





## Value added tax and household consumption in Sub-Saharan Africa: Evidence from Nigeria and South Africa

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### Abstract

This study focuses on Nigeria and South Africa and examines how value added tax (VAT) affects household consumption in sub-Saharan Africa. We use time series data from 1994 to 2021 as well as panel Autoregressive Distribution Lag (ARDL) regression through pooled mean group estimation. The findings show that in the long -run and with a 0.05 degree of materiality, VAT has a significant positive influence on household consumption and the exchange rate significantly depletes household consumption. In the short term, at 10% importance, VAT has a significant impact on household spending. According to the Error Correction Model (ECM), there will be a short-run return to equilibrium of 93.7%. According to the country specific results for Nigeria, VAT at 10% has a significant positive impact on CPI but at lag 3, CPI has a significant negative reaction to VAT and the Exchange rate (EXG). EXG has a significant positive influence on CPI at lags 1 and 2. For South Africa, CPI affects itself positively and significantly at lags 1 and 2 but VAT appears to be harmfully unimportant whereas EXG affects CPI positively and significantly at lags 1 and 3 but becomes minor at lag 2. The study concludes that VAT implications are detrimental to households in the short run despite having a positive impact in the long term. As a result, the study recommends adequate public awareness prior to VAT implementations as well as zero VAT for basic household goods and services in African regions that have yet to implement such policies.

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## 1. Introduction

A value-added tax (VAT) is a consumption tax that prompts lower income families to dedicate a greater percentage of their earnings. Thus, a value-added tax (VAT) is distorting when compared to current income and applied in the absence of other strategy alterations. A VAT seems to be less socially conservative when compared to earning potential. The tax liability is inequitable when determined as a proportion of actual earnings because lower-income families spend a higher proportion of their income on consumption than higher-income families. The debt load as an amount of income is particularly high for low-income households and declines quickly as domestic pay increases. However, the pressure of a VAT is more income-based when

measured as a proportion of earning because cash obtained today is frequently used at a later period. The VAT liability as a percentage of income is significantly lower for high-income households than other households in terms of future earnings. Consumer price indices (CPIs) are statistical indicators that display various changes in the prices of goods and services that households purchase and use both directly and indirectly to satisfy their own needs and preferences. Most CPIs are measured as mean scores of the proportion of total price fluctuations for a predefined set of commodities with the weight values representing their degree of importance in domestic consumption as time passes. CPIs are widely used to index retirement plans, social payment, interest and rent or bond rates. CPIs are also frequently used as a substitute for the overall rate of inflation despite the fact that they only quantify consumer inflation.

Several policymakers or monetary authorities use them to set thresholds for monetary and fiscal policy reasons. Price information provided for CPI applications could also be used to create other metrics such as price index used to deflate domestic consumer spending in economic figures or purchasing power parities used to make comparisons of genuine consumption levels in distinct nations. International institutions acknowledged that the International Monetary Fund (IMF) and the Organisation for Economic Cooperation and Development (OECD) would be responsible for the international compilation and analysis of global CPI statistics in order to better synchronise and harmonise the portfolio of CPI data.

Studies on the implications of pricing on the effects of spending taxes on consumers have already been carried out (Barret & Wall, 2006; Creedy, 2002; Decoster, Swerdt, & Verbist, 2007; Gaarder, 2019; Garfinkel, Rainwater, & Smeeding, 2006; Kaplanoglou, 2004; Mariscal & Werner, 2018; Warren, 2008; Warren, Harding, & Lloyd, 2005). However, other contemporary investigations (Benzarti & Carloni, 2019; Benzarti, Carloni, Harju, & Kosonen, 2020; Harju, Kosonen, & Skans, 2018; Kosonen, 2015) on the prevalence of spending taxes reveal that these taxes have an immediate influence on results such as profits other than costs. Earlier investigations have also assessed the implications of VAT rate increases and decreases on consumptions by households and businesses in various ways (Acosta-Ormaechea, Sola, & Yoo, 2019; Arnold et al., 2011; Komaki, 2021; Sekwati & Malema, 2011). This present study considers both the long run and short run effects of VAT in two weighty economies in sub-Saharan African. The importance of this study is to inform policymakers in developing countries about the severity of the negative impacts that VAT has on households and the need to take proactive action when the VAT rate rises.

## **2. Literature Review**

### *2.1. Review of Concepts*

#### *2.1.1. Concept of VAT*

The term "consumption" is built into the VAT concept's practicality (Terfa, Ereso, Kebede, Rajendran, & Nedelea, 2017). VAT is known as a utilization-based taxation typically pertains to products purchased for usage within a particular nation. It refers to the charge as a broad-based consumption tax that is inversely related to the cost of products and services. According to Sopkava and Spisiakova (2007), VAT is a load for the final buyer because of the costs of services and products. Abed (1994) claims that VAT tax responsibilities is primarily based on usage. Single-rate VAT is thought to be less distortive and deemed more productive. According to Levin and Sayeed (2014), one rate of VAT may be less distortionary and more effective but from a social welfare perspective, basic necessities such as food should be spared from VAT. This is due to the fact that people with low incomes spend nearly all of their earnings on them. As a result, a VAT on food would disproportionately burden the poor. Lower VAT rates reduce tax regressively while giving some transfers to lower-income households and neglecting the reality that lower rates benefit the most prosperous individuals too (Charlet & Owens, 2010). According to academic perspective, the research community concluded that the same VAT whether or not source-based is irrelevant when it comes to trading activity under various expectations (Keen & Syed, 2006). A uniform location-based VAT applies the same operating rate to all of the products consumed in the country whether they were manufactured in the country or overseas. As a result, VAT has no impact on one's decision between locally produced and foreign products and it has no effect on the inter-temporal flow of both production and usage (Alworth & Arachi, 2008). However, the concept that VAT is insignificant for trade is predicated on constant prices for each commodity purchase. There are a few cases where rates significantly differ between products apart from the situation where an unreasonable charge is imposed on goods created abroad.

According to Liu, Wang, and Liu (2022), the reduction or elimination of the VAT rate may have an impact on businesses' production and capital costs as well as their income tax liabilities.

#### *2.1.2. VAT Administration in Nigeria and South Africa*

According to Okezie (2003), VAT is a charge of five percent on commodities and services that was implemented in Nigeria in 1993. Nevertheless, the most recent modification to the VAT Act by the finance Act 2020 elevated it to 7.5%. The primary goal of this tax is to generate income for the state and its burden is footed by the person who purchases the product. VAT is imposed on both brought in and homemade items as well as services. Soyode and Kajola (2006) stated that VAT is a multiple phase's tax with an impact on the final buyer. Brazil was the very first growing economy to institute VAT in 1967 when the Brazilian

government dissolved various business tax structures in order to maintain monetary and economic collaboration among all of the 26 nations. This was subsequently adopted by both India and China in 1990 and Nigeria on January 1, 1994, though it was implemented on September 1, 1993 (Blumkin, Ruffle, & Ganun, 2008). VAT is currently handled and controlled by the Federal Inland Revenue Service which has caused controversy. However, it has been split among Nigeria's three levels of governance from 1999 to the present. The national government receives 15%, the state administration receives 50% and the municipal government receives 35%. VAT is a kind of indirect tax levied primarily on the domestic purchase of products and services as well as commodities purchased into South Africa (Mandy, 2022). The fee is intended to be primarily provided by the end user or buyer in South Africa. It is assessed at two percentages: normal and no rate (0%). The general rate of VAT is 15% beginning on April 1, 2018 but previously the usual rate was 14%. Revenue is generated for the state by asking expected merchants (vendors) who operate a business to submit paperwork for VAT. The sellers of the products are obligated to impose VAT on products and services that are supplied by them (i.e. output tax) if specific requirements are met. Chargeable materials are those that are subject to VAT depending on the usual rate (currently 15%) or the no VAT rate (0%). A restricted number of products and amenities are either covered by zero-rate VAT or are VAT-free (South Africa Revenue Service, 2023). The seller will also be able to subtract the VAT (input tax) imposed on products while providing goods that are taxable. The supplier can ask for an exemption (notional input tax) on purchases made under certain conditions. However, SARS mandates that the supplier ensure the following when a vendor registers for VAT: VAT is incorporated into every price displayed or stated, tax receipts are given out for products made where necessary, returns are sent in and settlements are sent out on duration and record-keeping is gathered and preserved to prove VAT obligations (South Africa Revenue Service, 2023).

Ramsey (1927) claimed that tax laws should influence consumer choices less as possible in the first half of the 20th century. He also highlighted modern uses of taxes that are different from earlier ones. Mankiw, Weinzierl, and Yagan (2009) propose taxing consumption highlighting the caution from Baunsgaard and Keen (2010) that shifting a tax system towards spending taxes has negative economic effects on low-income countries in order to create the most efficient tax structure. According to Arnold et al. (2011), promoting revenue and earnings assessments while decreasing spending and real estate taxes mitigates growth over time. Another viewpoint suggests that providing resources for consumers with lower incomes through special VAT rates is ineffective (Warwick et al., 2022).

## *2.2. Empirical Studies*

### *2.2.1. Foreign Studies*

Alm and El-Ganainy (2012) calculated the consequences of a broad-based VAT on general consumption in fifteen European Union countries from 1961 to 2005. The findings of the research suggested that one basis point rise in the VAT rate led to a one percent fall in total usage in the short term and a somewhat larger decline in overall consumption over time.

Gelardi (2013) deployed graphical representations to show and analyze how much consumers in the United Kingdom and Canada changed their behaviour after the introduction of value added tax in the two nations. The graphical representations used both sales quantity and proportional variation compared to the previous year's data (on a per-month basis). When the newly introduced taxes were implemented, there was no or very little significant behavioural shift. When the rates of taxation were substantially altered, nevertheless, customers adapted their behaviour to take advantage of the alteration by practicing choice behaviour. According to the study, American consumers are likely to behave similarly to UK and Canadian customers. Terfa et al. (2017) investigated the impact of value added tax on the purchasing habits of Nekemte Town residents. According to the research, this approach must incorporate extra incentives such as lower income tax rates for families and increase their capacity to make purchases in order to facilitate the implementation of VAT. Adoho and Gansey (2019) inquired whether the current value-added tax structure is changing given its limitations. The evaluation concluded that the implementation of the value-added tax reduced the buying capacity of all Congolese homeowners by an approximate amount of 10 to 12 percent. Gunter, Riera-Crichton, Vegh, and Vuletin (2019) examined the effects of consumption taxation on economic expansion in fifty-one nations from 1970 to 2014 and discovered that their influence is substantially non-linear. They discovered that the repercussions are unimportant at modest rates with minor modifications but their expansion rate decreases with an elevated start rate and larger modifications. They suggested that tax reductions might stimulate economic growth in developed European countries. Singh (2019) investigated the effects of VAT on Ethiopian businesses from 2017 to 2018. The paper presented the findings of a field experiment addressing the effects of a value added tax on firms which revealed an incompatible contradiction among factors. The study showed empirically and theoretically that the value added tax had little impact on corporate investment in Ethiopia and that other factors influenced company investment.

Alavuotunki, Haapanen, and Pirttilä (2019) investigated the consequences of the implementation of the value-added tax on disparity and revenues from government by using macroeconomic data. This study used the prior configurations of surrounding nations' VAT processes as a measuring tool to analyse VAT acceptability using typical nation fixed-impact regression analysis and key parameter assessments. The findings revealed that the VAT implementation raised disparities in earnings while leaving consumption

inequality unchanged. [Chavez and Dominguez \(2021\)](#) investigated the consequences of VAT improvements on Mexico's borders with other nations. According to the findings, the VAT increase had an advantageous impact on cost that was roughly half the amount of the complete transmission counterfactual. Furthermore, the changes had a detrimental effect on wages for employees while having no impact on job creation. Rewards did not eliminate the adverse effect on staff members' actual wages. The policy change had an adverse impact on utilization along Mexico's northernmost frontier but there was additionally little proof of an upsurge in purchasing on the US side of the boundary. [Santiago and Atsuyoshi \(2021\)](#) investigated how much a revenue-neutral increase in VAT compensated by a reduction in taxation on earnings would have distinct implications for the long-run expansion of the economies of the OECD. The findings indicated that raising the VAT base through smaller amount waivers and a more consistent rate arrangement with a lesser amount of decreases in rates supported advancement more than raising the conventional rates. [Liu et al. \(2022\)](#) investigated the underlying causes of the impact of a lower VAT rate on the financial expenses of businesses. The study concluded that lowering the VAT rate may substantially decrease the overall expenses of businesses implying that lowering the VAT rate has beneficial effects on lowering companies loads, promoting business vitality and boosting the efficiency of businesses. [Buterin, Drezgić, and Buterin \(2023\)](#) used vector auto-regression designs to investigate the impact of various taxation arrangements on the growth of the economy in the Republic of Croatia concluding that upfront taxes have an adverse impact on expansion while other types of taxes have no consequence. The VAT is the main component of the Croatian tax system which focuses primarily on collecting taxes on use but also distinguishes for having a high level of assessments. The statistics included in the estimation include multiple kinds of taxes, Gross Domestic Product (GDP) per capita, the rise in population, the creation of total fixed assets and the rate of joblessness from 2004 to 2019. The authors demonstrated that lowering the tax burden through direct taxes had positive economic, demographic and fiscal consequences.

### *2.2.2. Studies in Nigeria*

[Obiakor, Kwarbai, and Okwu \(2015\)](#) investigated the effects of value added tax on consumer behaviour and the final consumer cost index in Nigeria between 1994 and 2014. Results demonstrated that the value added tax and the one-period lag in transactions of costly goods had a significant impact on family spending on durable goods. In addition, useful major consequences for VAT have been assessed in relation to families' non-permanent item payments. Furthermore, VAT in its various forms as well as previous patterns of spending did not prevent families from paying prices and value added tax had a minimal impact on the end user price indices. [Ironkwe and Peter \(2015\)](#) investigated the impact of VAT on the cash flows of companies that are publicly listed. The study's conclusions showed that VAT has a little but unfavourable influence on the financial state of businesses associated with agriculture. [Ofogbe, Nweke, and Ogar \(2016\)](#) looked into the influence of VAT on the spending habits of consumers in South East Nigeria. The examination's predictions were computed using data from time series spanning 2011 to 2017. The ordinary least squares method was used to assess the assumptions. VAT had a significant impact on how much consumers spent on both alcoholic and non-alcoholic drinks in relation to the discoveries.

[Unegbu and Irefin \(2011\)](#) reviewed the impact of VAT on emerging economies' financial and human growth from 2001 to 2009 focusing on Adamawa State in Nigeria. The data was gathered both from primary and secondary sources. Statistical regression, variation assessment and an Analysis of Variance (ANOVA) approach were used to verify these assertions. Researchers found that the changes in Adamawa State's expenditure patterns were mostly driven by VAT spreads, accounting for 91.2% of those changes and that maintaining the VAT rate for the state throughout the aforementioned intervals was significant. Statistics gathered through additional resources showed that VAT had a significant impact on the state's growth in both the economy and society from 2001 to 2009 whereas data gathered through first-hand information suggested limited VAT perceptions. [Ofishe \(2015\)](#) investigated the impact of VAT on Nigerian GDP growth from 1994 to 2012. The results of the models proved that VAT has a hugely beneficial effect on the growth of the Nigerian economy. Furthermore, the study found a beneficial relationship between VAT and total tax revenue over the study period. [Otemu \(2020\)](#) conducted an in-depth review of data collected every quarter from 2000 to 2018 to assess whether value-added tax increases government income and decreases consumption in Nigeria. According to the results, value-added tax played an important role in fiscal revenue, it primarily regulated buying habits in Nigeria. [Omodero \(2020\)](#) discovered that VAT had a negligible but positive impact on consumption implying that the levy of VAT on goods and services discourages the consumption of certain food products and amenities while obviously permitting unregulated trading to flourish in Nigeria because consumers will prefer to purchase products and services that are VAT free in order to reduce household costs.

### *2.2.3. Studies in South Africa*

[Alderman and Del Ninno \(1999\)](#) investigated the effects of South Africa's proposed and existing tax benefits on low-income and economically disadvantaged families' protein and calorie consumption. The current VAT-free crop of maize turned out to be the best choice for minimum taxes in terms of fairness and their consequences for poor dietary intake. On the other hand, lowering tax rates on animal products where a

waiver had been proposed and liquid dairy products which are already exempt from VAT were ineffective means of assisting the underprivileged. Gcabo et al. (2019) studied the implications of getting rid of VAT zero-rating and using the resulting income to fund innovative social perks in South Africa. When compared to the present practice of zero rating certain consumer items in the VAT, the outcomes indicated that an overall strategy of an equitable VAT and a broader array of societal advantages might result in less income disparity and poverty. The results clearly displayed the importance of applying direct taxes and subsidies to accomplish redistributing over rules in indirect tax legislation. Alavuotunki et al. (2019) investigated the consequences of the implementation of the value-added tax on inequity and revenues from the government using newly available macro data. The findings suggested that the VAT's earnings effects had been negative, boosted disparities in earnings while leaving the disparity in consumption unchanged. Koloane and Makanisa (2020) examined the impact of increasing the VAT rate from 14% to 15% on revenue from the government and the collection of VAT throughout the years. According to computationally acceptable criteria, a 2% increase in the VAT rate raised spending by 4.2% in 2018-2019 and 5.8% in 2019- 2020. This culminates in an increase of 1.1% and 1.5% in general income in 2018-2019 and 2019-2020 respectively. Furthermore, the model predicts R313.9 billion to be collected at a 15% rate in 2020- 2021 with a decrease in collection due to the COVID-19 effects on tax collection. Erero (2021) determine the implications of raising the initially agreed-upon VAT rate from 14% to 15% on the South African economy. According to the research, when VAT increased from 14% to 15%, the immediate reactions of the shock from the Innovative Computable General Equilibrium (CGE) modelling implied GDP fell by 0.0002% in 2018 but rose by 0.0028% the following year. A further 1% rise in the VAT tax rate would bring the anticipated VAT collection up to R3.2 billion on an average schedule as the rising trend would continue until 2021.

### 3. Research Methods and Materials

The study investigates the effect of VAT on consumption in sub-Saharan Africa using Nigeria and South-Africa as case studies. The study period is from 1994-2022 because Nigeria's VAT implementation commenced in the 1994 fiscal year. For empirical estimation, the model was established as follows:

$$LNCPIt = \alpha_0 + \alpha_1LNVATt + \alpha_2LNEXGt + \epsilon t \tag{1}$$

Equation 1 presents LNCPi the consumption pattern and serves as the model's response variable in this study. LNVAT is the value added tax, LNEXG is the exchange rate prevailing in Nigeria and South-Africa,  $\alpha_0$  is the numerator,  $\alpha_1$  is the co-integrating matrix to be anticipated and  $\epsilon t$  is the traditional random error. Here, LNCPi means consumer price index expressed in natural log, LNVAT is the value added tax expressed in natural log and LNEXG represents the exchange rate. All data on relevant factors are given in billions of local currencies before conversion to natural log form. However, exchange rate was gathered in percentage form. The Pool Mean Group/Autoregressive Lag Model is used in econometrics to calibrate the longstanding relationship between two or more parameters based on stability metrics. To determine the short- and long-run interplay of VAT, exchange rate and economic service, the PMG is specified as follows:

$$\Delta yit = \sum_{k=1}^{p-1} \lambda * ik \Delta yi, t - k + \sum_{k=0}^{q-1} \delta' ik \Delta xi, t - k + \phi i(yi, t - 1 + \beta' iXit) + \omega i + \epsilon it \tag{2}$$

Where

Xit = Vector of explanatory variables for group which may be I(0), I(1) or mix.

lik,  $\delta' ik$  = Short-run coefficients.

lik = Coefficients of lagged dependent variables (scalers).

$\delta' ik$  = Coefficient vectors.

$\phi i$  = Group-specific error-correction coefficients.

$\beta i$  = The vector of long-run coefficients.

$\omega i$  = Group-specific fixed effects error term.

$\epsilon it$  = Error term.

This model provides assumptions that

$$\Delta yit = \sum_{k=1}^{p-1} \lambda * ik \Delta yi, t - k + \sum_{k=0}^{q-1} \delta' ik \Delta xi, t - k + \phi i(yi, t - 1 + \beta' iXit) + \omega i + \epsilon it \tag{3}$$

Where Pool Mean Group (PMG) long run coefficients assumes  $\beta i$  is same across groups (i.e., cross-sections) while the short run ( $\delta' ik$ ) and cointegrating ( $\phi i$ ) coefficients vary across groups. Dynamic Fixed Effect (DFE) assumes  $\beta i, lik, \delta' ik$  are same across groups. The mean group (MG) assumes  $\beta i, lik, \delta' ik$  vary across groups.

Table 1. Variable information

Variable code	Description	Measurement	Transformation	Source
LNCPi (Natural log for consumer price index)	Consumer price index	Percentage	Natural log	IMF
LNVAT (Natural log for value added tax)	Value added tax	Billions of naira	Natural log	Federal inland revenue service
LNEXG (Natural log for exchange rate)	Exchange rate	Percentage	Natural log	World development indicator

Table 1 provides details of all the variables applied in this study. The household consumption pattern is shown as LNCPI while the explanatory variables which are value added tax and exchange rate are shown as LNVAT and LNEXTG respectively.

#### 4. Results

We investigated the impact of VAT on households in sub-Saharan Africa with a focus on Nigeria and South Africa. This section presents the findings of the dataset analysis used in this study.

**Table 2. Descriptive statistics and correlation analysis**

Test type	CPI	VAT	EXG
Mean	2.11	8.50	3.46
Median	2.12	8.83	2.94
Maximum	4.29	12.7	5.94
Minimum	-0.37	1.62	1.27
Std. dev.	0.72	3.51	1.52
Observations	58	58	58
Correlation analysis			
Correlation	CPI	EXG	VAT
CPI	1.00	-	-
EXG	0.49	1.00	-
VAT	-0.71	-0.67	1.00

Table 2 shows the descriptive statistics and correlation analysis for the variable datasets. CPI, VAT and EXG have mean values of 2.1, 8.5, and 3.5 respectively. CPI, VAT and EXG have median values of 2.1, 8.8 and 2.9 respectively.

It is worth noting that the standard deviations of the variables (CPI, VAT and EXG) are all within a narrow range of 0.7, 3.5, and 1.5, respectively. On the other hand, the correlation matrix confirms a strong negative relationship between VAT and CPI as well as EXG and VAT while CPI and EXG are fairly positively correlated.

The findings imply that exchange rate fluctuations and increases in the cost of goods and services as a result of VAT inclusion typically have a negative impact on households in sub-Saharan Africa.

In Table 3, the study presents the unit root test results. LNCPI and LNVAT are stationary at level while LNEXTG becomes stationary at the first difference.

The panel unit root test before choosing evaluation tools is recommended by Im, Pesaran, and Shin (2003) and Levin, Lin, and Chu (2002). Therefore, the unit root result confirms the application of panel ARDL in this study.

**Table 3. Panel unit root test**

Variable	Levin, Lin & Chu t	Im, Pesaran and Shin W-stat	ADF-Fisher Chi-square	PP-Fisher Chi-square	Stationary
LNCPI	-4.94(0.00)	-4.75(0.00)	27.5(0.00)	16.5(0.00)	1(0)
LNVAT	-5.95(0.00)	-4.24(0.00)	23.8(0.00)	21.6(0.00)	1(0)
LNEXG	-5.97(0.00)	-4.61(0.00)	26.0(0.00)	25.8(0.00)	1(1)

Table 4 displays the panel ARDL results which show both the long- and short- run effects of VAT and EXG on household consumption.

In the long run, the t-statistic is 2.02 and the p-value is 0.05 indicating that VAT has a statistically significant positive impact on household consumption. The result of the findings shows that the first impact of VAT on households is unacceptable.

However, as time passes, every household in Africa tends to adjust to the change indicating that it will no longer affect their consumption pattern. On the other hand, the t-statistic of EXG is -3.2 while the p-value is 0.00 which is very significant but shows a negative effect of EXG on CPI. Thus, the result indicates that the exchange rate has a substantial detrimental effect on household consumption of goods and services in Africa.

Table 4 has also revealed that the speed of adjustment where there is disequilibrium will be at 93.5% and this is significant at the 10% level. All notable errors and imbalances of VAT and EXG rate effects on consumption during the short run can be adjusted so easily at 93.5%. This is the error correction model result in panel ARDL.

The short -run results of the variables also indicate that VAT can only have a positive and significant impact on consumption at lag 1. However, other variables in all the lags are insignificant.

Table 4. Panel ARDL results

Dependent variable: ln CPI				
Regressors: ln VAT, ln EXG				
Variable	Coefficient	Std. error	t-statistic	P-value
Long run equation				
LNVAT	0.21	0.11	2.02	0.05**
LNEXG	-0.72	0.22	-3.21	0.00***
Short run equation				
COINTEQ01	-0.93	0.50	-1.86	0.07*
D(LNCPI(-1))	0.42	0.28	1.49	0.14
D(LNCPI(-2))	0.07	0.17	0.45	0.66
D(LNVAT)	0.24	0.41	0.61	0.54
D(LNVAT(-1))	0.11	0.06	1.84	0.07*
D(LNVAT(-2))	-1.91	2.36	-0.81	0.42
D(LNVAT(-3))	-0.74	0.64	-1.15	0.26
D(LNEXG)	0.69	0.87	0.79	0.43
D(LNEXG(-1))	1.62	1.51	1.07	0.29
D(LNEXG(-2))	0.12	0.28	0.42	0.67
D(LNEXG(-3))	0.72	0.90	0.79	0.43
C	1.59	0.56	2.81	0.01**
S.E. of regression	0.28	Akaike info criterion		0.74

Note: \*, \*\* and \*\*\* specify level of significance at 10%, 5% and 1% respectively.

Table 5. Nigeria: Short run results

Variable	Coefficient	Std. error	T-statistic	Prob. *
COINTEQ01	-0.43	0.04	-12.0	0.00 ***
D(LNCPI(-1))	0.14	0.03	4.57	0.02**
D(LNCPI(-2))	-0.09	0.03	-3.27	0.05**
D(LNVAT)	0.65	0.26	2.54	0.08*
D(LNVAT(-1))	0.18	0.26	0.67	0.55
D(LNVAT(-2))	0.44	0.24	1.86	0.16
D(LNVAT(-3))	-1.38	0.20	-6.75	0.01***
D(LNEXG)	-0.18	0.06	-3.09	0.05*
D(LNEXG(-1))	0.11	0.04	3.04	0.05*
D(LNEXG(-2))	0.39	0.03	11.2	0.00**
D(LNEXG(-3))	-0.18	0.04	-4.32	0.02**
C	2.16	0.86	2.49	0.09*

Note: \*, \*\* and \*\*\* point out the level of significance at 10%, 5% and 1% respectively.

#### 4.1. Country-Specific Short Run Results

Table 5 shows the specific result of Nigeria in the short run. First, the speed of error adjustment will be 43.2% which is very significant at the 0.00 level. CPI has a significant positive impact on itself at lag 1 but a significant negative impact at lag 2. Furthermore, VAT at 1% has a negative impact on CPI but at lag 3, CPI has a negative reaction to VAT and EXG. EXG has a positive influence on CPI at lags 1 and 2. This finding differs from previous research (Ironkwe & Peter, 2015; Ofogbe et al., 2016; Omodero, 2020) which found that VAT had a negative impact on agricultural businesses and influenced consumption of household goods and services such as beverages and harmful products. In this study, VAT in Nigeria has a significant adverse effect on household consumption in the short run at lag 3.

Table 6. South Africa: Short run result

Variable	Coefficient	Std. error	t-statistic	Prob. *
COINTEQ01	-1.43	0.06	-22.5	0.00***
D(LNCPI(-1))	0.69	0.03	20.2	0.00***
D(LNCPI(-2))	0.24	0.01	17.2	0.00***
D(LNVAT)	-0.16	1.34	-0.13	0.91
D(LNVAT(-1))	0.05	1.44	0.04	0.97
D(LNVAT(-2))	-4.27	1.21	-3.54	0.04**
D(LNVAT(-3))	-0.09	1.68	-0.06	0.96
D(LNEXG)	1.55	0.15	10.4	0.00***
D(LNEXG(-1))	3.12	0.28	11.2	0.00***
D(LNEXG(-2))	-0.16	0.53	-0.30	0.78
D(LNEXG(-3))	1.62	0.48	3.38	0.04**
C	1.02	2.12	0.48	0.66

Note: \*, \*\* and \*\*\* indicate level of significance at 10%, 5% and 1% respectively.

Table 6 displays the short-run results of the analysis for South Africa. The error correction will be at 143% before equilibrium is established. CPI affects itself positively and significantly at lags 1 and 2 but VAT appears unimportant whereas EXG affects CPI positively and significantly at lags 1 and 3 but becomes minor at lag 2.

Previous research by Gcabo et al. (2019) found that equitable VAT rates reduced income disparity and poverty whereas Alavuotunki et al. (2019) found that VAT implementation raised income inequalities but did not change household consumption patterns in South Africa. However, VAT revenue was generally negative for the economy. This study confirms that VAT has negative impacts on household consumption although its level is insignificant.

Table 7. Model selection criteria

Dependent variable: LNCPI					
Model	LogL	AIC*	BIC	HQ	Specification
12	4.48	0.86	1.85	1.24	ARDL(3, 4, 4)
8	2.41	0.86	1.78	1.21	ARDL(2, 4, 4)
3	-3.73	0.87	1.56	1.13	ARDL(1, 3, 3)
7	-1.89	0.88	1.64	1.16	ARDL(2, 3, 3)
16	6.02	0.87	1.95	1.28	ARDL(4, 4, 4)
11	-0.31	0.89	1.73	1.21	ARDL(3, 3, 3)
15	1.18	0.91	1.83	1.26	ARDL(4, 3, 3)
2	-8.83	0.91	1.45	1.12	ARDL(1, 2, 2)
6	-7.05	0.92	1.53	1.15	ARDL(2, 2, 2)
4	-1.33	0.93	1.77	1.25	ARDL(1, 4, 4)
10	-6.60	0.98	1.67	1.24	ARDL(3, 2, 2)
14	-5.59	1.02	1.79	1.31	ARDL(4, 2, 2)
5	-14.3	1.05	1.51	1.22	ARDL(2, 1, 1)
1	-16.5	1.06	1.44	1.20	ARDL(1, 1, 1)
9	-13.8	1.11	1.65	1.31	ARDL(3, 1, 1)
13	-13.3	1.17	1.78	1.40	ARDL(4, 1, 1)

Note: \* indicates that AIC has the lowest lag among other lag selection criteria.

According to Table 7's lag selection criterion, the suitable lag for this study was determined using the lowest AIC (Akaike Information criteria) which is lags 3 and 4. Figure 1 shows the lowest lag in the graph.

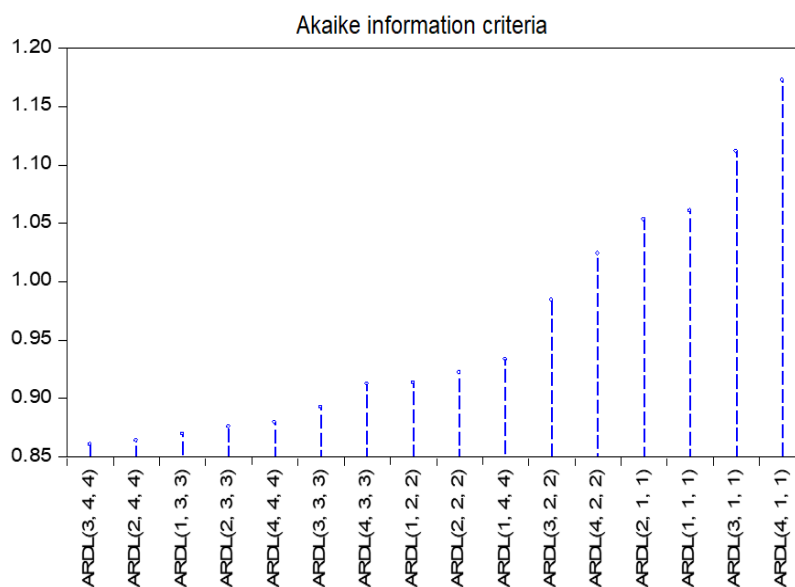


Figure 1. Lag selection criteria.



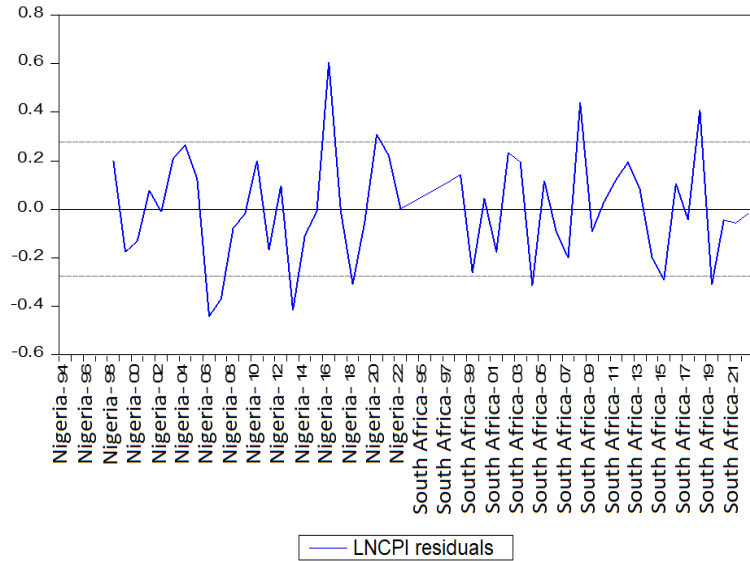


Figure 2. Robustness check of model.

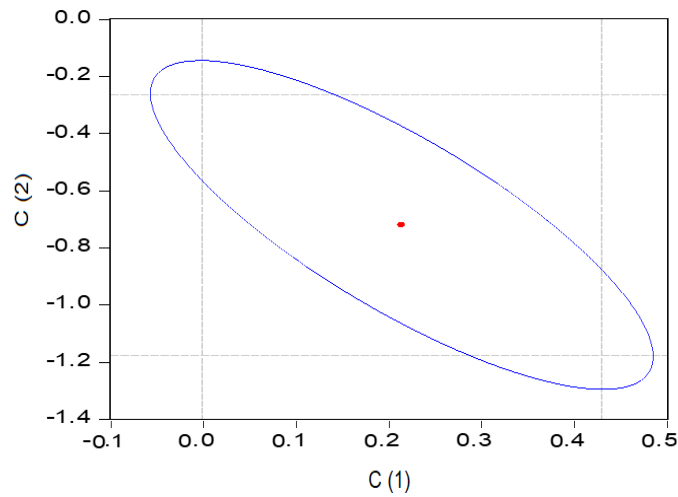


Figure 3. Confirmation of model stability.

Figures 2 and 3 show that our model is reliable and accurate. The circle in Figure 3 is within the 5% frontier as is the positioning of the red dot at the centre of the circle. The swinging of the blue waves between the 5% boundary lines in Figure 3 provides more confirmation of the reliability of the study outcomes. Figure 4 has also confirmed the normality of the dataset distribution using the p-value of 0.83 of the Jarque-Bera and a Kurtosis of approximately 3 to show that the datasets are evenly allocated.

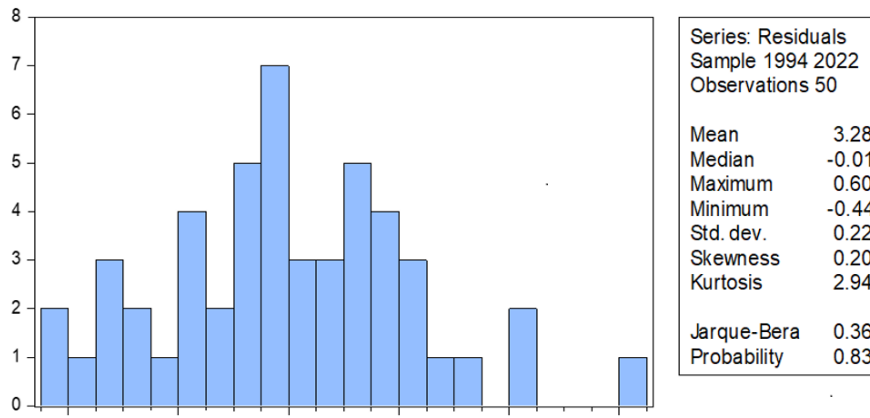


Figure 4. Confirmation of data sets normality

## 5. Conclusion

The introduction and implementation of VAT in sub-Saharan African regions are difficult in the short run. Our study covers Nigeria and South Africa from 1994 to 2021. This study confirms that African households appear to adjust to shocks brought on by the introduction of the VAT in the long run while the effect appears to be very detrimental to their household consumption in the short run. Thus, the government may need to create social awareness before implementing all VAT reforms. The government must organise a planned public awareness campaign before any VAT changes. Secondly, we propose zero VAT on basic household goods and services especially in poor sub-Saharan regions. The study has certain limitations. Due to a shortage of statistical data, we were unable to include additional sub-Saharan African regions in the research and instead concentrated on the largest economies having data that had been published and was available to the public. Future researchers might compare the results of this study to those from other African economies.

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