Indirect Taxation and Poverty in Sub-Saharan Africa: An Empirical Evidence from Panel Data Analysis

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Abstract

Sub-Saharan Africa (SSA) is among the regions in the world where the poverty rate is very high. Thus, majority of the people are not directly taxable and this could be responsible for the generally low domestic revenue mobilisation by governments in the region. With these peculiarities, mobilising revenue through indirect taxation might be considered as a more preferable option by governments. However, indirect taxes have their own shortcomings. They are regressive in nature and have tendencies to plunge more people below the poverty line and worsen the conditions of those that are already poor in the short run, via rise in commodity prices and fall in demand. Empirical studies on this subject that focused on SSA are largely country-specific. This study examines the effects of revenue mobilisation from indirect taxes on poverty based on panel data regression analysis covering the period from 1990 to 2020 for 29 selected SSA countries. The resulting panel regression estimates from the random effects model (REM) reveal that GDP per capita has negative and significant impacts on poverty in SSA in all estimated models. The impacts of customs and import duties, and domestic goods and services taxes were negative but significant in only one of the six models. The finding of this study suggests that customs and import duties, and domestic goods and services taxes could be used as good fiscal policy tools by which governments in SSA to raise revenue without necessarily worsening the poverty situation.

Keywords: Indirect Taxation; Poverty; Sub-Saharan Africa; Panel Data Analysis

JEL Classification Codes: H20, C10

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1. Introduction

Poverty remains a serious problem in Sub-Saharan Africa (SSA). Recent statistics reveal that about three in five of the world's poor live in SSA (Christiaensen & Hill, 2019). In 2018, approximately 40 percent of the SSA population was living in extreme poverty compared to 7.2 percent in the Middle East and North Africa (MENA) region (World Bank, 2020). In terms of multidimensional poverty index, 58 percent of the population of SSA was considered to be poor (Oxford Poverty & Human Development Initiative, 2018). Half of the poor population in SSA lives in five countries (including Nigeria, the Democratic Republic of Congo, Tanzania, Ethiopia, and Madagascar). Among them, Nigeria alone accounted for about one-quarter of poor population. This figure corresponds to 85.2 million people (Beegle, Kathleen & Luc Christiaensen, 2019). Figure 1 further depicts the trend of poverty in SSA between 1990 and 2018. The number of poor people living on less than US$1.90 a day in Sub-Saharan Africa has been on the rise. Between 1990 and 1993, the population of poor grew from 283.8 million to 335 million, and by 1996, 23.4 million people joined the population. In 2018, the number rose to 433.4 million.

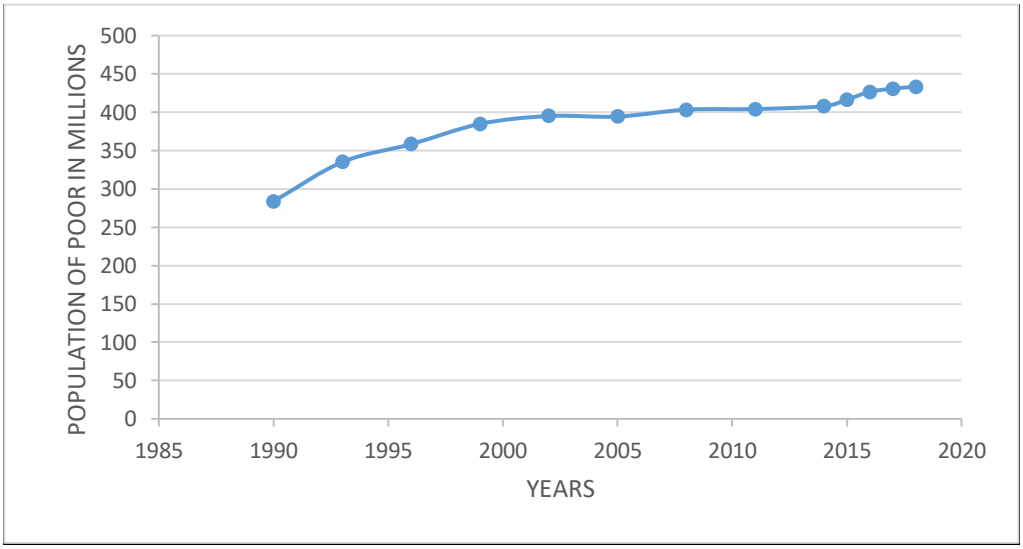

Figure 1: Trends in Poverty Level in Sub-Saharan Africa (1990 – 2018)

Source: Author's computation using data from World Bank, 2020.

Domestic revenue mobilisation to fund public investments that could fight poverty in these countries remains weak. The average percentage share of tax in GDP in SSA countries was 15.1 percent in 2018 (International Monetary Fund, 2019). Most of the countries are highly indebted. The average government debt to GDP ratio stood at 65 percent in 2020 (World Bank, 2021). Also, the International Monetary Fund (IMF)–World Bank Debt Sustainability Assessments report show that 53 percent of the low-income countries in the region were in the class of high risk of external debt distress (World Bank, 2021). This suggests that governments in SSA must step up in domestic revenue

mobilisation efforts through taxation to fund public capital investments and social services to reduce the level of poverty in the region.

Unfortunately, governments of SSA countries are faced with numerous challenges in the area of domestic revenue mobilisation including low tax base as a result of low industrialisation, large size of informal economy, low tax compliance rate, high tax avoidance and evasion (Gbato, 2017). Other factors include corruption (Yaru & Raji, 2022) and persistence of poverty. Given these challenges, indirect taxes would be more preferred to direct taxes in mobilising revenue in SSA countries. But indirect taxes are regressive in nature and might affect the poor disproportionately. Theoretical literature argues that imposition of indirect taxes often results in higher prices for affected goods and services, and reduced consumption by individuals, particularly on goods and services that are considered necessities or those with low elasticity of demand. Thus, increasing indirect taxes may aggravate poverty situation in SSA countries via price variation and sagged demand for affected goods.

Empirical studies on the impact of indirect taxes on poverty rate in the SSA largely focused on individual countries such as Ghana, South Africa, Zambia, Botswana and Uganda (Adukonu & Abebrese, 2016; Maboshe & Woolard, 2018; Fuente, Rosales & Jellema, 2017; Jellema, Lustig, Haas & Wolf, 2016). Empirical studies based on panel data analysis are rare. Thus, this study aims to fill this gap by empirically examining the impact of indirect taxes (domestic goods and services tax and customs and import duties) on the level of poverty in Sub-Saharan Africa (SSA) based on a panel data for 28 selected countries in the region between the period of 1990 and 2020.

The rest part of the paper is organised as follow. Section 2 contains review of empirical literature. Section 3 presents theoretical framework, while 4 contains the methodology. Section 4 contains results and discussion. Section 5 provides the conclusion.

2. Review of Empirical Literature

Several empirical studies have examined the impact of different taxes on the level of poverty in different countries in SSA and other regions (e.g., Adukonu & Abebrese, 2016; Jellema, Lustig, Haas and Wolf, 2016; Rossignolo, 2017; Deyshappriya, 2018; Sessu, 2019; Markina, 2022). The findings from these studies show that taxes have positive impact on poverty. For example, Sessu (2019) found that the impact of tax revenue on poverty was positive and statistically significant in Indonesia. In comparing the short run and long run impacts of both direct and indirect taxes on poverty in Ghana, Adukonu and Abebrese (2016) showed that the short run impact of direct taxes is positive and significant, while impact of indirect tax policies is negative and insignificant. But in the long run, direct taxes have negative and significant effect on poverty, while indirect taxes have positive and significant effect. Karanfil and Özkaya

(2013) found similar result for indirect taxes for Turkey over the period 1975-2005.

In Zambia, Fuente, Rosales and Jellema (2017) using Commitment to Equity Methodology (CEQ) argued that poverty increases as a result of indirect tax revenue collection. The study argued that the net transfer achieved through subsidies and indirect taxes on consumption is not large and positive enough to reduce poverty. Similarly, Martínez-Aguilar (2017) following Lustig and Higgins (2013) and Lustig (2017), show that indirect taxes exert an important adverse effect on the incidence of poverty in Chile. In Ukraine, Markina (2022) reveals that taxation contributes to the growth of poverty with consumption taxes having a stronger impact than income taxes. Also, Mengistu (2013) and Maina (2017) indicate that rise in domestic taxes on commodities result to welfare loss, decline in household consumption expenditures and worsening of the poverty situation in the short-run in Ethiopia and Kenya respectively. In Lebanon, Salti and Chaaban (2010) show that increasing VAT rate would result to an increase in overall poverty as households that are little above the national poverty line might fall into poverty. The same impact was found for VAT in Sri Lanka (Deyshappriya, 2018). However, Ogboi and Ogbuji (2014) found that VAT has an inverse but insignificant impact on poverty reduction in Nigeria.

Evidence from Deyshappriya (2018) further reveals that the impact of VAT on poverty varies among different groups of the poor. For example, the study shows that VAT increases the probability of being extreme poor, poor and vulnerable non-poor, while reducing the probability of being non-poor. Nguyen (2017), based on a study in Vietnam corroborated that VAT only affects the near poor households. Though the better-off households are also affected, but the effect is not significant enough to cause them to plunge into poverty. Similarly, Maipita, Dan Jantan and Abdul Razak (2010) shows that increase in taxes exacerbates the poverty situation among people in urban areas more than those in rural areas. In contrast, Sekwati and Malema (2011) suggests that VAT increase is most likely to have a profound impact on the poor households in rural areas, followed by the urban village poor and lastly the cities/towns dwelling poor in Botswana.

One obvious inference from the reviewed empirical literature is that most of the previous studies on SSA examined the impact of taxes on poverty for individual countries such as Ghana, South Africa, Zambia, Nigeria, Bostwana and Uganda (Ogboi and Ogbuji, 2014, Adukonu & Abebrese, 2016; Lustig, Haas & Wolf, 2016; Fuente, Rosales & Jellema, 2017; Jellema, Maboshe & Woolard, 2018). Thus, not much is known about the effects of taxes on commodities (indirect taxes) on poverty based on panel dataset on SSA countries. This forms the research gap the current study aims to fill by empirically examining the impact of indirect taxes (specifically domestic goods and services tax, and customs and import duties or trade taxes) on the level of poverty in SSA region based on panel data regression analysis.

3. Theoretical Framework

The theoretical framework adopted was derived from the theory of consumer behavior which explains the effect of price and income changes on the welfare of a consumer. To suit the purpose of this study, the model has been modified to illustrate the effects of imposition of per unit commodity tax on the consumer's welfare. The generic welfare function and associated budget constraint for a representative consumer are expressed in equation 1 and 2.

$Max\ U\ =\ U(\boldsymbol{X})$ Objective Function (1)
Subject to $\sum \boldsymbol{PX} = M$ Budget Constraint (2)

Where U represents consumer's utility, $\boldsymbol{X}$ is a vector of commodities (X_1 and X_2), $\boldsymbol{P}$ is the price vector (P_1 and P_2) and $\boldsymbol{M}$ is the total income of the consumer. Assuming the utility function is multiplicative, then the objective function and budget constraints of the representative consumer respectively will take the form of equation 3 and 4 respectively.

$Max\ U\ =\ X_1X_2$ Objective function (3)
Subject to $P_1X_1 + P_2X_2\ =\ M$ Pre-tax budget constraint (4)
The Langrangian function is given as:
$Z\ =\ X_1X_2 - \lambda(P_1X_1 + P_2X_2 - M)$ (5)
The First Order Conditions (FOCs) for optimisation are given as:
$Z_{X_1} = X_2 - \lambda P_1 = 0$ (6)
$Z_{X_2} = X_1 - \lambda P_2 = 0$ (7)
$Z_\lambda = -P_1X_1 - P_2X_2 + M = 0$ (8)
$\lambda = \lambda$ in equation 6 and 7.
$\lambda = \frac{X_2}{P_1} = \frac{X_1}{P_2}$,
Thus, $X_2 = \frac{P_1X_1}{P_2}$and by substituting the value of X_2 into equation 8,
$P_1X_1 + P_2\frac{P_1X_1}{P_2} = M$ (9)
By solving for X_1 and X_2, the pre-tax optimal demands for the 2 commodities are presented in equation 10.
$X_1 = \frac{M}{2P_1}, X_2 = \frac{M}{2P_2}$ (10)
When per unit tax is imposed uniformly on the commodities X_1 and X_2, the tax will change the consumer's budget constraint to take the form in equation 11 and the new Langragian function becomes equation 12.
$((1+t)\ P_1)\ X_1 + ((1+t)\ P_2\ )\ X_2\ =\ M$ (Post-tax budget constraint) (11)
$Z\ =\ X_1X_2 - \lambda((1+t)P_1X_1 + (1+t)P_2X_2 - M)$ (12)
The First Order Conditions (FOCs) for optimization are given as:
$Z_{X_1} = X_2 - \lambda(1+t)P_1 = 0$ (13)
$Z_{X_2} = X_1 - \lambda(1+t)P_2 = 0$ (14)
$Z_\lambda = -(1+t)P_1X_1 - (1+t)P_2X_2 + M = 0$ (15)
Solving for the optimal demands for the two commodities based on equations 13-15, we have:

$X^*_1 = \frac{M}{2(1+t)P_1}, X^*_2 = \frac{M}{2(1+t)P_2}$ (post-tax optimal demand for X_1 and X_2. (16)

From equation 16, the first order derivative of $X^*_1 \; and \; X^*_2$ will be $\frac{\partial X^*_1}{\partial t} < 0$ and $\frac{\partial X^*_1}{\partial t} < 0$, respectively which show that imposition of "t" or an increase in "t" will lead to decrease in demand/consumption for the taxed commodities.

Equation (16) represents the new form that the Marshallian type demand function would take following imposition of an indirect tax showing inverse relationships between indirect taxation and the quantity demanded of both commodities and the welfare of the consumers. Whenever tax is imposed on goods, the sellers may shift the burden of payment of the tax partly or wholly to the consumers by increasing the price of the goods. And in some cases they absorb the burden or shift it backward to suppliers of factor inputs in form of lower profit to sellers or rents to landowners, wages/salaries to workers or lower prices for raw materials respectively. The imminent variation in prices of inputs and/or final goods would reduce the purchasing power of individuals as sellers, suppliers of factor inputs or consumers given their fixed incomes. This leads to reduction in the quantity demanded of these goods by the consumers and/or factors of productions hired by the producers. As a result of the decrease in consumption of goods, the consumers' welfare reduces which would imply increase in level of poverty "all other things being equal".

4. Methodology

This study uses both simple descriptive data analysis and panel data regression models which are presented in this section. The section is divided into 5 sub-sections. Sub-section 1 presents description of data and sources. Sub-section 2 presents the descriptive statistics of variables in the model and the pairwise correlation analysis among them. The empirical model specification is presented in subsection 3, while sub-section 4 delves into estimation.

4.1 Data Description and Sources

Table 1 presents the description of the variables used, their measurements and the sources of data. The study used unbalanced panel data set spanning from 1990 to 2020 for 29 Sub-Saharan Africa countries (including Angola, Botswana, Burkina Faso, Cape Verde, Cameroon, Central African Republic, Congo Republic, Cote d'Ivoire, Ethiopia, Gabon, Ghana, Kenya, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Rwanda, Senegal, Seychelles, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe). The sample countries and period chosen were dictated principally by availability of data. For example, Nigeria was omitted from the sampled countries due to lack of data on customs and import duties as well as domestic goods and services tax in World Development Indicators (WDI) database, where the data were sourced (see Table 1).

Table 1: Description of variables and data sources

S/No.	Variables	Measurements
1.	Poverty (POV)	Measured as poverty headcount at $1.90 a day
2.	Domestic goods and services tax (GST)	Taxes on goods and services as percentage of GDP.
3.	Customs and import duties (CID)	Customs and other import duties as percentage of GDP
4.	Foreign Direct Investment (FDI)	FDI net inflows as a percentage of GDP
5.	Power infrastructure (PIN)	Electric power consumption (kwh per capita)
6.	Government expenditure on education (GEE)	government expenditure on education as percentage of GDP
7.	Income (GDPPC)	GDP per capita (constant 2015 US$)
8.	Governance Indicators Political Stability and Absence of Violence (POLS) Government Effectiveness (GOV), and Control of Corruption (CCOR)	Measured as indices on a scale with values ranging between -2.50 (very weak) and 2.50 (very strong) respective institutional indicators.

Source of Data: World Development Indicators ,2022

4.2 Descriptive Statistics and Correlation Analysis

In order to discern preliminary characteristics of the data used, simple descriptive statistics that summarized the data were computed, and examined for the respective variables considered in the study as a prelude to the panel regression analysis. These statistics include the mean, standard deviations, minimum and maximum values of all the variables for the 29 SSA countries covered the period between 1990 and 2020 (see Table 2). From Table 2, the average poverty headcount rate (POV) for the 29 SSA countries during the period was 43.73 percent with a maximum rate of 86.2 percent, minimum value of 0.2 percent and standard deviation of 22.79. This reflects prevalence of very high poverty rate with wide variance among the countries in the region. Domestic goods and service tax (GST) as percentage of tax gross domestic product (GDP) has a mean value of 6.57 percent, while customs and import duties has an average value of 2.89 percent. The mean value of power infrastructure (PIN) stood at 785.01 kWh per capita with minimum and maximum values of 23.00 and 4665.18 kWh per capita respectively, and a standard deviation of 1261.35.

Government expenditure on education (GEE) as percentage of GDP has a mean of 4.33 percent with maximum value of 10.10 percent, minimum of 1.29 percent and standard deviation value of 1.90. Net Foreign direct investment (FDI) as percentage of GDP averaged 3.27 percent with maximum, minimum and standard deviation values of 39.44 percent, -6.89 percent and 28.22 respectively. The real gross domestic product (GDP) per capita (GDPC) has an average value of U$1,888.01 with maximum value of U$15,866.91, minimum value of US$236.46 and standard deviation of 2522.33. The rather low average values for the socioeconomic variables such as power infrastructure (PIN) and GDPC are indicative of miserable socioeconomic conditions in SSA, while wide ranges and large values of standard deviations seem to portray high variations regarding access to basic infrastructure and average general standard of living among citizens of different countries in the region.

Institutions and quality of governance indicators also portray the low average scores for the four World governance indicators considered suggesting that SSA is dominated by countries with weak government institutions. The average values for the four indicators (Government Effectiveness (GOV), Control of Corruption (CCOR), and Political Stability and Absence of Violence (POLS) range from -0.50 and -0.38; with best score which is in POLS standing below 1.05 out of a maximum score of 2.50. The inference from the descriptive statistical analysis is that the socioeconomic conditions in SSA are on the average deplorable and governance institutions remain weak. But the wide difference between the maximum and minimum values and high standard deviation values depict the existence of outliers in the region suggesting that a few countries are doing well, while some are performing very poorly with regards to socioeconomic conditions of the people.

Table 2: Summary of Descriptive Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
POV	129	43.739	22.79	0.2	86.2
PIN	65	785.01	1261.35	23.002	4665.18
FDI	129	3.27	4.24	-6.90	28.22
GDPPC	129	1888.01	2522.33	236.47	15866.91
GST	83	6.57	3.47	1.07	19.63
CID	76	2.89	2.54	0.26	11.89
GEE	87	4.33	1.90	1.29	10.10
GOV	99	-0.501	0.59	-1.54	0.99
CCOR	99	-0.44	0.60	-1.52	0.96
POLS	99	-0.38	0.81	-2.65	1.04

Source: Authors' computation, 2022.

In addition to the descriptive statistics presented in Table 2, pairwise correlation coefficients were computed to examine the extent of linear relationship among the variables (see Table 3). From Table 3, contrary to popular expectation, there exist weak negative correlations between poverty (measured as headcount ratio) and tax variables (GST and CID). For instance, the correlation coefficient between poverty and GST is -0.3289; and CID is -0.1384. This is suggestive that the tax revenue might be having negative effects on poverty level. This relationship is possible if the tax revenue is used to provide public goods and/or services or transfers that more than offset the loss in welfare caused by the tax imposition. Similarly but expectedly, power infrastructure (PIN), government expenditure on education (GEE), GDP per capita (G$DPPC$) and all the four institutional variables (including measures of government effectiveness (GOV), control of corruption (CCOR), rule of law (ROL) and political stability and absence of violence (POLS) have negative correlation with poverty. In terms of strength, the correlation between poverty and GDP per capita appears to be the strongest with a coefficient of -0.6436, followed by government effectiveness with -0.3874 and then power infrastructure, -0.3828, while FDI is has the least with a value of -0.0734.

This might imply that the power generation, public expenditure on education and the output per capita in SSA have negative relationship with the poverty level in the region. Foreign direct investment (FDI) has the weakest correlation with poverty. This might imply that FDI could be having insignificant effect on poverty. Meanwhile, the high correlation coefficients reported in Table 3 among some of the regressors, particularly the institutional variables, and between power infrastructure and some of the institutional variables suggest that multicollinearity may be a serious problem with the empirical model if all the affected regressors are considered empirical model estimation at a time.

Table 3: Matrix of Correlation Coefficients

Variable	POV	PIN	FDI	GDPC	GST	CID	GEE	GOV	CCOR	POLS
POLS										1
CCOR									1	0.6795
GOV								1	0.8612	0.6289
GEE							1	0.4453	0.4919	0.3835
CID						1	0.5486	0.1649	0.3086	0.2874
GST					1	0.0123	0.4111	0.5026	0.5100	0.5116
GDPC				1	0.4960	-0.0233	0.1883	0.5884	0.4841	0.4598
FDI			1	0.1938	0.3139	0.0493	0.0486	0.0135	0.1044	0.1927
PIN		1	-0.0849	0.7526	0.5490	-0.2429	0.2561	0.6874	0.6586	0.3276
POV	1	-0.3828	-0.0734	-0.6436	-0.3289	-0.1384	-0.3322	-0.3874	-0.3090	-0.1707

Source: Authors' computation, 2022

4.3 Model Specification

The model for this study stems from the theoretical framework presented in section 3 and previous empirical literature (e.g., Adukonu and Abebrese, 2016; Sessu, 2019; Maboshe and Woolard, 2018). Based on the theoretical framework, poverty increases with indirect taxation all things being equal. In addition to taxes, the previous empirical studies suggest that poverty is also influenced by other factors such as income, infrastructural development, foreign direct investment, government expenditure on education and economic growth (Pervez, 2014; Anigbogu et. al., 2016; Oyegoke and Wasiu, 2018; Yaru & Raji, 2022). Given the increasing recognition of governance institutions in policy and development outcomes including poverty reduction policies in the literature (Acemoglu & Robinson, 2012), institutional variables such as government effectiveness, control of corruption and political stability and absence of violence are added to the list of control variables in the model. Thus, the generic model for this study is given as follows:

$$Poverty = f(tax\ revenue, control\ variables) \quad (17)$$

As shown in equation 17, poverty represents the dependent variable, while tax revenue and other control variables are independent variables. Equations 18 and 19 represent the general and structural forms of the panel data models containing the specific tax revenue and control variables used for the empirical analysis respectively.

$$POV = f\ (GST, CID, PIN, GEE, FDI, GDPPC, GIs) \quad (18)$$

$$POV_{it} = \beta_0 + \beta_1 GST_{it} + \beta_2 CID_{it} + +\beta_3 PIN_{it} + \beta_4 GEE_{it} + \beta_5 FDI_{it} + \beta_6\, GDPPC_{it} + \beta_7\, GIs_{it} + u_{it} \quad (19)$$

Where: POV= Poverty headcount ratio, GST = Domestic goods and services tax as percentage of GDP, CID = Customs and import duties as percentage of GDP, PIN = Power infrastructure, GEE= Government expenditure on education as a percentage of GDP, FDI = Foreign direct investment (Net inflow) as percentage of GDP, $GDPPC$ = Real gross domestic product per capita, and GIs= Measure of governance institutions which include: GOV=government effectiveness, CCOR = control of corruption and POLS = political stability and absence of violence. $u_{\text{it}} = \mu_i + v_{\text{it}}$, where μ_{i} denotes the unobservable individual-specific effect and v_{it} denotes the remainder disturbance.

β_0 is the autonomous of the POV independent of the explanatory variable which remains constant, $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ *and* β_6 are the parameters to be estimated. All these parameters are the short-run static coefficients of the model. A priori, the coefficients of $PIN, GEE, FDI, GDPPC$ *and* GI are expected to be negative respectively (i.e., $\beta_3, \beta_4, \beta_5, \beta_6$ *and* $\beta_6 < 0$), while GST and CID are expected to have positive coefficients ($\beta_1$and $\beta_2 > 0$).

4.4 Estimation

The study estimated the empirical model specified in equation 19 in six variants Models I-VI. In estimating the model, only one from the set of three institutional variables is considered at a time. This is partly to control for possible multicolinearity suggested by the high correlation among the institutional variables reported in Table 3. The models were estimated using three alternative methods of panel data regression analysis, i.e., Pooled OLS, Fixed Effect and Random Effect. The pooled OLS method assumes homogeneity among panel members, while Fixed Effect and Random Effect methods assume members are heterogeneous. To choose the most appropriate model, F-test and Hausman test were conducted. The F-test examines the null hypothesis of homogeneity among panel members and is used to check the appropriateness of the pooled OLS method against the fixed and random effects. If the p-value of the F-test is greater than 0.05 or 5 percent significance level, we accept the null hypothesis which suggests that the pooled OLS would be appropriate and otherwise Fixed and Random Effects methods would be considered. Then, Hausman test would be employed to examine the null hypothesis that the Random Effect method is more appropriate. If the test result comes up with a p-value below 0.05 or less than 5 percent significance level, we reject the null hypothesis and consider Fixed Effect as the appropriate model. However, as in the case of this study the F-test and Hausman test statistics and their associated P-values reported in Table 4, show the p-values are greater than 0.05 or 5 percent. Thus, Random Effect method was considered as most appropriate for estimating the various specifications of the empirical models.

5. Results and Discussion

The results of six variants of the estimated models are reported in Table 4. Model I-III presented in column 2-4 examine the effects of all the explanatory variables in the specified model and one of the three institutional variables at a time, while in Model IV-VI, government expenditure on education was omitted, partly to allow for additional observations due to missing values and also to serve as robustness check for the results obtained in Model I-III. Overall, the results show that real GDP per capita (GPPC), government expenditure on education, goods and services taxes (GST), and customs and import duties (CID) which imply that they have negative effects on poverty in SSA. However, among them, only Gross Domestic Product per capita was statistically significant in all the six models. The coefficient of government expenditure on education (GEE) was statistically significant in Model I and II at 10 and 5 percent significance levels respectively. Goods and services taxes (GST) and custom and import duties (CID) are statistically significant in only one of the six models, i.e., Model VI. The negative signs of goods and services taxes (GST) and customs and import duties (CID) do not conform to the a-priori expectations and previous empirical studies (such as Mengistu, 2013; Lustig, Pessino & Scott, 2014; Fuente, Rosales & Jellema, 2017; Martínez-Aguilar, 2017; Maina, 2017) but appeared to be in tandem with the results obtained by Adukonu & Abebrese (2016) who recorded that indirect tax policies have negative impact on poverty level in Ghana in the

short run. The negative and statistically significant impact of customs and import duties on poverty could be as a result of the fact that the revenue gotten from customs and import duties may have been redistributed into the economy through infrastructural development and welfare programs that benefit the poor thereby reducing the poverty level. In effect, the impact of taxes on welfare can best be examined from net fiscal incidence analysis which also take into cognisance how the tax revenues are utilized (Inchauste and Lustig, 2017).

The negative and statistically significant impact of government expenditure on education on poverty aligns with the a-priori expectation of this study as well as the findings of Pervez (2014) who recorded a negative and statistically significant impact of education on poverty in Pakistan. This is particularly, possible if education spending result into human capital development and increased production and productivity of factors of production, and inclusive development. Expectedly also, the negative and statistically significant impact of real GDP per capita on poverty is in line with the work of Oyegoke & Wasiu (2018) where statistically significant negative impact of economic growth on poverty in Nigeria was reported and (Yaru & Raji, 2022) for SSA. Other variables such as power infrastructure and foreign direct investment have positive and statistically significant coefficients in the regression results and hence, do not conform to the a-priori expectation. One possible for reason for this result in the case of FDI for example could be the concentration of foreign investment. In most of the SSA countries, FDI is concentrated in the capital intensive sectors of the economy where the poor segment of the population hardly participate directly. Another possible factor could be data limitations leading to omitted observations bias. Overall, data on poverty for the countries in the sampled countries are available for very few years, and in most cases for different years in different countries. This has definitely affected the number of observations included in the for the regression analysis. Meanwhile, the limitation notwithstanding, the overall explanatory powers of the model as indicated by the R^2 values which range from 58.75 to 84.58 percent show that the explanatory variables in the models substantially explained systematic variations in poverty level in SSA.

Table 4: Results of Random Effect GLS Regression Estimates

Dependent Variable: POV Independent Variables	Model I	Model II	Model III	Model IV	Model V	Model VI
	Coefficients					
GST	-0.07906 (0.842776)	-0.54133 (0.825482)	-1.68134 (1.372936)	-0.73794 (0.863182)	-1.15609 (0.769559)	-2.56713*** (0.978576)
CID	1.982167 (1.402102)	1.413353 (1.89744)	1.154737 (1.76728)	-0.51235 (1.033657)	-1.13977 (1.376467)	-1.79623*** (0.595956)
PIN	0.00739*** (0.002046)	0.006231** (0.002726)	0.007363*** (0.002023)	0.00436** (0.002076)	0.002998 (0.002713)	0.004101*** (0.001211)
GEE	-3.55894* (2.000784)	-4.80611** (2.444482)	-4.27659 (2.758951)			
FDI	1.165311 (0.682472)	1.414249** (0.563082)	1.135581*** (0.374872)	1.081305* (0.556766)	1.281319** (0.517183)	1.122499*** (0.376236)
GDPPC	-0.00651*** (0.001745)	-0.00809*** (0.001635)	-0.00757*** (0.001809)	-0.00419** (0.001741)	-0.00543*** (0.001488)	-0.00638*** (0.001353)
GOV	-4.07266 (7.274356)			-7.04934 (9.356712)		
CCOR		8.579039 (8.365886)			1.680445 (10.20274)	
POLS			6.901805 (4.966507)			8.342304** (4.187389)
β_0	45.76433*** (15.22375)	65.76901*** (15.66029)	68.54011*** (13.3076)	36.50338** (16.1633)	49.27773*** (16.67186)	63.9527*** (10.27805)
Obs.	22	22	22	28	28	28
No. of Groups	12	12	12	14	14	14
R-squared	0.821	0.8425	0.8458	0.658	0.5875	0.7253
Wald Chi-squared stat	124.84	296.04	510.81	102.6	97.58	96.83
p-value of Wald Chi statistic	0.000	0.000	0.000	0.000	0.000	0.000
Hausman	6.22	6.25	4.96	10.12	10.12	8.54
p-value of Hausman	0.399	0.395	0.549	0.72	0.72	0.129

Source: Authors computation, 2022

6. Conclusion

This study empirically examined the impact of indirect taxes on the level of poverty in Sub-Saharan Africa (SSA). The theoretical framework (modified Marshallian demand theory) used in this study and evidence from some of the previous empirical works such as Lustig, Pessino, and Scott, (2014) indicate that higher taxes on commodities could exacerbate the poverty situation. To test this hypothesis, the study uses unbalanced panel data obtained from the World Development Indicators (WDI) for 29 SSA countries during 1990-2020 period. The results reveal that the impact of domestic goods and services taxes (GST) customs and import duties (CID) on poverty in SSA is negative but not statistically significant except in one of the models. Government expenditure on education and real GDP per capita had negative and significant impacts on poverty. Meanwhile, the impact of power infrastructure and foreign direct investment are positive and statistically significant. The finding of this study suggests that customs and import duties, and domestic goods and services taxes could be good tax policy tools by governments in for domestic SSA revenue mobilisation without worsening the conditions of poor. This conclusion is however indicative as further studies may be required that would incorporate the channel through which indirect taxes impact on poverty based on dynamic models and tax incidence framework to confirm these findings.

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