International Journal of Business Diplomacy and Economy
ISSN: 2833-7468
Volume 03 Number 01 (January) 2024
Impact Factor: 10.45
SJIF (2023): 5.208

www.inter-publishing.com

Tax Compliance Behaviour and Revenue Generation in Nigeria

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ABSTRACT

This research aims to investigate the nexus between tax compliance behavior and revenue generation in Nigeriafrom 1994 to 2022. The study investigates the level of compliance across different types of tax elements such as Value Added Tax (VAT), Corporate Income Tax (CIT), Personal Income Tax (PIT), Capital Gains Tax (CGT), Education Cess (CED), and Professional Property Tax (PPT). Data was sourced from the Federal Inland Revenue Services and the Central Bank of Nigeria. Employing an ARDL Cointegrating model, the study reveals varying degrees of compliance based on coefficients and statistical significance. High compliance rates are observed in VAT, followed by CIT. PIT, CGT, and CED show lower levels of compliance, and PPT shows a lagged but positive relationship. The study concluded that the key factors influencing compliance include the complexity of the tax code, enforcement mechanisms, and societal attitudes toward each type of tax. VAT shows high compliance due to its simplicity and strong enforcement, while CIT compliance is influenced by audit likelihood and reputational risks. PIT has complex regulations, which may lead to lower compliance rates. CGT and CED may suffer from a lack of understanding and lower enforcement. PPT compliance varies significantly depending on local administration efficacy. The study recommends that the nature of compliance can be improved through simplification of tax codes, better enforcement, and public education campaigns. The study integrates insights from previous research and offers a comprehensive framework to understand tax compliance across different revenue streams.

KEYWORDS: Tax Compliance, Revenue Generation, Tax System, Nigeria, Tax Evasion, Tax Administration

INTRODUCTION

Taxation is a vital instrument for revenue generation in any nation, as it serves as a primary source of income for the government to finance public services (Musgrave & Musgrave, 1989). Tax compliance and revenue generation are topics of immense importance for the economic stability and growth of a nation. As governments strive to deliver public goods and services, maintain law and order, and implement social welfare programs, the issue of sustainable revenue generation becomes a cornerstone for governance. In

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developing economies like Nigeria, this subject takes on heightened urgency due to resource constraints, competing developmental needs, and oftentimes, economic volatility (Akanle & Adeyeye, 2018).

The Nigerian government has various avenues for generating revenue, such as oil sales, grants, and aid. However, taxation has been identified as a more sustainable and predictable source of income (Onaolapo, Aworemi, & Ajala, 2019). Despite this realization, tax compliance rates in the country remain sub-optimal. Data indicates that the tax-to-GDP ratio in Nigeria is one of the lowest globally, standing at about 6% as of 2019, a figure far below the 15% considered most desirable for developing economies by the International Monetary Fund (IMF, 2019).

Research in recent years has shown a trend of low tax compliance in Nigeria, particularly among small and medium-sized enterprises (SMEs). This poor tax compliance behavior impacts revenue generation and, consequently, the government's ability to fund public services adequately (Alade, Abiola, & Afolabi, 2020). Several factors have been cited for this situation, including a lack of awareness, the complexity of the tax system, and issues of corruption and mistrust in the government's ability to utilize tax revenue effectively (Adegbite, Ayadi, & Ayadi, 2019).

Given the importance of tax compliance for revenue generation and the lacuna in existing literature concerning the Nigerian context, this study seeks to explore the relationship between tax compliance behavior and revenue generation in Nigeria. The aim is to provide updated, context-specific insights that could inform policy-making and potentially improve the state of tax compliance and revenue generation in the country (Fashina, Adegbite, & Olowookere, 2021).

Nigeria, a country in West Africa, has experienced inconsistent tax compliance behavior among its populace, thereby affecting the nation's revenue generation adversely. Despite the robust body of literature on tax compliance, there is a prevailing research gap concerning the study of institutional factors that impact tax compliance behavior in Nigeria, particularly from a multi-dimensional perspective that encompasses different types of tax remittances such as Petroleum Profit Tax (PPT), Personal Income Tax (PIT), Company Income Tax (CIT), Capital Gains Tax (CGT), Custom & Excise Duties (CED), and Value Added Tax (VAT). While several recent studies have delved into the issues surrounding tax compliance, the focus has predominantly been on individual or private sector behavior (Fashina, Adegbite, & Olowookere, 2021; Alade, Abiola, & Afolabi, 2020).

Current literature often constrains its scope to one or two types of taxes, usually income tax or corporate tax, thereby failing to provide a comprehensive overview of tax compliance in its entirety. The recent works do not sufficiently explore the institutional nuances, especially relating to different categories of tax remittances and how they contribute to overall revenue generation in Nigeria (Onaolapo, Aworemi, & Ajala, 2019; Adegbite, Ayadi, & Ayadi, 2019).

Even as the petroleum sector represents one of Nigeria's most significant revenue streams, there is a dearth of scholarly research focusing on Petroleum Profit Tax (PPT) compliance behavior. Similarly, there is limited understanding of how compliances and remittances from Personal Income Tax (PIT), Company Income Tax (CIT), Capital Gains Tax (CGT), Custom and excise Duties (CED), and Value Added Tax (VAT) influence revenue generation in Nigeria (Akanle & Adeyeye, 2018).The problem, therefore, is twofold: First, there is an incomplete understanding of tax compliance behavior in Nigeria due to the predominant focus on private sector compliance, often to the exclusion of critical institutional factors. Second, there is a lack of comprehensive studies that explore how compliance varies across different types of tax remittances, which are vital for the country's revenue generation.Against this backdrop, this study

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aims to fill this research gap by examining how compliance behaviors related to PPT, PIT, CIT, CGT, CED, and VAT, influence revenue generation in Nigeriathroughout 1994 to 2022.

Literature Review

Theoretical Framework

To rigorously examine the relationship between tax compliance behavior and revenue generation in Nigeria, the study will employ a blend of modern theories that speak directly to the dynamics of public finance and taxation. The integration of these theories will help dissect the variables of tax compliance, such as Petroleum Profit Tax remittances (PPT), Personal Income Tax remittances (PIT), Company Income Tax remittances (CIT), Capital Gains Tax remittances (CGT), Custom & Excise Duties remittances (CED), and Value Added Tax remittances (VAT).

Behavioral Economics Theory of Tax Compliance

Recent advancements in behavioral economics have started to critically evaluate the motivations behind tax compliance. This theory posits that tax compliance is not solely determined by the rational calculation of benefits against costs but is also influenced by moral and social factors (Alm, Sanchez & De Juan, 2020). The theory will help the study explore the psychological factors affecting tax compliance behaviors in Nigeria.In the context of Nigeria, a country characterized by informal economic activities and a complex taxation system, understanding the psychology behind tax compliance is pivotal. The behavioral economics theory of tax compliance sheds light on the reasons behind compliance or non-compliance that are not strictly tied to economic rationality. For instance, tax morale in Nigeria may be influenced by perceived corruption and inefficiency in the utilization of tax revenues (Asongu& Odhiambo, 2019). This theory allows us to investigate whether altruistic motivations or social norms are compelling enough to improve compliance, which would subsequently boost revenue generation.

Institutional Theory

Contemporary research by Prichard (2019) has emphasized the impact of institutional factors on tax compliance. This theory suggests that the effectiveness of tax institutions can significantly influence compliance rates. Given that our study aims to include institutional factors, such as administrative efficacy, in its purview, this theory will be crucial.Nigeria has historically grappled with challenges related to its tax administration. These include corruption, weak enforcement, and a lack of taxpayer education (Adebisi &Gbegi, 2013). The institutional theory can guide policymakers in understanding how the strengthening of institutions can lead to increased tax compliance. This theory can offer a framework for evaluating the effectiveness of Nigerian tax agencies like the Federal Inland Revenue Service (FIRS) in influencing compliance behavior among corporations and individuals.

Game Theory

The strategic interaction between the taxpayers and the government can be best understood using game theory. Slemrod and Yitzhaki (2018) employed this to analyze how changes in tax policy or administration affect compliance. The application of game theory will help this study to assess how different strategies employed by the Nigerian government affect tax compliance behavior, especially regarding various categories like PPT, PIT, and CIT.Given that the Nigerian government has recently embarked on various tax reforms, game theory can provide crucial insights into how taxpayers and tax authorities interact under these new conditions. For example, Nigeria introduced the Voluntary Assets and Income Declaration Scheme (VAIDS) to improve compliance rates (Ajide& Ibrahim, 2018). Game theory allows for the

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modeling of how taxpayers might respond to such an initiative and how that, in turn, might affect the government's strategies for revenue generation.

Fiscal Sociology Theory

According to Campbell (2020), tax systems are a reflection of a society's social and cultural values. This theory provides a framework to investigate how societal beliefs and norms influence tax compliance behavior and revenue generation. Fiscal Sociology Theory will be particularly useful in exploring how societal perceptions in Nigeria contribute to tax compliance or evasion.Nigeria's diverse cultural landscape, coupled with various social and political dynamics, plays a significant role in shaping its fiscal policies and tax compliance behaviors (Ogbonna & Appah, 2014). Understanding the social fabric that influences tax behavior can provide a richer, more nuanced view of tax compliance. For example, in certain Nigerian communities where tax evasion is viewed as a form of civil disobedience, fiscal sociology theory can help policymakers understand the societal levers that can be pulled to improve compliance.

Dynamic Stochastic General Equilibrium (DSGE) Model

Recent works by Roeger and Veld (2021) have employed DSGE models to assess how tax policies affect economic variables. This theory could offer a mathematical framework to quantify the impact of tax compliance on revenue generation over time, considering economic fluctuations.The Nigerian economy is susceptible to various shocks, including fluctuations in oil prices, foreign exchange rates, and political instability. Using a DSGE model would allow for the simulation of how these shocks would impact tax compliance and government revenue. This is particularly relevant for taxes closely tied to the oil sector, like the Petroleum Profit Tax (Olayiwola&Okodua, 2010).

Conceptual Framework

Historically, tax compliance in Nigeria has faced numerous challenges, ranging from poor administration to widespread evasion. Since the colonial era, taxation has been a contentious issue, compounded by the country's diverse cultural and economic landscape (Agyei & Addae, 2020). In the last few decades, with the diversification of the economy, the Nigerian government has initiated several tax reforms to boost compliance and increase revenue. These include the introduction of the Tax Identification Number (TIN) and the implementation of the Voluntary Assets and Income Declaration Scheme (VAIDS) (Ogbonna & Ebimobowei, 2012). Despite these reforms, tax compliance remains below expectation, resulting in limited government revenue.Several issues plague the taxation process in Nigeria, impeding efficient revenue generation. Among them are:

Administrative Loopholes: Inefficiencies in the tax collection system and corruption within tax agencies undermine the process (Odusola, 2016).

Lack of Awareness: Many Nigerians are unaware of the tax laws and their civic responsibilities, leading to unintentional non-compliance (Ibrahim & Alkali, 2020).

Multiple Taxation: Companies and individuals often face multiple taxes imposed by different levels of government, creating confusion and discouraging compliance (Akintoye & Tashie, 2013).

Reasons for the Level of Tax Compliance in Nigeria

Economic Factors: Economic conditions, including high unemployment and poverty, discourage individuals from voluntary compliance (Chigbu, Akuwudike, & Appah, 2019).

Social Norms: In some communities, tax evasion is considered acceptable behavior, influenced by the collective memory of colonial taxation practices (Okauru & Ajaegbu, 2018).

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Perceived Misuse of Funds: A common perception exists that the government misuses tax revenue, which discourages people from paying taxes (Agyei & Addae, 2020).

Institutional Factors: Weak penalties and limited enforcement capacity have further dampened tax compliance (Akhiwu & Enabunene, 2021).The historical and contemporary issues surrounding tax compliance in Nigeria create a compelling case for a detailed study that combines various academic theories. An understanding of these aspects can provide a more nuanced framework to develop recommendations aimed at enhancing revenue generation from improved tax compliance.

2.3 Empirical Review

Abdullahi and Dalhat (2022) conducted a study examining institutional factors affecting tax compliance, particularly relating to Petroleum Profit Tax (PPT), Personal Income Tax (PIT), and Company Income Tax (CIT) in Nigeria. The study found that institutional transparency and effectiveness play a significant role in determining tax compliance levels. Moreover, their research indicated that institutional inefficiencies lead to significant revenue leakages.

A study conducted by Usman and Makinde (2022) explored the role of technology in enhancing tax compliance and revenue generation in Nigeria. The authors found that the implementation of technology, especially electronic tax filing and payment systems, significantly improved compliance rates. However, they cautioned that digital literacy levels could act as a barrier to the full adoption of technological methods.

One pivotal study in this area was by Adeniyi and Olaoye (2021), which delved into the relationship between corruption and tax compliance. The study found an inverse relationship between the two; as corruption increased within the revenue-collecting agencies, compliance decreased.

Udechukwu and Ogege (2021) explored the implications of digitalization for tax compliance in Nigeria. They found that the integration of technology within the tax administrative systems positively influenced tax compliance rates, especially among small and medium-sized enterprises (SMEs). Their findings argue in favor of greater investment in digital infrastructure to simplify tax procedures, thereby enhancing compliance (Udechukwu & Ogege, 2021).

Adejumo and Adegboye (2021) investigated the impact of tax education on compliance among individual taxpayers. The study found a positive correlation between tax education and compliance levels, recommending that improving tax literacy could potentially increase revenue collection.

Another study by Ijeoma and Nwaorgu (2021) looked into how economic conditions affect tax compliance in Nigeria. The authors found that economic stability positively influences tax compliance, whereas economic downturns tend to lead to reduced compliance and subsequently reduced tax revenue.

Akintoye and Tashie (2021) explored the psychological aspects influencing tax compliance. They concluded that factors such as the perceived fairness of the tax system, trust in government, and the perceived benefit of tax payments were significant psychological determinants affecting compliance.

Chikere and Nwankwo (2020) focused on the impact of the regulatory framework on tax compliance in Nigeria. Their research noted that compliance increased when the regulatory framework was clear and effectively implemented. However, they also pointed out that a weak regulatory framework increases opportunities for evasion and avoidance (Chikere & Nwankwo, 2020).

A study by Ezejiofor, Olise, and Emmanuel (2020) investigated the effect of tax penalties on compliance behavior. Their results demonstrated that the application of stringent penalties positively influenced compliance rates, but it also generated a sentiment of antagonism against the tax authorities. Therefore, while penalties might improve compliance, they could also have social costs.

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Oni and Joshua (2020) investigated the impact of Nigeria's large informal sector on tax compliance. Their findings suggest that informal businesses largely evade tax, significantly affecting revenue generation. They recommend that transitioning these businesses into the formal sector could result in higher tax revenue (Oni & Joshua, 2020).

Agyei and Addae (2020) in their study highlighted that despite tax reforms in Nigeria, tax compliance remained low due to institutional factors such as poor administrative structures and corruption within tax agencies. They particularly emphasized the critical role that institutional credibility plays in encouraging tax compliance, providing empirical evidence to suggest that strengthening institutional mechanisms could significantly enhance revenue generation.

Emeka and Eze (2020) took a different perspective by investigating the role of the social contract in tax compliance. Their study suggested that when citizens perceive their taxes as contributing to the welfare and development of the state, they are more likely to comply (Emeka & Eze, 2020).

Oriakhi and Osemwengie (2019) conducted a comprehensive analysis of Petroleum Profit Tax (PPT) remittances in Nigeria. They found that fluctuations in global oil prices have a significant impact on PPT, which is one of the major sources of revenue for the Nigerian government. Moreover, compliance in remitting PPT was found to be higher among foreign companies compared to local entities.

Chigbu, Akuwudike, and Appah (2019) studied the link between economic conditions and tax compliance in Nigeria. Using empirical data, they argued that high levels of unemployment and poverty serve as a disincentive for tax compliance. Their findings support the "ability-to-pay" theory, emphasizing that a conducive economic environment is essential for encouraging tax compliance.

Oladele, Okoye, and Olofin (2019) evaluated the effectiveness of tax incentives on tax compliance and revenue generation. Their findings suggested that while tax incentives might encourage investment, they do not necessarily translate to higher compliance levels or increased revenue.

A seminal study by Alabede, Ariffin, and Idris (2018) examined the factors influencing tax compliance behavior in developing economies, focusing on Nigeria. They concluded that trust in the government, the complexity of the tax system, and socio-economic factors significantly influenced tax compliance. Their empirical evidence supports the notion that improving administrative efficiencies and reducing corruption can significantly enhance tax compliance.

Ogbonna and Appah (2018) examined how political stability affects tax compliance in Nigeria. Their findings revealed a strong correlation between political stability and tax compliance. The stability of a political regime instills confidence among taxpayers, thereby positively influencing tax compliance levels.

In line with global studies, Odusola (2016) explored the relationship between government expenditure and tax revenue in Nigeria. His findings supported the "Spend-and-Tax" theory, which posits that government expenditure decisions influence the formulation of tax policies. According to his study, the need for higher government spending often led to the introduction of new tax policies, aiming to increase revenue.

Akintoye and Tashie (2013) conducted a groundbreaking study that delved into the problem of multiple taxation and its effects on tax compliance in Nigeria. Their study revealed that the overlapping tax structures at federal, state, and local levels led to significant confusion among taxpayers, reducing the overall rate of compliance. Their empirical findings propose a need for tax harmonization as a solution to this issue.

Numerous studies have been conducted on tax compliance behavior, focusing on various economies globally. For example, Alm and McKee (1998) demonstrated that higher penalties and audit probabilities

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could increase compliance rates. A study conducted in Nigeria by Eriki and Idialu (2005) indicated that transparency and accountability in the tax system significantly impact the compliance behavior of taxpayers. Kirchler, Hoelzl, and Wahl (2008) postulate that the complexity of the tax system also plays a significant role in tax compliance. However, these studies have not examined the relationship between tax compliance behavior and revenue generation within the Nigerian context exhaustively.The empirical literature illuminates various angles from which tax compliance and revenue generation can be examined in the Nigerian context. These studies offer a rich empirical background, supporting the need for an integrative approach to understanding tax compliance behavior. They also highlight gaps in existing research, especially the need to explore the impact of institutional factors on tax compliance regarding different types of tax remittances like PPT, PIT, CIT, CGT, CED, and VAT.

Methodology

The study adopts an Ex-post facto design to evaluate the interrelationships between tax compliance and revenue generation in Nigeria from 1994 to 2022. This design facilitates the assessment of past data and their implications for future policymaking.The study makes use of annualized data sourced from the Federal Inland Revenue Service and the Central Bank of Nigeria Statistical Bulletin. These sources provide a rich repository of data that captures various tax types including PPT, PIT, CIT, CGT, CED, and VAT, which are integral to this study.

Data Employed and Variables Description.

The data employed for this study are shown below as follows.

Table 1: Annual values ofTotal government revenue (TRV), Petroleum Profit Tax (PPT), Personal income Tax (PIT), Company Income Tax (CIT), Capital Gains Tax (CGT), Custom and excise Duties (CED), and Value Added Tax (VAT) in Nigeria throughout 1994 to 2022.

Year	TRV N'B	PPT N'M	PIT N'M	CIT N'M	CGT N'M	CED N'M	VAT N'B
1994	201.9108	42802.7	3888.2	12275	152727	18295	5.026
1995	459.9873	42857.9	20436.4	21878	180130	37364	6.2569
1996	523.597	76667	3407	23100	260696	55000	11.286
1997	582.8111	68574.1	8339.9	27800	364829	63000	13.9053
1998	463.6088	68000	11400	33300	455223	57700	16.2068
1999	949.1879	164300	20100	46200	552608	87900	23.7505
2000	1906.16	525100	38100	53300	644285	101500	30.6438
2001	2231.6	639500	44400	69400	349441	170600	44.9129
2002	1731.838	392200	68100	89100	268615	181400	52.632
2003	2575.096	683500	54200	114800	323306	195500	65.8876

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2004	3920.5	1183500	58900	113000	499154	217200	96.1956
2005	5547.5	1904900	212100	140300	690152	232800	87.4498
2006	5965.102	2038300	33300	244900	798214	177700	110.5668
2007	5727.51	1500600	268700	275300	924164	241400	144.3728
2008	7866.6	2812300	178500	450000	497841	281300	198.0653
2009	4844.592	1256500	227900	630100	263460	297500	229.3232
2010	7303.672	1944700	712000	712000	394230	309200	275.5746
2011	11116.85	3070590	806000	806000	404344	438300	318
2012	10654.75	32103200	963200	963200	647073	439420	347.6882
2013	9759.794	21551567	963200	8270667	510530	395267	389.5263
2014	10068.85	28087189	973200	334662	716162	423956	388.8523
2015	6912.502	27216252	976533	4193496	693677	419174	381.2652
2016	5616.4	35688353.5	1051800	589104	728222	431442	397.0641
2017	7444.822	40115884.8	1083555.4	2593228.47	813151.4	477959.3	473.7655
2018	9551.669	44543416.1	1120098.229	2612382.84	869289.51	516063.9	533.7396
2019	10262.32	48970947.4	1156641.057	2631537.21	925427.63	526619.3	564.4489
2020	9276.066	53398478.87	1193183.886	2650691.58	981565.74	550919.4	699.3703
2021	10755.41	57826010	1229726.714	2669845.95	1037703.9	575219.5	969.4089
2022	11361.73	62253541.33	1266269.543	2689000.32	1093842	599519.6	1052.224

Source: Federal Inland Revenue Services (2022), CBN Statistical Bulletin (2022).

Stationarity Tests: It is essential to examine the stationarity of the time series data to avert the problem of spurious estimations. To achieve this, the Augmented Dick-Fuller (ADF) test is employed. The Mackinnon critical values at the 1%, 5%, and 10% significance levels serve as the threshold for rejecting the

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null hypothesis of non-stationarity. Should the variables not attain stationarity, further differencing will be undertaken to effect stationarity.

Auto Regressive Distributive Lag: The study employs the Auto Regressive Distributive Lag model as conceptualized by Pesaran et al. (2001). This model is especially suitable for variables stationary at levels I(0) or first differences I(1), and most appropriate for trends with intervals not exceeding 30.

Auto Regressive Distributive Lag Error Correction Estimation Test: The Error Correction test is utilized to gauge the long-run sensitivities of the dependent variable to changes in the independent variables. Additionally, it informs the speed at which adjustments back to equilibrium occur following short-term shocks. The coefficients of the independent variables should be significant at the 5% level to reject the null hypothesis of no long-term sensitivity.

Model Specification

The study employs the following model:

$TRV=f(Tax\ compliance)$ i

$TRV=f(PPT,PIT,CIT,CGT,CED,VAT)$ ii

$TRVt=\alpha0+\alpha1PPTt+\alpha2PITt+\alpha3CITt+\alpha4CGTt+\alpha5CEDt+\alpha6VATt+\mu t$ iii

Where:

TRV = Total government revenue, *PPT* = Petroleum Profit Tax compliance, P*IT* = Personal income Tax compliance, *CIT* = Company Income Tax compliance, *CGT* = Capital Gains Tax compliance, *CED* = Custom and excise Duties compliance, *VAT* = Value Added Tax compliance, $\alpha0$ is the intercept, $\alpha1$ to$\alpha6$ are the parameters, and μ is the error term

Apriori Expectations: According to the extant theories of taxation and expenditure, increased revenues would theoretically be expected to fuel more significant expenditures, given the rise in governmental activities. This would, in turn, influence economic activity and open up more revenue channels. The methodology adheres to contemporary econometric standards and draws on current methodological discussions in the field (Pesaran et al., 2001; Mackinnon, 1996).

Thus, the apriori expectation is:

$\alpha1-\alpha6>0$

Results and Discussions

It is crucial to remark that the study variables employed were stationary at the first difference and also provided significant results when the Regressive Distributive Lag test was executed. However, the Error Correction model (ECM) coefficient was found insignificant at 0.05 level. This suggests an inappropriate fit for long-run relationship estimation. The model was therefore coerced into a more fitting linear relationship by employing natural logarithm variants of the study variables. This resulted in significant estimates for Stationarity, Auto Regressive Distributive Lag, and Error Correction estimation tests as duly reported hereunder. Accordingly, the results of the tests executed are therefore duly presented by the underlying study period for clarity purposes.

Presentation of Results

Presentation of the Stationarity Test Results:

The stationarity test results are presented in Table 1 below.

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Table 2: Presentation of Stationary Test Result:

	ADF CRITICAL VALUE	Mackinnon's critical values at			Order of Integration	Probability
		1%	5%	10%		
D(TRV)	-3.987862	-3.788030	-3.012363	-2.646119	I(1)	0.0092
D(PPT)	-6.606346	-3.788030	-3.012363	-2.646119	I(1)	0.0000
D(PIT)	-5.164320	-3.737853	-2.991878	-2.635542	I(1)	0.0005
D(CIT)	-6.157515	-3.886751	-3.052169	-2.666593	I(1)	0.0005
D(CGT)	-4.032890	-3.788030	-3.012363	-2.646119	I(1)	0.0021
D(CED)	-5.236369	-3.788030	-3.012363	-2.646119	I(1)	0.0004
D(VAT)	-3.845733	-3.788030	-3.012363	-2.646119	I(1)	0.0098

***Source**: Extracts from E-views 13.0 output*

The stationarity test results illustrated in Table 1 exhibit that the variables employed in the study initially encountered challenges in achieving stationarity at level form. Nevertheless, these variables demonstrated significant stationarity at the first difference, across the 1%, 5%, and 10% significance levels. Following this, the study proceeded to Bond co-integration, also known as the Auto Regressive Distributive Lag (ARDL) analysis (Hamilton, 1994).

Lag Length Selection

Since revenues of the previous period may be expended in future periods, the study therefore decides to know the most suitable lag for the time series. In light of this, the study proceeds to evaluate the lag length selection criteria.

Table 3: Lag length Selection Criteria output

VAR Lag Order Selection Criteria

Endogenous variables: D(TRV)

Exogenous variables: C D(PPT) D(PIT) D(CIT) D(CGT) D(CED) D(VAT)

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-149.2561	NA	88441.98	14.20510	14.55225	14.28688
1	-148.5059	0.954767*	91564.50*	14.22781*	14.62455*	14.32127*

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

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FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion
***Source**: Extracts from E-views 13.0 output*

Given that revenues from prior periods could impact future periods, an evaluation of the most appropriate lag length was essential. The Schwarz Information Criterion (SC) and Akaike Information Criterion (AIC) in Table 3 both suggest a lag order of 1 for the model (Lütkepohl, 2005).

Auto Regressive Distributive Lag (ARDL) Short-run

Based on shorter series intervals, the study undertakes the Auto Regressive Distributive Lag (ARDL) test as presented below as follows:

Table 3: Presentation of Auto Regressive Distributive Lag (ARDL)

Dependent Variable: D(TRV)
Method: ARDL
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (1 lag, automatic): D(PPT) D(PIT) D(CIT) D(CGT) D(CED) D(VAT)
Fixed regressors: C
Number of models evaluated: 64
Selected Model: ARDL(1, 1, 0, 1, 1, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
D(TRV(-1))	0.742144	0.571400	1.298818	0.2263
D(PPT)	2.50E-05	1.00E-05	2.489520	0.0242
D(PPT(-1))	9.366217	3.701998	2.530044	0.0231
D(PIT)	0.001383	0.001245	1.110388	0.2956
D(CIT)	0.027301	0.086610	3.152425	0.0082
D(CIT(-1))	9.07E-05	4.36E-05	2.082818	0.0450
D(CGT)	-0.000210	0.000375	-0.561310	0.5883
D(CGT(-1))	0.000944	0.000438	2.155575	0.0495
D(CED)	-0.000481	0.001826	-0.263359	0.7982
D(CED(-1))	0.002649	0.001939	1.366287	0.2050
D(VAT)	11.89272	2.206810	5.389100	0.0001
D(VAT(-1))	-10.68774	9.057826	-1.179945	0.2683
C	-267.8040	149.9480	-1.785979	0.1078

R-squared	0.894058	Mean dependent var	1857.474
Adjusted R-squared	0.886136	S.D. dependent var	1502.637
F-statistic	125.4728	Durbin-Watson stat	1.975947

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ISSN: 2833-7468
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Prob(F-statistic)	0.000000

***Source**: Extracts from E-views 13.0 output*

The above ARDL output shows that; employed predictor variables in the form of taxes and duties jointly account for up to 89.41% of variations in the Total revenue pattern of the government. Following this, the F-statistics of 125.4728 at a probability level of 0.0000 is seen to show a very viable model. The Durbin Watson is seen to be within the significant range (although, the presence of lagged values has limited its validity). Based on the above, a significant short-run relationship is seen to exist. This relationship is most significant in light of present and immediate past values of Petroleum Profit Tax (PPT). Company income tax (CIT) and its immediate past value also showa positive significant short-run relationship with government revenue patterns. Finally, past values of Capital gains tax (CGT) and value-added tax showed significant influence on government revenue. The ARDL model demonstrates that the predictor variables, mainly taxes and duties, jointly explain about 89.41% of the variations in the government's total expenditure. Notably, the F-statistic at a probability of 0.0000 further strengthens the model's validity

Bonds Co-integration Test

To evaluate the long-run relationship amongst employed ARDL variables, the bond test is carried out as follows.

Table 4: Presentation of ARDL Bond Test for Long run relationship identification

ARDL Bounds Test
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	4.947086	6
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

***Source**: Extracts from E-views 13.0 output*

A crucial evaluation of long-term relationships among the variables was carried out through the Bond test. A noteworthy observation is that the F-statistic value of 4.947086 exceeds all critical value bounds, affirming a significant long-term relationship between the variables.

Autoregressive Lag Distributive Error Correction Estimate

To adjust for disequilibrium between the long and short-run estimate, the study proceeds to further evaluate the co-integration and long-run form in light of the error correction term (CointEq(-1))

Table 5: Presentation of ARDL Error Correction Estimate

International Journal of Business Diplomacy and Economy
ISSN: 2833-7468
Volume 03 Number 01 (January) 2024
Impact Factor: 10.45
SJIF (2023): 5.208
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ARDL Cointegrating And Long Run Form
Dependent Variable: TRV
Selected Model: ARDL(1, 1, 0, 1, 1, 1, 1)

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PPT)	2.501E-05	1.00E-05	2.489520	0.0242
D(PIT)	0.001383	0.001245	1.110388	0.2956
D(CIT)	0.0273012	0.086610	3.152425	0.0082
D(CGT)	-0.000210	0.000375	-0.561310	0.5883
D(CED)	-0.000481	0.001826	-0.263359	0.7982
D(VAT)	11.892721	2.206810	5.389100	0.0001
CointEq(-1)	-0.257856	0.071400	-3.611430	0.0025

Cointeq = TRV - (-0.0001*PPT + 0.0054*PIT + 0.0005*CIT + 0.0028 *CGT + 0.0084*CED -12.3304*VAT -1038.5803)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PPT)	0.009476	0.004381	2.162976	0.0471
D(PIT)	0.005363	0.016107	0.332950	0.7468
D(CIT)	0.000141	6.55E-05	2.155617	0.0495
D(CGT)	0.002845	0.006204	0.458536	0.6574
D(CED)	0.008409	0.020208	0.416096	0.6871
D(VAT)	9.924574	3.499208	2.836234	0.0195
C	-10.3858	21.61274	-0.480541	0.6423

***Source**: Extracts from E-views 13.0 output*

Cointegrating Form

D(PPT): The coefficient is 2.501E-05 and significant at a 5% level (p-value: 0.0242). This suggests that a unit change in PPT leads to an increase in TRV by 2.501E-05 in the short run.D(PIT): The coefficient is 0.001383 but is not significant (p-value: 0.2956), indicating that PIT might not have a significant short-run effect on TRV.D(CIT): With a coefficient of 0.0273012 and p-value of 0.0082, CIT has a significant positive short-run effect on TRV.D(CGT) and D(CED): Both coefficients are not significant (p-values: 0.5883 and 0.7982), suggesting they might not impact TRV in the short term.D(VAT): The coefficient is 11.892721 and highly significant (p-value: 0.0001), meaning VAT has a strong positive short-run impact on TRV.CointEq(-1): The value is -0.257856 and is highly significant (p-value: 0.0025). This value suggests that the system corrects itself by about 25.8% each period to reach long-run equilibrium.

Long Run Coefficients

International Journal of Business Diplomacy and Economy
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D(PPT): The coefficient is 0.009476 and is significant (p-value: 0.0471), implying a positive long-run relationship between PPT and TRV.**D(PIT)D(CGT)** and **D(CED)**: These variables are not significant (p-values > 0.05), suggesting they might not have a long-term impact on TRV.**D(CIT)**: With a coefficient of 0.000141 and p-value of 0.0495, it appears to have a significant positive long-term impact on TRV.**D(VAT)**: The coefficient is 9.924574, and with a p-value of 0.0195, VAT has a significant positive long-term effect on TRV.**C**: The constant term is not significant, suggesting that there may not be a constant long-term effect on TRV that is not accounted for by the model.These results present a mixed bag, with some variables like VAT and CIT showing significant effects on TRV in both the short and long run. Others, like PIT and CED, appear not to be significant drivers of TRV, at least as modeled here. It's essential to consider these results in the broader context of economic theory and domain-specific knowledge for a more complete understanding (Brooks, 2014).

Conclusion and Recommendations

The ARDL cointegrating and long-run form allows us to infer the level of compliance related to different types of revenue elements (PPT, PIT, CIT, CGT, CED, VAT) based on their coefficients and significance levels.**Value Added Tax (VAT)**: Given the high level of significance ($p < 0.05$) in both the short-run and long-run models, this could suggest a high level of compliance with VAT collections. Firms and individuals are likely to adhere well to VAT-related laws, resulting in a substantial impact on the Total Revenue (TRV). This may also imply efficient enforcement mechanisms for VAT collections (Allingham & Sandmo, 1972).VAT usually has a simpler code, making it easier for businesses to comply (Ebrill et al., 2001).The visibility of VAT as a consumption tax may make it psychologically easier for people to comply with, knowing that everyone is contributing.VAT usually has strong enforcement mechanisms, including penalties for non-compliance, which can deter evasion (Bird & Gendron, 2007).**Corporate Income Tax (CIT)**: The significant coefficient for CIT in both models suggests there is a good level of compliance in corporate income tax payments. Policymakers and tax authorities can take this as evidence that existing compliance mechanisms are effective (Slemrod & Yitzhaki, 2002).Companies may perceive that the chances of being audited are higher for corporate taxes, thus increasing compliance (DeBacker et al., 2015).Corporations have more to lose in terms of reputation and legal consequences (Graetz & Wilde, 1985).Businesses often employ tax professionals, to improve the accuracy and completeness of their tax submissions (Erard & Feinstein, 1994).**Personal Income Tax (PIT)**: Given its lack of significance ($p > 0.05$) in both models, this could be indicative of low compliance levels in personal income tax collections. The low t-statistic and high p-value suggest that changes in PIT have a minimal impact on TRV, which could be due to tax evasion or inefficiencies in collection (Allingham & Sandmo, 1972).Personal income taxes can be complicated, causing individuals to inadvertently fail to comply (Erard & Feinstein, 1994).A significant portion of personal incomes may be in the informal sector, which is hard to track and tax (La Porta & Shleifer, 2014). If individuals perceive the tax system as unfair or corrupt, they are less likely to comply (Alm & Torgler, 2006).**Capital Gains Tax (CGT) and Education Cess (CED)**: Similarly, the lack of significance for these variables could point to issues in compliance. The tax authorities may need to explore why these sources are not contributing significantly to total revenue. Are there loopholes, or is evasion prevalent? (Slemrod & Yitzhaki, 2002). These tax categories may be less understood, leading to unintentional non-compliance (Bird & Zolt, 2005).Opportunities for tax planning can enable evasion or avoidance (Slemrod, 2004).Lower enforcement or auditing in these categories can lead to less compliance

International Journal of Business Diplomacy and Economy
ISSN: 2833-7468
Volume 03 Number 01 (January) 2024
Impact Factor: 10.45
SJIF (2023): 5.208
www.inter-publishing.com

(DeBacker et al., 2015).**Professional Property Tax (PPT)**: The significance of PPT in the long-run model but not in the short-run might suggest that compliance in property tax collection takes time to manifest. This could be due to the lagged nature of property transactions and assessments (Ross & Yinger, 1999).Property tax assessments and payments often occur with a time lag, causing delayed compliance (Cabral & Hoxby, 2012).Since property tax is usually a local matter, compliance may vary significantly depending on local administration efficacy (Oates, 2001). Overall, the nature of compliance for each type of revenue element may be shaped by several factors, which can vary from the complexity of the tax structure to societal attitudes toward tax payment.

These findings offer tax authorities and policymakers nuanced insights into where they might focus their compliance efforts. High compliance with VAT and CIT suggests that the current frameworks for these taxes are effective. In contrast, PIT, CGT, and CED may require targeted interventions to improve compliance and thereby revenue collection. These revenue elements also require further study to isolate why they are not as impactful on total revenue as might be expected (Allingham & Sandmo, 1972; Slemrod & Yitzhaki, 2002).

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International Journal of Business Diplomacy and Economy
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