



Modeling the Economic Impact of Value Added Tax Reforms in Nigeria

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ABSTRACT

The purpose of this study is to verify the response of economic services to changes in value-added tax legislation. This research looked at all economic activities, including agriculture, transportation, communication, entertainment, construction, manufacturing, and financial services, among others. Nonetheless, the VAT policy amendment is intended to improve economic activity and provide funds for the government to carry out social obligations. However, it is critical to provide the government with empirical data to help guide these amendments as needed. The study employs ARDL and ECM to investigate both the long- and short-term effects of VAT reform on economic productivity enhancement. The data used in this study ranges from 1994, when VAT was fully implemented in Nigeria, to 2022. The use of these data allows for a thorough examination of the economic impact of VAT reform. The findings indicate that in the long run, VAT has a positive and significant impact on economic services, but in the short run, the findings show that VAT has an intangible impact on economic activities. The implication is that the economic service response to VAT reformation can only be tangible and positive in the long run when businesses are able to adjust to policy changes. The study also reveals that inflation is harmful to the economy in both the long and short run. As a result, the study suggests that policymakers keep an eye on inflation before raising or lowering the VAT rate in order to avoid a massive economic collapse.

KEYWORDS

VAT, economic activities, inflation, legislation amendment, tax policy reform

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Моделирование экономических последствий реформ налога на добавленную стоимость в Нигерии

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АННОТАЦИЯ

Целью исследования является оценка влияния изменений законодательства по налогу на добавленную стоимость на основные экономические процессы в Нигерии. Рассматривалось влияние реформ НДС на все виды экономической деятельности, включая сельское хозяйство, транспорт, связь, развлечения, строительство, производство и финансовые услуги. Изменения налоговой политики в отношении НДС призваны улучшить экономическую активность и обеспечить дополнительные средства правительству для выполнения социальных обязательств. В процессе таких реформ крайне важно предоставить правительству эмпирические данные, позволяющие оценить результативность данных реформ. В исследовании используются модели ARDL и ECM для изучения как долгосрочного, так и краткосрочного влияния реформ НДС на экономические показатели в стране. Данные, используемые в исследовании, варьируются от 1994 г., когда НДС начал применяться в Нигерии, до 2022 г. Использование этих данных позволяет тщательно изучить экономические последствия проводимых

реформ в сфере НДС. Результаты исследования показывают, что в долгосрочной перспективе НДС оказывает положительное и существенное влияние на экономические процессы в стране. В краткосрочной перспективе результаты показывают, что НДС оказывает несущественное влияние на экономическую деятельность. Обосновывается, что реакция экономики на реформу НДС может быть ощутимой и положительной только в долгосрочной перспективе, когда предприятия смогут приспособиться к изменениям в сфере НДС. Исследование также показывает, что инфляция вредна для экономики как в долгосрочной, так и в краткосрочной перспективе. Исследование обосновывает, что политики должны мониторить уровень инфляции, прежде чем повышать или понижать ставку НДС, чтобы избежать экономического коллапса.

КЛЮЧЕВЫЕ СЛОВА

НДС, экономическая деятельность, инфляция, изменение законодательства, реформа налоговой политики

1. Introduction

Tax policy amendments is the way the state receives and manages tax payments to suit the prevailing economic realities. Tax policy changes have objectives: many aims to lower the administration's tax burden on citizens, while others are aimed at rendering the tax structure a little more innovative. Others strive to standardize the tax system with the goal of making it more comprehensible and answerable to the people.

Tax reform became necessary in Nigeria because of the complexity of the country's tax system, which [1] described as extremely complicated, deformable, unproductive, unequal, and biased. Furthermore, the nation was reliant on duties on imported and exported goods, with no chances of earning income through consumer taxes such as VAT.

The nation's reliance on tax contributions associated with international economic relations had resulted in a highly volatile total income. Besides that, Nigeria's taxable income is really very limited, whereas the tax rate is extremely elevated.

Tax policy modification is a multidimensional and continuously emerging occurrence in all economies' tax system. Clause 30 of the Finance Act 2020 highlights the use of taxpayer identification number as a precondition for creating an account with a bank, which could reduce evasion and avoidance of taxes and thus enhance the compliance rate of tax paying citizens in the country [2]. Relevant provision of the Finance Act also invalida-

ted the part four of the old VAT Act, by raising VAT rate from 5% to 7.5% in the order to boost income and close the state's budget shortfall.

The tax on commodities and services, also known as Value Added Tax, is imposed on the economic benefit that occurs from every buying and selling. It is an implied tax collected from an individual other than the service user who carries the sales taxes expense.

A value added tax (VAT) is a form of taxation that is charged to products and services purchased by any service user, corporations, or persons. VAT is also known as a tax on expenditures that is charged at each phase of the payment but is ultimately incurred by the end user of such products or services [3].

In 1954, a French economics expert named Maurice Laure devised Value Added Tax as a sort of indirect tax and the concept was initially launched in France on April 10, 1954. Ever since, numerous advanced nations have adopted VAT as a type of national sales tax in their economic systems [4]. VAT has been discovered to be a treasure trove in certain regions in the past couple of decades.

Considering their experiences in industrialized regions, funding agencies, particularly the International Monetary Fund, have consistently advocated for this type of tax in emerging countries. Demi et al. [5] posit it that fiscal and economic legislative changes have a consequential effect on companies' financial performance, deliver less earnings to

households, decrease social assistance, and cause societal disparities to emerge, among other things.

The idea of VAT as a solution is based on the fact that it can generate considerable income because non-compliance is incredibly hard and the platform is broad [6]. A further justification for proposing VAT is the perception that it can be used to close the gap between rich and poor.

Gordon & Nielsen [7] are positive about the efficacy and fairness of VAT, which has received huge backing in later research [8–10] among others. Considering the mismatch arising from commercial operations between advanced and developing nations, Moore [11] posited that too much export obligations may deter domestic manufacturing, while exorbitant import taxes may dissuade imports. In quite an initiative to tackle this issue, research [12; 13] affirmed that the wealth inequality broadens in poor economies as reform efforts become more stringent. Authorities must keep researching all mechanism of redistributing funds and enhancing public's well-being, even though various taxes are imposed in Nigeria, the value-added tax continues to remain clearly different and has long been a recurring theme in legal review and public dialogue [14; 15].

The *purpose* of this study is to verify the response of economic services to changes in value-added tax legislation. The study specifically seeks to determine the consequences of VAT and inflation on economic services in an emerging economy.

Economic services in Nigeria comprises agricultural activities, construction of roads and bridges, tourism and entertainment, transport and communication, manufacturing, and financial services among others. However, the question is: do consumption tax and rising prices of goods and services affect economic services in the country? To pursue the main objective of this study, the following specific *objectives* are identified: (1) To determine the economic impact of value-added tax in Nigeria; (2) To establish the degree at which inflation affects economic activities in Nigeria.

The following null *hypotheses* are stated:
 H_{0_1} : VAT does not have significant economic impact in Nigeria.

H_{0_2} : Inflation does not have substantial economic effect in Nigeria.

Article structure. The study is divided into 5 sections which includes the introduction that states the background to this research, literature review, research approach, results emanating from the data analysis and the concluding remarks.

2. Literature review

2.1. Conceptual review

Tax reform is critical to increasing competitive strength through more cost-effective investment strategies, which ultimately result from the reduction or remediation of malfeasance, corrupt practices, and transaction processing incoherence, which previously characterize and create awareness of the restructuring when it is implemented [16].

According to the [17], substantial tax arrangement reform efforts have happened in a variety of industrialized nations, including Canada, France, Germany, Japan, Spain, the United Kingdom, and the United States, as well as emerging nations, including Eastern European countries, Russia, China, and other emerging markets. Germany, for comparison purposes, integrated a new tax initiative in 2000 that formalized the system for collecting taxes, resulting in a significant increase in revenue collection. The importance of tax law changes across both advanced and emerging nations worldwide is the lessening or elimination of budget deficits through acceptable taxation system re-vamping to draw increased earnings or to achieve better revenue flexibility or lightness of the taxation system [6]. Tax structure amendment is thus a purposeful strategy for increasing cash flow, increasing productivity, and promoting fairness [18].

According to [19], taxation cannot attain macroeconomic objectives, necessitating tax re-engineering and restructuring perspectives in the form they appear originally. Thus, tax policy changes are merely a set of initiatives launched by

the governments to improve tax revenue collection and the entire system of taxation. Reduced wealth creation is the result of poor taxation policy and ineffective tax system, and even the little that is produced is worn down by the great and powerful dirty fingers of pragmatism and bribery.

Furthermore, to the use of revenue mobilization policy changes to tackle the problem of perennially lesser government income, as proposed by [20,21], it was contended that an effective and successful tax administration legislation is a prospective facilitator for instantaneous amplification of an unfair tax system of government and self-interested propensity. The idea is not new, as Nigeria has implemented several tax legislative changes.

The various tax changes had the goal to increase the base of taxes, minimize the financial strain on taxpaying citizens, rebuild ratepayer sense of trust in the taxation system, and encourage conformity and taxpayers' voluntary compliance. Overall, the ultimate objective of tax policy amendment is to encourage greater government revenue gathering to carry out social obligations [22].

Value added tax, also known as the tax on products and services, is billed on the economic output that tends to result out of each buying and selling. It is a kind of hidden tax that is assessed to products and services for the value created at each step-in manufacturing and delivery [14]. VAT is an implicit tax paid from a party other than the participant who holds the expense associated with the tax.

The origins of VAT in Nigeria are traceable back to a systematic review on consumption taxes led by Dr. Sylvester Ugho in November 1991. Following that, a review panel chaired by Mr. Emmanuel Ijewere was formed to carry out a detailed investigation and provide suggestions. Value added tax was successfully added in Nigeria's tax structure following the outcome of the investigations, in 1993 by the VAT Act No. 102 of 1993 as a potential substitute for the sales tax that had previously been in process under Federal government Legislated decree No. 7 of 1986

but was prescribed by the states including Federal Capital Territory [3].

Value added tax is imposed on goods when value is added at a manufacturing phase and at completion of the sale, or a wide-ranging tax levied at numerous different manufacturing phases, with tax payments on factors of production recognized against tax payments on yield [4].

Thus, the sum of value added tax paid by the consumer is the price for the good less any previously taxed expenses of the components that make up the item. Numerous VAT frameworks have a base rate, special percentages for only certain products and services, and deferral position for such business activities or items and services [4].

2.2. Theoretical review

This research is based on the optimal taxation theory proposed by ethical humanist John Stuart Mill in 1871. According to [23], the goal of legislation in a normal ideal tax assessment is to maximize people's benefits, which is estimated using a social welfare model that is dependent only on the social assistance thresholds of people in the community.

Ramsey advanced optimal taxation in 1927 by introducing a principle for ideal primary commodities levies. Ramsey [24] observed that a rational agent looking to generate a specific amount of fiscal revenue through commodity taxes should levy such tax payments in opposition to the reflective consumer's demand flexibility for the good, with commodities experiencing relatively inelastic taxed more heavily.

Newbery & Stern [25] utilized best possible tax overhaul model to investigate the tax structural reforms using a regulatory regime. According to [25], the optimized income tax framework stresses how important it is to measure the influence of tax policy modification and assess both its administrative expenses and its implications for public social assistance.

The principal drawback to this strategy is that it requires a large amount of data, which is challenging to get in emerging regions [22]. Furthermore, optimized tax system remarkable success tax admi-

nistration, which does not arise in Nigeria or several other emerging economies [22]. The premise of this hypothesis is the belief that a decent tax system ought to be capable to encourage a functional community by reaching the highest sum of joy for the largest number of residents as a yardstick for taxes [26].

A VAT revenue growth achieved by widening the framework with very few exclusions and/or attaining a somewhat more homogeneous rack rate with lesser discounted rates could be more developmental furthering than earnings achieved by raising the basic rate, in determining the value to most of the taxable consumption, given that the latter increase is almost certain to negate the productivity improvements [27].

Onaolapo et al. [28] submit that when more items and services are levied, the government has the potential to collect sufficient funds to cope with the difficulties of her discretionary spending regarding the delivery of social and economic infrastructure and the operational expenses of the authorities.

Generally, tax reforms are a critical approach to controlling a state's financial configuration. The fact that several nations' tax administrations do not function optimally and/or misrepresent the primary aim of tax legislation [29] is an underlying confirmation of organizational botch.

2.3. Empirical review

Oriakhi & Ahuru [22] studied the effect of tax policy changes on tax earnings in Nigeria from 1981 to 2011. The study established a long-term relationship between tax legislative change and total federal revenue. Direction of causality demonstrated that customs and excise obligations, as well as real worth tax, granger induced amount of tax revenue. Ultimately, the research found that tax amendment, by strengthening the system of taxation and lowering the tax liability, increased the government's capacity for raising so much income.

Omesi & Nzor [6] investigated tax changes in Nigeria in terms of value added tax. It emphasized the causes for the sub-

stitution of value-added taxes for sales tax, the annual role of value-added taxes to the country's earnings base and disclosed that the implementation of value-added tax was intended to support advancement at the lower ranked of leadership. The article also confirmed that Nigeria has the minimum values added tax rate among nations.

By analyzing the impact of tax reforms on Nigerian future prosperity from 2000 to 2015, Herbert et al. [16] demonstrated that tax changes are a future direction of a nation's economic structural reforms and management. The research implemented an evolved statistical analysis dimensional framework to evaluate how to determine the extent tax reforms promote financial prosperity. The results proved, among many other things that VAT reform efforts had a good association with future prosperity, but the influence was minimal.

Ezenwafor [30] examined the effects of the value-added tax on Nigerian trade and industry progression from 2004 to 2019. At the 5-percentage threshold for importance, the researcher reported that the value added tax had a notable adverse effect on the gross domestic product per head of population in Nigeria.

Orisadare & Fasoye [15] used the price index for consumer goods as a lower limit to look at the impact of VAT on Nigeria's economic expansion between 1994 and 2020. A Tolerance Var Model method was used, and the findings confirmed that a VAT far above 10% predefined threshold harms the economic system, whereas a VAT below the 7.59 percent threshold level does not cause economic damage, but rather improves people's well-being. It is therefore recommended that the Nigerian economy maintain the lower VAT threshold in order to mitigate the impact of rapidly increasing Consumer prices on inhabitants.

Odu [31] examined the effects of VAT on raising revenue and the growth of the Nigerian economy from 1994 to 2018. The research determined that VAT had a considerable influence on all taxes collected with a two-year latency and that it progressively tried to explain modifications in the overall revenue from taxes

over time. The research additionally discovered that Goods and services tax had a major adverse impact on Economic output with a one-year time delay. The VAT pattern had a positive and statistically significant impact, denoting that VAT grew over the years.

Omodero & Eriabie [8] investigated how much VAT earnings affect manufacturing industry output. The said investigation examined the causal consequence of VAT earnings on manufacturing efficiency in the Nigerian economy using data from 2010 to 2021. The response variable was production outcome, and the explanatory variables were shipping VAT, household VAT, and total VAT receipts. Pairwise Granger Causality Evaluations were used in the study, which revealed that local VAT yields and combine VAT gathering had beneficial and substantial direct causal consequences on industrial output. The study also measured the relationships between the study objects, and the findings demonstrated that there is a strong connection between the research variables. The outcome of the study led to a conclusion that VAT is a potent stimulus in the nation's industry attractiveness.

Lalarukh & Chowdhury [4] examined the connection between VAT and Productivity growth in Bangladesh as well as how VAT made a significant contribution to the economic expansion of the nation from 1991 to 2012. The Johansen co-integration approach was used to assess the connection. In keeping with the study, the value added tax had a beneficial effect on gross domestic product and was able to contribute to the economic expansion of the nation.

Simionescu & Albu [32] investigated the effect of the standard VAT rate on productivity expansion in five Central and Eastern European countries between 1995 and 2015. The research showed that the VAT rate had a beneficial impact on growth in the economy. For both productivity expansion and the VAT percentage, there was a bilateral Causal relation. The study disclosed that it was only in Hungary the Bayesian existing models demonstrated an advantageous implication of

VAT on Economic output. Once VAT rates went up, other nations' Output growth rates fell in the near term.

Chan et al. [33] investigated the effect of public expenditure quality on economic expansion in 115 countries with a value-added tax structure. According to the research, the VAT scheme was identified as improving the overall impact of effectual government spending on growing the economy, and the VAT platform's moderating effects has been further reinforced by the democratic standards and the regulatory resilience of the authorities.

Gashi et al. [34] investigated the impact of the taxation system on Kosovo's economic progress from 2007 to 2015. The findings indicate that a great deal of tax contributions, together with VAT, had a productive effect on growing the economy.

Semenova [35] discovered that a 2% VAT rate increase imposed a huge strain on smaller firms. It was anticipated that as the tax burden increased, some businesses might well close because of a scarcity of finances, and investment opportunities in the Russian economy would decline. According to the study, a relatively high VAT rate might indeed compel overseas investment to consider leaving Russia.

Suna et al. [9] used the distributional autoregressive lag technique to assess the influence of indirect and direct taxation on economic progress in Turkey in order to determine the efficacy of taxes as a critical tool of policy decisions in an economic system. The findings from the investigations indicated that indirect taxes had an optimistic and significant effect on the growth of the economy, while direct taxes had a substantial and adverse effect. With the expansion of national production transmission, conventional market data could perhaps clearly describe the true extent to which trade occurs in a geographical area.

Sui et al. [36] sought to unveil the dynamic nature of serious trade along the "Belt and Road" by constructing a value-added trade route of "Belt and Road" nations and attempting to compare it to the trade system. When they compared the trade route to the VAT channel, they

discovered that the concentration of the VAT channel is significantly smaller than that of the trading route. Although the expansion of local economic magnitude and bilateral trade pacts will benefit both commerce and VAT, the study established that the financial shortfalls and population discrepancies among “Belt and Road” countries will prevent provincial commercial relations.

Hameed et al. [37] investigated the benefits and drawbacks of VAT on Small and medium enterprises (SMEs), finding that the detrimental consequences were more predominant.

Zhang et al. [10] reviewed the 2016 VAT distribution restructure to analyze the effect of revenue sharing on economic challenges and offer an alternate strategy for recovering the VAT sharing ratio. The investigation discovered that while the VAT sharing transformation ameliorated a number of the directional budget deficits induced by the legislative change of substituting corporate taxes with Value-added tax, it exacerbated lateral macroeconomic deficits and broadened provincial budgetary discrepancies.

Mitusova [38] noted, among other VAT issues, the challenges of unauthorized VAT reimbursement in the export of wood products connected with the adoption of new approaches by taxpaying citizens to minimize tax obligations and the complexity of the type of contractual arrangements in Russia. According to [39], VAT decrease is a vital platform for cultivating new dynamics for industrial prosperity which has had a substantial effect on regional fiscal pressure. Using the 2018–2019 VAT rate change in China as a case in point, their study used an Econometric model to determine the effect of the VAT decrease strategy on local fiscal stress in China in the context of the COVID-19 deadly virus. The findings demonstrated that local fiscal tension accelerated by 27.08%, from 0.342 to 0.435.

Sarwar et al. [40] investigated the impact of VAT and Vision 2030 on the Saudi economy. To test this, they examined how economic transition influenced the roles of labour, assets, price of crude oil, financial

deepening, and trade openness in economic progress. Based on the vector error correction approach, the effect of labour was bad after VAT, but the influence of finance and capital expansion was considerable. Crude prices coefficients are important and detrimental for both positive and adverse shocks. Budgetary growth and commercial liberalization revealed different outcomes; supply shocks have produced negative coefficients. Trade liberalization, on the other hand, had a major beneficial correction factor after Vision 2030.

Andrejovska & Helcmanovska [41] looked at the associations between identified macroeconomic indicators and VAT rates in 28 European states from 2004 to 2018. The findings indicate that a 1% upsurge in the basic VAT rate might cause a decline in each year increments when juxtaposed with the actual value systems of annual incremental steps for randomly chosen macroeconomic factors. In the end, this could have a detrimental effect on the economy in the near term by slowing growth.

The goal of tax policy reforms is to improve the social welfare of individuals in a country. Thus, the entire essence of VAT policy transformation is expected to improve general economic conditions in emerging economies such as Nigeria.

2.4. Elaboration of the problem

As we have shown the works of [6; 8; 15; 30] partially pursued this goal but were inconclusive as to the effect of VAT reform on general economic activities in both the short and long term. In the context of other economies, the works of [33–38], for example, expressed the extent to which VAT implementation affected government spending, economic growth, foreign investment, provincial commercial relations, SMEs, exportation, and fiscal equilibrium. In this study, we model the economic impact of VAT reform in Nigeria in both the long and short term.

This study fills a gap by examining the impact of VAT policy changes on general economic activities to determine their effectiveness in improving economic activities, which leads to a betterment in public social well-being.

3. Methodology

For empirical estimation, the model was established as follows:

$$\text{LogESV}_t = \alpha_0 + \alpha_1 \text{LogVAT}_t + \alpha_2 \text{LogINF}_t + \epsilon_t \tag{1}$$

LogESV, also known as economic services, is the model's response variable, LogVAT is the value added tax, LogINF is inflation, α_0 is the numerator, α_1 is the co-integrating matrix to be anticipated, and ϵ_t is the traditional random error.

All data on relevant factors are given in billions of local currencies before conversion to log form. However, inflation was gathered in percentage form.

The ARDL model is used in econometrics to calibrate the longstanding relationship between two or more parameters premised on stationarity metrics. To determine the short- and long-run interplay of VAT, inflation, and economic service, the ARDL bound-testing method recommended by [42] and [43] has been used.

The ARDL bound-testing method has been chosen over other analytical techniques by scholars such as [44; 45], because it allows factors to be static at varying degrees [I(0), I(1)] and regression coefficients to have divergent appropriate lag sizes when using the traditional co-integration operation [43].

The following hypothesis is proposed to verify the occurrence of co-integration between the variables included in the model:

$H_0: b_{1i} = b_{2i} = b_{3i} = 0$ (There is no long-term relationship in these series).

$H_1: b_{1i} \neq b_{2i} \neq b_{3i} \neq 0$ (There is long-term relationship in these series).

(Where $i = 1, 2, 3$).

Therefore, the specification for bound test include:

$$\begin{aligned} \text{LogESV}_t &= \alpha_{01} + b_{11} \text{LogESV}_{t-1} + b_{21} \text{LogVAT}_{t-1} + b_{31} \text{LogINF}_{t-1} \\ &+ \sum_i^p = 1\alpha_{1i} \Delta \text{LogESV}_{t-i} + \sum_i^q = 1\alpha_{2i} \Delta \text{LogVAT}_{t-i} + \sum_i^q = 1\alpha_{3i} \Delta \text{LogINF}_{t-i} + e_{1t} \end{aligned} \tag{2}$$

Long-run model specification is highlighted below:

$$\text{LogESV}_t \rightarrow \alpha_{01} + b_{11} \text{LogESV}_{t-1} + b_{21} \text{LogVAT}_{t-1} + b_{31} \text{LogINF}_{t-1} + e_{1t} \tag{3}$$

$\text{LogESV} C \text{LogESV}(-1) \text{LogVAT}(-1) \text{LogINF}(-1)$

Error correction model (ECM) specification:

$$\begin{aligned} \Delta \text{LogESV}_t &= \alpha_0 + \sum_i^p = 1\alpha_{1i} \Delta \text{LogESV}_{t-i} + \sum_i^s = 1\alpha_{2i} \Delta \text{LogVAT}_{t-i} + \sum_i^s = 1\alpha_{3i} \Delta \text{LogINF}_{t-i} + \lambda \text{ECM}_{t-1} + e_t \end{aligned} \tag{4}$$

$d(\text{LogESV}) C d(\text{LogESV}(-1)) d(\text{LogVAT}(-1)) d(\text{LogINF}(-1)) \text{ECM}(-1)$

Table 1 provides details of all the variables applied in this study. The economic service is shown as LogESV, while the explanatory variables which are value added tax and inflation are shown as LogVAT and LogINF respectively.

4. Results

Table 2 depicts the model's data description, which includes mean, median, minimum, maximum, standard deviation, skewness, kurtosis, and Jarque-Bera test values. The skewness and kurtosis values indicate that the dataset does not have any skewed value issues or problems. Because the Jarque-Bera value is inconsequential

Table 1

Variable Information

Variable Code	Description	Measurement	Transformation	Source
LogESV	Economic Service	Billions of Naira	Logarithm form	Central Bank of Nigeria
LogVAT	Value Added Tax	Billions of Naira	Logarithm form	Federal Inland Revenue Service
LogINF	Inflation rate	Percentage	Logarithm form	World Development Indicator

Source: Research output, 2023.

which prove that all of the variables are evenly dispersed.

Table 2 shows that VAT is positively and strongly related to economic services and is not harmful to them because it is not felt due to its indirect phenomenon. However, as shown in Table 2, inflation is always detrimental to economic activity and has no positive relationship with it.

The unit root result for the factors used in this investigation is shown in Table 3. We used the conventional Augmented Dickey Fuller and Phillip Peron methods, and the results are the same, implying that LogESV is stationary at first difference or order one (1). LogVAT and LogINF are also established to be stationary at level or order zero. These

findings influenced the use of ARDL because it is the most applicable and useful technique based on the unit root test results.

It is observed that in Table 4, VAT has a considerable affirmative influence on economic services while inflation has been shown as have a destructive effect at 10% level of significance. However, at lag 2, inflation becomes more detrimental to economic activities at 1% degree of relevance. Although these results come from the unrestricted ARDL result, but it quickly tells us that inflation is not a good omen to the economic situation and no matter how much VAT contributes to the economy, inflation diffuses the immense benefits.

Table 2

Descriptive Statistics			
Index	ESV	VAT	INF
Mean	2.007	2.254	1.121
Median	2.307	2.460	1.093
Maximum	2.750	3.213	1.862
Minimum	0.592	0.702	0.732
Std. Dev.	0.676	0.701	0.249
Skewness	-0.845	-0.624	1.361
Kurtosis	2.451	2.239	3.161
Jarque-Bera	3.682	2.492	14.09
Probability	0.159	0.288	0.087
Sum	56.20	63.10	31.40
Sum Sq. Dev.	12.35	13.25	1.686
Observations	28	28	28
Correlation analysis			
ESV	1.000		
VAT	0.955	1.000	
INF	-0.465	-0.431	1.000

Source: Authors' calculation, 2023.

Table 3

Unit Root Calculation								
Variable	ADF T-Stat	Critical value @ 5%	P-Value	Order of Integration	PP T-Stat	Critical value @ 5%	P-Value	Order of Integration
LogESV	-6.32	-2.98	0.00	1(1)	-6.32	-2.98	0.00	1(1)
LogVAT	-5.57	-2.98	0.00	1(0)	-4.05	-2.98	0.00	1(0)
LogINF	-4.82	-2.98	0.00	1(0)	-4.66	-2.98	0.00	1(0)

Source: Authors' calculation, 2023.

The study used ADF and PP unit root tests to ascertain data stationarity, and the outcomes of both testing methods are shown in Table 3. Given that some parameters were I(0) and the other is I(1), the results reinforce the application of the ARDL bounds assessment [42]. Both tests showed that the ESV factor was distinction static, while the VAT and inflation indicators were level stationary. Based on this, a bound test must be performed to confirm the co-integration type and ensure that the required lag length is preferred.

As a result, Table 5 shows that the F-statistic value is 5.113, which is greater than both the lower bound of 3.79 at the critical value of 5% and the upper bound of 4.85 at the critical value of 5%. On this basis, we conclude that long run co-integration exists, as supported by [42; 45]¹.

Having established the long run relationship, the test is carried out and the long run result is displayed in Table 6. The results of the short run are reflected in Table 7.

¹ <https://davegiles.blogspot.com/2013/06/ardl-models-part-ii-bounds-tests.html>

Table 4

Unbound ARDL results

Variable	Coefficient	Std. Error	t-Statistic	P-value
LOGESV (-1)	-0.009	0.191	-0.049	0.962
LOGVAT	2.116	0.845	2.504	0.023**
LOGVAT (-1)	-0.928	1.191	-0.779	0.447
LOGVAT (-2)	1.565	1.189	1.316	0.206
LOGVAT (-3)	-1.726	0.859	-2.008	0.062*
LOGINF	-0.511	0.285	-1.789	0.092*
LOGINF (-1)	-0.074	0.262	-0.283	0.781
LOGINF (-2)	-0.777	0.228	-3.404	0.004**
C	0.911	0.425	2.141	0.048

Notes: R-squared = 0.93; Adjusted R-squared = 0.89; S.E. of regression = 0.17; F-statistic = 27.65; P-value (F-stat) = 0.00; Durbin-Watson stat = 2.07; ** represents significant level at 5%; * Represents significant level at 10%; Research output, 2023.

Table 5

ARDL Bounds Test

F-statistic value	Critical values, %	I(0)	I(1)
5.113	10	3.17	4.14
	5	3.79	4.85
	2.5	4.41	5.52
	1	5.15	6.36

Source: Authors' calculation, 2023.

Table 6

Long run result (Dependent variable: LogESV)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.645	0.289	2.234	0.035
LOGESV (-1)	0.319	0.193	1.654	0.112
LOGVAT (-1)	0.509	0.187	2.721	0.012***
LOGINF (-1)	-0.309	0.173	-1.786	0.087**

Notes: R-squared = 0.91; Adjusted R-squared = 0.90; S.E. of regression = 0.19; F-statistic = 82.24; P-value (F-stat) = 0.00; Durbin-Watson stat = 2.23; *** represents significant level at 1%; **Represents significant level at 10%; Research output, 2023.

5. Discussion

The result of the long run test performed is shown displayed in Table 6. From Table 6, VAT has positive *t*-statistics of 2.721 and *p*-value of 0.012 which is less than 0.05. On the contrary, inflation has a negative *t*-statistics of -1.786 and a *p*-value of 0.087 adjudged significant at 10% level of significance. The information provided in Table 6 suggests that VAT has a significant positive effect on economic activities, but inflation is very harmful to economic services. The positive and significant effect of VAT on economic services confirms the strong and positive relationship established in Table 2 as well as the unstructured ARDL result in Table 4.

The null hypothesis that VAT does not a significant influence on economic services in the long run is rejected. Thus, the findings of [4; 8; 16; 31-33] support this outcome but there is a disparity between this result and the findings of [30; 35; 41]. At 10% level of significance, inflation hurts the economy. Here, the null hypothesis is not rejected.

Following the other information provided, we established from the Durbin-Watson result that there is no au-

torrelation, and the predictor variables jointly affect the economic services using F-statistics and the *p*-value shown in Table 6. There is also a confirmation through the standard error of regression of 0.19 that our prediction is without error.

As a result, as shown in Table 7, in the short run, VAT has a negligible positive effect on economic services while inflation is insignificantly negative. ECM(-1) has a -4.290 hurtful *t*-statistic, a 0.000 *p*-value, and a statistically relevant coefficient of -1.343. It affirms that if the numerous factors veer away from the synchronization target level by 1% in the short term, they will revert back to adjustment by approximately 100% on annual basis. That is, the return to equilibrium is 100% guaranteed in the event of any disequilibrium.

The cumulative sum of recursive graph (Figure 1) depicts the robustness of the study’s model by showing the blue line between the frontiers of the red dotted lines which implies that at 5% level of significance the model is stable.

The cumulative sum of squares graph (Figure 2) provides a confirmation that Figure 1 is correct and that the model ap-

Table 7

Short run result (Dependent variable: LogESV)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001	0.062	-0.020	0.984
D(LOGESV (-1))	0.527	0.242	2.183	0.041**
D(LOGVAT (-1))	0.366	0.566	0.647	0.524
D(LOGINF (-1))	-0.015	0.179	-0.085	0.933
ECM(-1)	-1.343	0.313	-4.290	0.000

Notes. R-squared = 0.50; Adjusted R-squared = 0.41; S.E. of regression = 0.18; F-statistic = 5.35; P-value (F-stat) = 0.00; Durbin-Watson stat = 2.00; ** represents significant level at 5%; Research output, 2023.

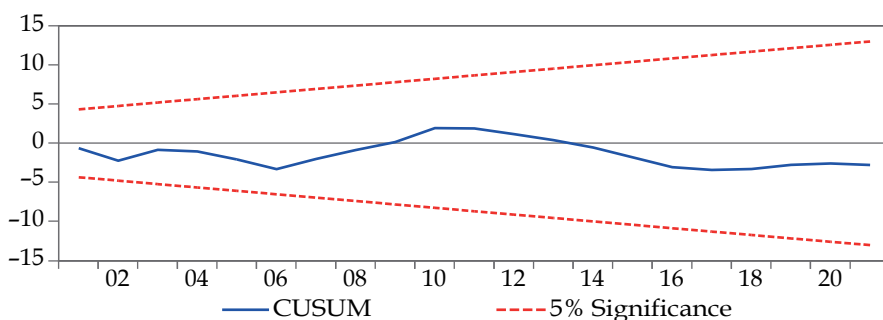


Figure 1. Cumulative sum of recursive graph

plied in this study is free from structural breaks.

Figure 3 endorses that the recursive coefficients estimates are correct, and the models are free from bias. This is confirmed by the blue lines not exceeding the red dotted lines.

The normality check confirms that all datasets used in this study have a uniform distribution. The Kurtosis is approximately 3, and that is the benchmark, and most importantly, the p-value of the Jarque-Beta is 0.25, which is greater than the 0.05 level of relevance (Figure 4, Table 8).

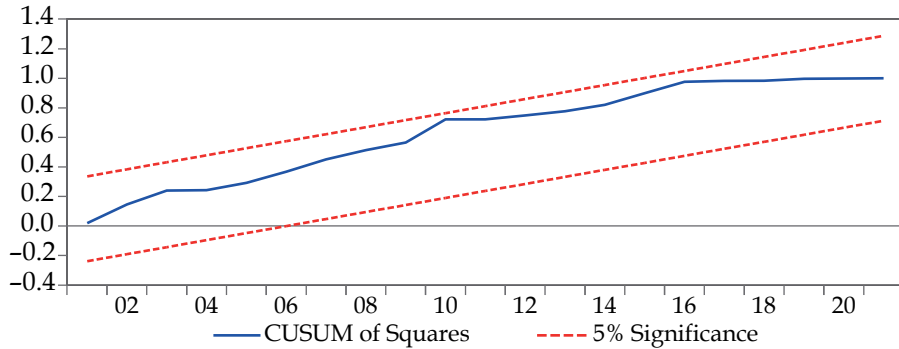


Figure 2. Cumulative sum of squares graph

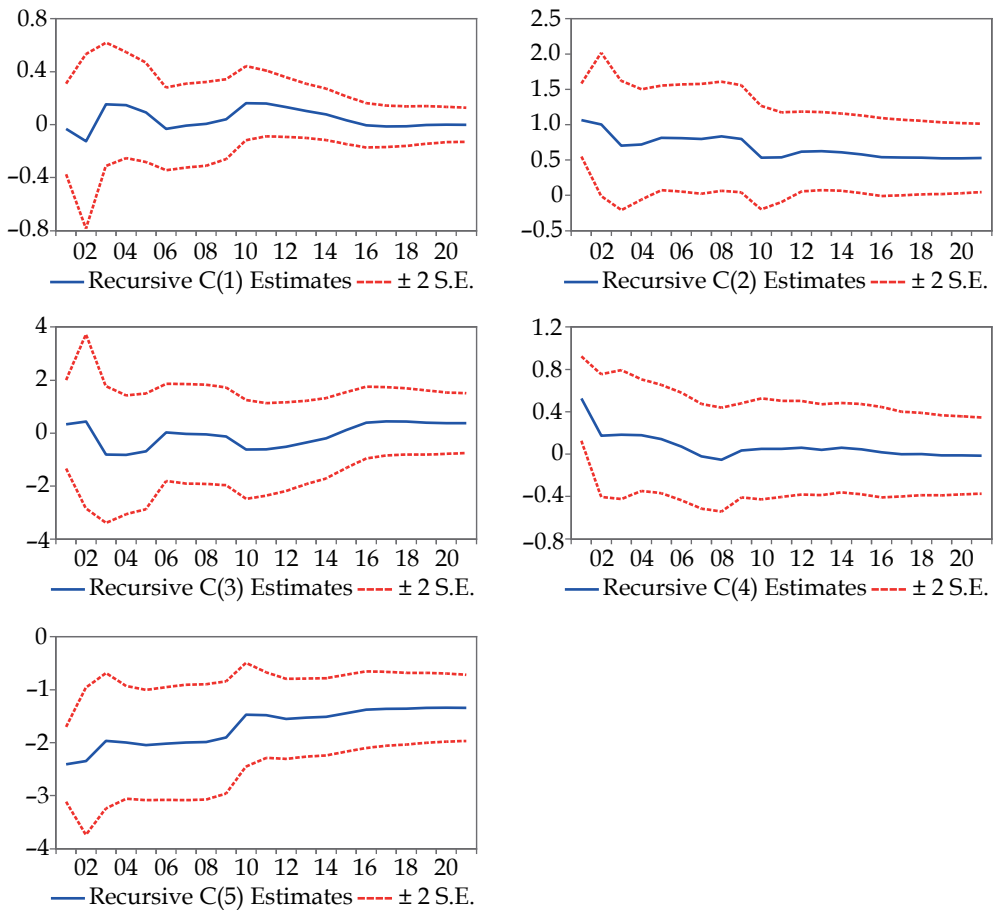


Figure 3. Recursive coefficients

The skewness is also fairly and positively skewed. All of these are indicators that the datasets are appropriate and correctly apportioned.

The structural rigidity verification shown in Figures 1–3 demonstrate that the model we have developed is reliable and free of structural flaws. We also tested for data sharing normal function in Figure 4, and the final outcome reaffirms that there is no problem with dataset, as indicated by the Jarque-Bera p-value of 0.255. A further examination of multi-collinearity proves that predictors are not interdependent.

6. Conclusion

The study concludes that VAT is coherent with commercial development in the long term because it has a major and beneficial effect on all economic services, but there is no impact in the short run.

The study also shows that inflation is hurtful to economic activities in both

the short and long term. Although in the short term, it appears immaterial but over time it depresses businesses and reduces purchasing power of households and enterprises.

Therefore, the outcome of this study confirms that VAT has a beneficial and positive economic impact in the long run but not in the short run while inflation is detrimental to the economy at both ends.

Thus, H_{01} is declined while we do not reject H_{02} . The optimal taxation theory used in this research is supported by this result which shows that when VAT reform is optimally applied, in the long run, it tends to benefit both the government and the entire economy.

The policy recommendation is that VAT reform be reviewed on a regular basis to avoid a short-term zero effect. When the VAT rate remains stable, both producers and consumers are unaffected. However, an increase in VAT rates raises the cost of

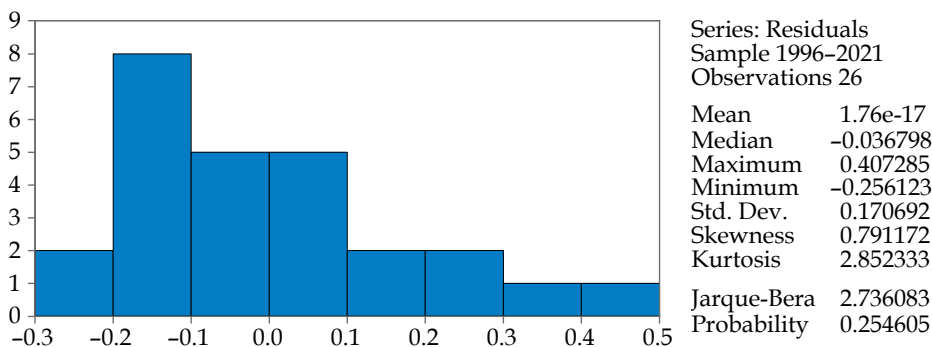


Figure 4. Normality test confirmation

Table 8

Further Robustness test		
Type of test	Statistic	P-value
Autocorrelation/Serial Correlation LM Test	0.001	0.971
Heteroskedasticity Test	1.696	0.187
Ramsey RESET Test	1.963	0.176
Normal distribution check (Jarque-Bera)	2.736	0.255
Multi-collinearity test	Coefficient	VIF
LogESV	0.058	2.475
LogVAT	0.320	1.050
LogINF	0.032	1.009

Source: Author’s calculation, 2023.

goods and services, which may cause consumers to abandon certain goods and services, such as luxury goods and services, reducing the output of manufacturers of such economic goods and services.

In this study, the negative impact of inflation is also worth noting. As a result, before raising the VAT rate, the government should consider the impact of inflation, as increases in both economic forces (inflation and VAT rates) will harm the country's economic system.

This research looked at all economic activities, including agriculture, transportation, communication, entertainment, construction, manufacturing, and financial services, among others. The Central Bank publication enabled the collection of statistics for all economic activities. According to the study, future research in this area may need to break down these economic activities and apply a segment of choice rather than the entire economic activities as used in the current work.

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