** | 450 | -1.20e-08 | 1.178427 | -2.037798 | 2.939446 |
| **FDI** | 450 | 3.977186 | 5.450849 | -18.91777 | 57.87725 |
| **EXT** | 450 | 6.688263 | 6.392568 | 0 | 37.36543 |
| **CPI** | 450 | 129.8242 | 173.6526 | 0 | 3364.82 |
| **TOP** | 450 | 68.53202 | 35.70722 | 0 | 225.0231 |
| **GOV** | 450 | 14.08722 | 6.573746 | 0 | 39.45063 |

Source: Computed by the Authors, 2023

The descriptive statistics show the total number of variables used for computation as 450 in Table 4. The average value of poverty (POV) is −1.20e-08 with a standard deviation of 1.18, indicating the extent of dispersion from the mean. The minimum value in the data set is −2.04, while the maximum is 2.94, respectively. The average value for foreign direct investment (FDI) is 3.98 with a standard deviation of 5.45, ranging from −18.92 at the minimum and maximum of 57.88. External debt (EXT) accounts for 6.69 and a standard deviation signifying a divergence from the mean value of 6.39, with the minimum value of 0 and the maximum of 37.37. The results of the consumer price index indicate 129.82 with a standard deviation of 173.65, signifying substantial deviation across various countries and times. The value of trade openness (TOP) shows a mean of 68.53 and 35.71 as standard deviation. An average value of government size (GOV) is 14.09, while the standard deviation is 6.57, whose value ranges from 0 to 39.45, the minimum and maximum, respectively. In general, the use of the panel data method and the two-step System GMM estimation techniques is necessary for descriptive statistics results, which show significant variation in poverty reduction and the explanatory variables across countries and over time.

### *Correlation analysis*

Table 5: Pairwise Correlations Analysis

| Variable | POV | FDI | EXT | CPI | TOP | GOV |
|---|---|---|---|---|---|---|
| **POV** | 1.0000 | | | | | |
| **FDI** | 0.2698 | 1.0000 | | | | |
| **EXT** | -0.5561 | -0.1118* | 1.0000 | | | |
| **CPI** | -0.0381 | -0.0427 | -0.0214 | 1.0000 | | |
| **TOP** | 0.5992 | 0.4969* | -0.3021* | -0.1874* | 1.0000 | |
| **GOV** | 0.2522 | 0.1373* | -0.0544 | 0.1438* | 0.3782* | 1.0000 |

Source: Computed by the Researchers, 2023

Table 5 exhibits poverty reduction (POV) to be fairly strong and has a positive correlation along with foreign investment (FDI) and government size (GOV), with a very strong relationship with trade openness (TOP). This suggests that, as FDI, GOV, and TOP increase, poverty reduction (POV) also tends to decrease due to a strong relationship existing between them, that is, 0.27, 0.25, and 0.60, respectively. Poverty reduction exhibits a very strong, but negative bond with external debt. The coefficient value is -0.57, signifying that, when external debt accrued, the SSA falls as poverty reduction declines. With the correlation coefficient of -003, the inflation rate appears weak and exhibits negative links with poverty reduction. This suggests that as inflation rises, the

tendency for poverty reduction to decline is low due to the strength of their relationship.

Table 6: Fixed Effect and Random Effect

| VARIABLES | Model 1 | | | Model 2 | | | Model 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| | OLS | FE | RE | OLS | FE | RE | OLS | FE | RE |
| LnFDI | 0.000805 | -0.0297 | -0.0157 | | | | | | |
| | (0.0286) | (0.0331) | (0.0317) | | | | | | |
| EXT | | | | 0.00605 | 0.0100 | 0.00774 | | | |
| | | | | (0.00537) | (0.00894) | (0.00741) | | | |
| FDI*EXT | | | | | | | -0.00121 | -0.000184 | -0.000633 |
| | | | | | | | (0.00170) | (0.00198) | (0.00189) |
| LnCPI | 0.0144 | 0.0498 | 0.0420 | 0.0215 | 0.0444 | 0.0405 | 0.0170 | 0.0492 | 0.0425 |
| | (0.0593) | (0.0537) | (0.0547) | (0.0594) | (0.0537) | (0.0547) | (0.0592) | (0.0539) | (0.0549) |
| LnTOP | 0.187*** | -0.0407 | 0.0594 | 0.200*** | -0.0570 | 0.0542 | 0.194*** | -0.0481 | 0.0552 |
| | (0.0568) | (0.0743) | (0.0679) | (0.0544) | (0.0741) | (0.0666) | (0.0542) | (0.0739) | (0.0669) |
| LnGOV | -0.00479 | -0.573*** | -0.372*** | -0.00587 | -0.557*** | -0.363*** | -0.0120 | -0.570*** | -0.371*** |
| | (0.0556) | (0.0726) | (0.0671) | (0.0553) | (0.0733) | (0.0672) | (0.0562) | (0.0728) | (0.0673) |
| Constant | -0.885** | 1.328*** | 0.440 | -1.007** | 1.288*** | 0.382 | -0.903** | 1.329*** | 0.443 |
| | (0.410) | (0.457) | (0.439) | (0.419) | (0.459) | (0.443) | (0.406) | (0.458) | (0.439) |
| Observations | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 | 450 |
| R-squared | 0.030 | 0.134 | | 0.033 | 0.135 | | 0.031 | 0.132 | |
| Number of SSAid | | 30 | 30 | | 30 | 30 | | 30 | 30 |

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

Source: Researchers Computation, 2023

Table 6 displays models 1–3 for the Ordinary Least Squares (OLS), Fixed Effects (FE), and Random Effects (RE) estimation, respectively. In Model 1, the pooled OLS results show no positive connection existing between foreign direct investment (lnFDI) and poverty reduction. Inflation (lnCPI) shows a positive and non-statistically significant relationship with poverty, while trade openness (lnTOP) exhibits a positive and statistically significant relationship at 1% level of significance, signifying increased in trade openness enhances poverty reduction. Government size (lnGOV) is not significant under OLS estimation. Under the fixed effects (FE) estimation, government size shows a negative impact on poverty level, implying increase in government expenditure has contributed to a reduction in the rate of poverty. The variables for controlled inflation and trade openness are often characterized by one-time country-specific factors, which in most cases always remained insignificant. The results of the random effects (RE) show that government size is negatively significant to poverty reduction, while other variables remain insignificant.

The results on Model 2 show external debt (EXT) to be positive and statistically insignificant to poverty reduction across OLS, FE, and RE estimations. Under OLS estimation techniques, trade openness remains statistically significant, signifying intensification of the role of trade openness in promoting poverty reduction, while the government size exhibits a negative and statistically significant result with FE and RE results.

The interaction term (FDI*EXT) captures the simultaneous effect of FDI on external debt in Model 3. The result shows a negative and statistically insignificant result in all estimation methods used. Meaning, the outcome of the results of FDI on external debt has not positively reduced the rate of poverty in the SSA countries. However, the level of trade openness is positively significant using the OLS estimation. Government size upholds negative and statistically significant with poverty in FE and RE estimations.

Generally, the results show trade openness consistently contributing positively to poverty reduction under pooled OLS estimation, thereby highlighting the impact of external trade in SSA countries. Similarly, government size consistently exhibits a negative and significant effect once country differences have been accounted for, suggesting inefficiencies in public sector spending or misallocation of resources. The finding indicates that both foreign direct investment and inflation are not statistically significant across models. This result motivates the use of a dynamic estimation approach since poverty reduction exhibits persistence, and static panel approaches may be biased because of endogeneity and unobserved country effects.

Table 7: Hausman test results

| Ho: difference in coefficients not systematic | | |
|---|---|---|
| **Model** | chi2(5) | Prob>chi2 |
| **1** | 60.14 | 0.0000 |
| **2** | 59.59 | 0.0000 |
| **3** | 59.13 | 0.0000 |

Source: Computed by the Authors, 2023

Using a probability value of the Hausman test result in models 1 – 3, it could be observed that the results of the null hypothesis (H0) do not show a logical difference in the coefficients. Thus, we have to reject the p-values that are statistically significant at 1%. Hence, the panel fixed effects model is a more appropriate specification.

### *Two-Step GMM estimation*

The study utilized two-step GMM estimation techniques to capture the model specification in equation 3.

Table 8: Two-step GMM estimation result.

| VARIABLES | (1) Model 1 | (2) Model 2 | (3) Model 3 |
|---|---|---|---|
| L.lnPOV | 0.405*** | 0.382*** | 0.410*** |
| | (0.00523) | (0.00493) | (0.00592) |
| lnFDI | -0.00628 | | |
| | (0.00960) | | |
| EXT | | 0.0252*** | |
| | | (0.00180) | |
| FXT | | | -0.000361* |
| | | | (0.000192) |
| lnCPI | 0.0334*** | 0.0326*** | 0.0346*** |
| | (0.00366) | (0.00341) | (0.00341) |
| lnTOP | 0.157*** | 0.138*** | 0.189*** |
| | (0.0399) | (0.0375) | (0.0318) |
| lnGOV | -0.314*** | -0.281*** | -0.280*** |
| | (0.0242) | (0.0233) | (0.0253) |
| Constant | -0.0349 | -0.203 | -0.255 |
| | (0.202) | (0.179) | (0.173) |
| Observations | 420 | 420 | 420 |
| Number of SSAid | 30 | 30 | 30 |

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

Source: Researchers Computation, 2023

The findings obtained from the Two-step GMM estimator regarding the role of FDI, external debt (EXT), simultaneous adoption of FDI and external debt on poverty reduction are displayed in Table 8. The foreign direct investment (lnFDI) coefficient appears negative and statistically insignificant, indicating that FDI has not exerted a significant inverse influence in the period under study. Hence, the findings are contrary to Tsaurai (2018), Ozoh et al. (2022), and Han et al. (2023). The outcomes of the results indicate the benefits FDI could derive in reducing poverty through corresponding features like quality of the institution, absorptive capacity, and sectoral allocation of resources.

The dependent lagged variable (L.lnPOV) is positive and significant throughout, affirming that persistence poverty reduction dynamics justified the use of the dynamic estimation method. While the lag in consumer price index (lnCPI) also exhibits a positive and significant correlation with poverty reduction, this testifies to rising price levels that are allied with increased poverty reduction. The views are in line with our expectations of Das (2011); Anetor, Esho, & Verhoef (2020); Fauzel et al (2016), that sees moderate inflation as a reflection of strong and growing enterprises, increasing job employment creation, and increased demand for goods and services, which invariably leads to poverty reduction.

Most of the models regressed indicate trade openness that has a positive and significant weight in reducing poverty in the SSA. This implies that increased participation in open and free trade contributes to the reduction of poverty. The results on government size (lnGOV) negatively affect the outcome of poverty reduction in three models, which indicate that larger government expenditure could be poorly targeted, thus limiting its value in reducing poverty.

Model 2 explains external debt (EXT), having a positive and statistically significant correlation with poverty reduction. This indicates a direct connection with reduction in poverty. This corroborates the a priori expectation that indicates either negative or positive significance levels depending on its usage. This outcome is consistent with Zahra Nasir, Rahman, & Idress (2023), who observed that efficient utilization of funds sourced outside the country could lead to poverty reduction and enlargement initiatives.

Model 3 captures the combined effect of FDI and external debt through an interaction term that has a negative and weakly significant impact on poverty. The joint effect of these variables tends to eradicate poverty in SSA countries. This suggests that while external financing may be beneficial individually, excessive reliance on both FDI and external debt simultaneously may impose adjustment costs, debt servicing pressures, or profit repatriation effects that weaken poverty reduction efforts.

In all, the GMM results highlight the dynamic nature of poverty reduction in SSA countries, with strong persistence effects, positive roles for trade openness and inflation, mixed outcomes for external financing, and a consistently negative influence of government size on poverty reduction.

### *Post Estimation Results*

Table 9: Sargan Test

| **$H_0$: overidentifying restrictions are valid** | | | |
|---|---|---|---|
| | Model 1 | Model 2 | Model 3 |
| **chi2(25)** | 21.34656 | 20.33165 | 22.56697 |
| **Prob> chi2** | 0.6731 | 0.7292 | 0.6028 |

Source: Computed by the Authors, 2023

From Table 9, the post estimation results (Sargan test), H0 shows the overidentifying restrictions are valid (that is, the instruments variable used in the regression model are exogenous and do not have any omitted variable bias). With a probability value greater than 10%, we fail to reject H0, the instruments are valid, and there is no evidence of endogeneity or omitted variable bias. Hence, the model specification of all the models and estimation is valid.

Table 10: Arelleno-Bond test

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| **Order** | Z | Prob> z | Z | Prob> z | Z | Prob> z |
| **1** | -2.2443 | 0.0248 | -2.2355 | 0.0254 | -2.2613 | 0.0237 |
| **2** | -0.69175 | 0.4891 | -.71382 | 0.4753 | -.68358 | 0.4942 |

H0: Computed by the Authors, 2023

Table 10 presents the autocorrelation of the first and second-order autocorrelation tests. First-order autocorrelation (AR1) is statistically significant across all models because the probability values are below 0.05. This result is expected in first-differenced GMM estimations and does not invalidate the model. While the second-order test (AR2) checks for the presence of second-order autocorrelation, where there is absence of autocorrelation. Based on (AR2) result, Based on the results provided, we fail to reject the null hypothesis, as indicated by the estimated AR2, since all probability values are above 0.05 i.e. (5% significance level) are above 0.05 (5% significance level). Thus, there is no second-order autocorrelation present in any of the models specified above.

Table 11: Results of Wald Test

| | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| **Wald chi2(5)** | 39304.86 | 18550.53 | 14540.02 |
| **Prob> chi2** | 0.0000 | 0.0000 | 0.0000 |

Source: Researchers Computation (2023)

The Wald test checks for the overall significance of the model. From the above table result (table 9), it can be inferred that the probability value of the Wald test for all models (1-3) is significant at all significance level, implying that the overall model is statistically significant. Thus, the model in general is validated by the rejection of the null hypothesis that suggests the explanatory variables collectively exert a significant influence.

## CONCLUSION

From the foregoing analysis, it could be seen that there is no statistical link between FDI and poverty reduction as observed within the reviewed period. Thus, the power to reduce poverty depends on its corresponding factors, like the quality of institutions, absorptive power, and sectoral allocation. Furthermore, external debt also revealed a significant and positive link with a reduction in poverty, which shows that when external debt is properly managed, it can lead to improvement in poverty eradication. When considering the FDI and external debt (EXT) simultaneously, a weak and significantly negative effect implies excessive reliance on external financing can entail modification of the costs of debt servicing pressures, and invariably hinder poverty reductions.

In the same vein, poverty has a significant positive correlation with trade openness (TOP) as well as inflation (CPI). This indicates that an improvement in trade liberalization, along with moderate inflation, can lead to an increase in income and overall improvement in productivity in Sub-Saharan Africa. In other words, government size (GOV) results appear negatively significant with the level of poverty, thereby limiting its effectiveness in poverty reduction.

In general, two-step system estimates show a dynamic behavior in eliminating poverty in their various regions, which revealed a persistent effect on inflation and trade openness, and invariably have diverse effects on external financing, and a persistent negative effect on government size. Therefore, for reduction in poverty to be attained, emphasis should be laid more on well-targeted government policies that promote productive investment and proper monitoring of external funds.

## REFERENCES


Anetor, F. O., Esho, E., & Verhoef, G. (2020). The impact of foreign direct investment, foreign aid and trade on poverty reduction: Evidence from Sub-Saharan African countries. Cogent Economics & Finance, 8(1), 1737347.

Anigbogu, T. U., Edoko, T. D., & Okoli, I. M. (2016). Foreign direct investment and poverty reduction in Nigeria. International Journal of Business and Management Invention, 5(6), 19-28.

Arellano, M. &Bover, O (1995). Another look at the instrumental variable estimation of Error-Component Models. Journal of Econometrics, 68, 29-52. http://dx.doi.org/10.1016/0304-4076(94)01642-D

Arogundade, S., Mduduzi, B., & Eita, H. (2022). Foreign direct investment and poverty in sub-Saharan African countries: The role of host absorptive capacity. Cogent Economics & Finance, 10(1), 2078459.

Ayenew, B. B. (2022). The effect of foreign direct investment on the economic growth of Sub-Saharan African countries: An empirical approach. Cogent Economics & Finance, 10(1), 2038862.

Azolibe, C. B. (2022). External debt accumulation and foreign direct investment inflows in Sub-Saharan Africa: Analysing the interaction effects of selected macroeconomic factors. The Review of Black Political Economy, 49(3), 327-352.

Blundell, R. & Bond, S.R (1998). Initial conditions and movement restrictions in dynamic panel data models. Journal of Econometrics, 87(1), 115-143.

Chindengwike, J. (2022). The effect of foreign direct investment on poverty alleviation in East Africa countries. Journal of Global Economy, 18(1), 53-66.

Dada, J. T., & Akinlo, T. (2021). Foreign direct investment and poverty reduction in sub-Saharan Africa: does environmental degradation matter?. Future Business Journal, 7, 1-10.

Das, R. U. (2011). Regional trade-FDI-poverty alleviation linkages–some analytical and empirical explorations. Regional Integration, Economic Development and Global Governance, 149.

Ekpo, A. H., & Udo, E. (2015). External debt, growth and poverty reduction in a failing state: Nigeria, 1970-2011. Journal of Business and Economics, 6(5), 944-951.

Fauzel, S., Seetanah, B., & Sannassee, R. V. (2016). Foreign direct investment and welfare nexus in Sub-Saharan Africa. The Journal of Developing Areas, 271-283.

Gökmenoğlu, K. K., Apinran, M. O., &Taşpınar, N. (2018). Impact of foreign direct investment on human development index in Nigeria. Business and Economics Research Journal, 9(1), 1-14.

Gossel, S. (2022). FDI and inequality in Sub-Saharan Africa: Does democracy matter? International Journal of Emerging Markets.

Han, Q., Jin, L., Khan, M. A. S., Vitenu-Sackey, P. A., & Obrenovic, B. (2023). Poverty alleviation in developing and underdeveloped countries. Do foreign capital and economic freedom matter?. Technological and Economic Development of Economy, 29(1), 45-73.

Jilenga, M. T., Xu, H., & Gondje-Dacka, I. M. (2016). The impact of external debt and foreign direct investment on economic growth: Empirical evidence from Tanzania. International Journal of Financial Research, 7(2), 154-162.

Magombeyi, M. T., & Odhiambo, N. M. (2017). Foreign direct investment and poverty reduction. Comparative Economic Research. Central and Eastern Europe, 20(2), 73-89.

Moloi, T., &Marwala, T. (2020). The Growth Model. Artificial Intelligence in Economics and Finance Theories, 13-20.

Nurske, R. (1953). Problem of capital formation in Less Developed Countries. Oxford University Press, Oxford.

Ogunniyi, M. B., & Amusa, W. A. (2018). The Impact of Foreign Direct Investment: FDI on Poverty Reduction in Nigeria. LAP LAMBERT Academic Publishing.

Ozoh, J. N., Anisiobi, C. A., & Madueke, C. M. (2022). Foreign Direct Investment and Poverty Reduction in Nigeria: Implication for Sustainable Development. Asian Journal of Economics, Business and Accounting, 22(24), 1-12.

Saleem, H., Shabbir, M. S., Shah, S. A. R., & Shah, J. (2021). Nexus between Foreign Direct Investment and Poverty Reduction: A case of Pakistan. iRASDJournal of Economics, 3(3), 272-280.

Saungweme, T., & Mufandaedza, S. (2013). An empirical analysis of the effects of external debt on poverty in Zimbabwe: 1980–2011. International Journal of Economics and Research, 4(6), 20-27.

Schoch M. &Lakner C. (2020). World Bank Blog. The number of poor people continues to rise in Sub-Saharan Africa, despite a slow decline in the poverty rate. Accessed at https://blogs.worldbank.org/opendata/number-poor-people-continues-rise-sub-saharan-africa-despite-slow-decline-poverty-rate on Tuesday, April 11, 2023 by 4.39pm.

Schoch M., Kofi S., Lakner C. & Friedman J. (2022). World Bank Blogs. Half of the global population lives on less than US$6.85 per person per day. Accessed at https://blogs.worldbank.org/developmenttalk/half-global-population-lives-less-us685-person-day#:~:text=Almost%20a%20quarter%20of%20the,Poverty%20and%20Shared%20Prosperity%20report. on Thursday, April 13, 2023 by 12.31pm.

Schoch, M., Lakner, C., Gerszon Mahler, D., & Castaneda Aguilar, R. A. (2022). Poverty and shared prosperity 2022: Correcting course. World Bank.

Shabbir, S., & Yasin, H. M. (2015). Implications of public external debt for social spending: a case study of selected Asian developing countries. The Lahore Journal of Economics, 20(1), 71.

Shamim, A., Azeem, P & Naqvi, S.M.M.A (2014). Impact of foreign direct investment on poverty reduction in Pakistan. Journal of Academic Research in Business and Social Sciences, 40 (10), 465-490 https://doi.org/10.6007/IJARBSS/v4-i10/1244

Sulaiman, L. A., & Azeez, B. A. (2012). Effect of external debt on economic growth of Nigeria. Journal of Economics and Sustainable Development, 3(8), 71-79.

Tsaurai, K. (2018). Investigating the impact of foreign direct investment on poverty reduction efforts in Africa. RevistaGalega de Economia, 27(2), 139-154.

Tsaurai, K. (2023). Does foreign direct investment affect poverty in BRICS?.Asian Economic and Financial Review, 13(3), 216-227.

Ujunwa, A. (2020). Re: How to interpret Sargan test for difference GMM estimator? Retrieved from: https://www.researchgate.net/post/How-to-interpret-Sargan-test-for-difference-GMM-estimator/5f3e675709af827479066cf4/citation/download.

Ullah, S, Akhtar, P., & Zaefarian, G. (2018). Dealing with endogeneity bias: The generalized method of moments (GMM) for panel data. Industrial Marketing Management, 71, 69-78.

Vyas, S & Kumaranayake, L. (2006). Constructing socio-economic status indices: how to use Principal Components Analysis. Health Policy and Planning, 21(6), 459-468.

WDI (2023). World Bank's World Development Indicators database. Retrieved from: https//data.worldbank.org/indicator.

Winkler, D. (2013). Jobs and foreign investment: Are multinational enterprises good for employment in developing countries? World Bank.

World Bank (2022). The World Bank in Africa. Accessed at https://www.worldbank.org/en/region/afr#:~:text=Sub%2DSaharan%20Africa%2C%20home%20to,to%20live%20healthier%20and%20more on Wednesday, April 12, 2023 by 9.29am.

World Bank (2023). What is the difference between Foreign Direct Investment (FDI) net inflows and net outflows? – World Bank Data Help Desk. (n.d.). https://datahelpdesk.worldbank.org/knowledgebase/articles/114954-what-is-the-difference-between-foreign-direct-inve

Zaghdoudi, T., & Hakimi, A. (2017). Does external debt-poverty relationship confirm the debt overhang hypothesis for developing counties? Economics Bulletin, 37(2), 653-665.

Zaghdoudi, K. (2018). Threshold effect of external debt on human development: Evidence from developing countries. International Economic Journal, 32(1), 113–128.

Zahra, A., Nasir, N., Rahman, S. U., & Idress, S. (2023). Impact of exchange rate, and foreign direct investment on external debt: evidence from Pakistan using ARDL Cointegration Approacsh. IRASD Journal of Economics, 5(1), 52-62.