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E-Tax System and Government Tax Revenue Generation in Nigeria: A Comparative Analysis of Pre and Post

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Abstract: Electronic tax platforms have transformed tax administration in many countries by improving efficiency, transparency, and compliance. However, in Nigeria, the contribution of tax revenue to broader economic performance has not been as visible as expected. This study therefore examined how the introduction of the electronic tax system has influenced revenue mobilization from petroleum profit tax, companies' income tax, and value added tax between 2005Q3 and 2024Q4, thus, using e-tax system (ETAX) as dummy variable, such that ETAX = 0 for pre-e-tax system and ETAX = 1 for post-e-tax system. To compare outcomes before and after the rollout of e-taxation, time series analysis was employed, specifically using the autoregressive distributed lag (ARDL) modeling technique after the pre-test of unit root tests in the variables. The empirical results indicate that electronic tax reforms have significantly strengthened revenue generation from companies' income tax and value added tax. In contrast, significant decline in petroleum profit tax was witness in the e-tax regime. These results demonstrate the resultant impact on tax generation arising from the changes in tax administration and policy in Nigeria. They suggest that reform strategies may need to be tailored to

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the unique operational and structural features of each tax category to ensure that digital tax systems deliver optimal outcomes.

Keywords: Electronic taxation; petroleum profit tax; companies' income tax; value added tax

JEL Classification: H2

1. Introduction

The collection of taxes remains a fundamental component of public finance systems across countries (Ashafoke & Obareti, 2023). Through taxation, governments mobilize the financial resources required to execute their economic mandates and meet public obligations. Aneke (2009) describes taxation as a central instrument of fiscal policy used to guide and stabilize economic growth. In most nations, taxes constitute a major and reliable source of government revenue. Appah (2011) defines tax as a compulsory levy imposed on individuals or their property by the state to provide public goods, social services, and economic support. Similarly, Nzotta (2007) views tax as a mandatory transfer made by residents or individuals under a government's jurisdiction for the broader benefit of society. He likens tax obligations to paying routine bills, emphasizing that responsible citizens are expected to comply with tax laws and avoid all forms of evasion, which is considered unlawful (Appah, 2011). Nwezeaku (2005) further notes that taxpayers are required to fulfill their obligations regardless of whether they receive direct or immediate benefits.

Technological advancements have increasingly enhanced how governments administer taxes and raise revenue. From the earliest tools used for survival in the Stone Age to the industrial revolution of the 18th century, the invention of the internet in the 20th century, and the emergence of artificial intelligence, technology has become deeply woven into daily human activities (Crawford, 2013; Maad, 2015). Tax authorities worldwide now leverage technology to make tax administration more transparent, efficient, and reliable. Electronic taxation (e-taxation) has become one of the key innovations transforming global tax systems (Akadakpo & Imonite, 2024). Many countries have transitioned toward fully electronic submission of tax returns, allowing individuals and organizations to file taxes quickly, conveniently, and securely (Akpu & Ohaka, 2017).

Nigeria adopted electronic filing in 2015, following the IMF's earlier recommendation that countries develop centralized and unified tax systems (Newman & Ekhatior, 2019). Although the Federal Inland Revenue Service (FIRS)

initially implemented the Integrated Tax Administration System (ITAS), effective deployment required collaboration with the Nigerian Interbank Settlement System (NIBSS). By 2017, e-filing had been fully rolled out nationwide, enabling taxpayers to process tax clearance certificates and complete other tax-related transactions entirely online. However, many developing economies, including Nigeria, still struggle with the infrastructure and resources needed to sustain digital tax systems (Ezeala, Opara & Omaliko, 2024).

Despite modernisation efforts, Nigeria's tax revenue performance remains below potential. Challenges such as tax evasion, limited public awareness, and resistance to technological change continue to impede full adoption of e-tax platforms (Abdullahi, Saidu & Dombut, 2025). Empirical studies using primary data which may be biased have often reported no significant relationship between e-filing and tax revenue (Akadakpo & Imonite, 2024; Olasunkonmi & Adejuwon, 2024; Tina & Osasu, 2023; Ibrahim, Lamidi & Alis, 2017). Studies using quarterly FIRS secondary data have reached similar conclusions, indicating that e-filing has not produced measurable improvements in fiscal inflows in the short term (Ofurum et al., 2018; Ajayi & Oyeniya, 2020; Olaoye & Atilola, 2018).

However, the majority of existing research focuses on relatively short periods typically 6 to 8 years (24–36 quarters). To better understand the long-term effects of e-taxation, a longer period of analysis is needed. This study therefore examines nearly 20 years of data spanning pre- and post-e-taxation periods (approximately 78 quarters) to assess how e-tax adoption influences petroleum profit tax, companies' income tax, and value-added tax.

The hypotheses tested are:

H₀₁: Electronic tax system has no significant impact on petroleum profit.

H₀₂: Electronic tax system has no significant impact on companies' income.

H₀₃: Electronic tax system has no significant impact on value-added tax.

2. Literature Review

2.1. E-Taxation

E-taxation refers to a framework and system in which taxpayers submit their records or returns electronically, removing the need for traditional paper-based filing

(Ezeala, Opara & Omaliko, 2024). It is a digitalized approach to filing tax returns, which has the potential to save time and be more convenient for the taxpayer. This method ensures the taxpayer is self-reliant and can calculate their own tax liability without assistance from the tax department (Monica, Makokha & Namusonge, 2017). This implies that tax payers (both corporate and individuals) will have to resort to filing their taxes electronically or online. This seems to be an effective means of levying and administering taxes, the process which is common in developed nations. Beginning in 1986 in the United States, additional countries adopted electronic filing for taxes: 1987 in Australia, 1993 in Canada, 2013 in Egypt, and 2015 in Nigeria (Oforum, Amaefule, Okonya & Amaefule, 2018).

When it comes to tax collection, there are a number of benefits that can be gained from switching to electronic filing, as noted by Akpu and Ohaka (2017). This is especially helpful for working people who can complete their tax returns without having to take time away from their day to do so. E-filing helps taxpayers maintain their confidentiality and security, according to Agrawal (2012). As Babatunde (2018) notes, these advantages would encourage SME business owners to participate in the tax system. As a result, tax administrators will be able to earn enough money for the government, increase compliance level and a decrease in evasion rate, thanks to e-filing (Okauru, 2011; Wamathu, 2014).

Despite its convenience, electronic tax filing does have certain drawbacks. First, not everyone has access to a computer or smartphone with internet capabilities. Electronic filing and payment of taxes may be discouraged as a result. In addition, not everyone is savvy with digital tools. The advent of e-filing presumes that all taxpayers are familiar with the internet and know how to use computers. It's possible that's not the case, given that the difficulties of using technology and the web tend to be more pronounced among the elderly mainly because so many significant technological advances happened after their time of life (Ajayi & Oyeniyi, 2021). As a result, it will be challenging to force a community with a large senior working population to use electronic filing for their tax returns. Electronic filing also makes the unrealistic assumption that taxpayers are able to do their own tax calculations (Monica et al., 2017). A tax expert's help would be necessary for these people, and such help could come at a cost. As a result, the intended purpose of e-filing may not consistently deliver on its aim of enhancing tax compliance and raising government fiscal inflows.

2.1.1. Government Revenue

All income accruable to government, of which income from taxation is an integral part, is known as public revenue or public income. Public revenue can be viewed from two perspectives, thus: From narrow and Broader perspectives. In the broader sense, public revenue comprises all government borrowings or grants from foreign countries, institutions, public and private individuals during a particular period of time. Income from public enterprises is known as public receipts (Abubakar & Mustapha, 2020).

Fiscal inflows which serve as government revenues continue to play a crucial role in shaping fiscal policy. Public revenue serves as a key driver of national development, funding essential projects like road and bridge construction, housing initiatives, school rehabilitation, and other critical public services. The government also, utilizes part of the income so generated to pay for the service rendered by people. Globally, the revenue from tax remains a critical source of revenue for governments thereby enabling the funding of essential services and infrastructure (Abdullahi, Saidu & Dombut, 2025). The central government primarily relies on taxes collected from the public as its main source of funding (Ofurum et al., 2018).

2.2. Theoretical Framework

Davis (1986) developed technology acceptance model (TAM) theory to explain human behavior in terms of individual beliefs and collective expectations. This model describes the process through which people become accustomed to a new piece of technology. The goal of the model is to determine whether or not a given tool will be well-received by its intended audience, and if not, what adjustments can be made to the system to increase its chances of success. Within this framework, the likelihood that users will embrace a particular information system depends mainly on how useful they believe it to be and how easy it is to operate. Davis (1986) suggests that an individual's intention to adopt a system is shaped not only by personal attitudes, but also by the expected advantages and possible limitations associated with using the technology. Due to this, if the user believes that utilizing the system will improve his performance, he is more likely to accept its use. According to TAM, there is a one-to-one correspondence between these two factors. A user will choose the simpler system if two similar ones exist (Dillon & Morris, 1996). According to Davis (1986), there are two primary mechanisms by which a person's attitude is influenced: self-efficiency and instrumentality. Bandura's idea

of self-efficacy proposes that an individual's confidence in their own ability to succeed grows when a system is easy to understand and operate. To bolster this, Lepper (1982) suggests that a user's sense of agency increases as his familiarity with a tool or machine grows.

One of the primary drivers of intrinsic motivation is the perception of one's own ability to bring about desired results (Bandura, 1982; Lepper, 1982). One's own estimation of how simple something is to use can be an important factor in boosting their efficiency. The less time and energy spent learning how to utilize the technology, the more time and energy the user will have to devote to other endeavors (Davis, 1986). The fact is further supported by the observation of Sussman and Gifford (2019) that individuals display a disposition that in turn affects their behavior pattern. The theory of reasoned action posits that a person's behavior is influenced by a combination of internal and external factors. Research by Davis, Bagozzi and Warshaw (1989) supported the Technology Acceptance Model, demonstrating that the perceived ease of use and practical benefits of a technology are more decisive in adoption than attitudes or social pressures. This perspective is further endorsed by Muhammad et al. (2015). To further investigate whether or not e-filing may be utilized to raise funds for the state, the study employs the theory of Technology Acceptance Model.

2.3. Empirical Review

Lai (2008) examined the impact of electronic tax filing on Malaysia's tax revenue growth and GDP, finding that e-filing had a significant positive effect on tax collection. Similarly, Nasir (2015) analyzed Malaysian data from 2004 to 2011 to compare the effectiveness of electronic tax filing with traditional manual filing. When assessing the proportion of Malaysian taxpayers who submit their returns electronically, even using a very straightforward method like trend analysis, it was discovered that just 5% of taxpayers actually do so. The low rate of adoption is a direct result of the country's lack of technological advancement. Additionally, Ibrahim, Lamidi and Alias (2017) investigated how the perceived usefulness and adoption of tax electronic-filing reflects the system's effectiveness in boosting fiscal revenue in Malaysia and Nigeria. Descriptive statistics were employed to evaluate datasets from both countries, and primary data was used for analysis. The study indicated that while the perceived effectiveness of e-filing systems was not

significant in either Malaysia or Nigeria, the government's role in fostering technology development was.

Ofurum et al. (2018) examined the effect of Nigeria's digital tax administration system on government revenue collection. The research used a matched sample statistic to examine quarterly data from 2013 to 2016. Data for this analysis came from both the FIRS and the CBN statistical records. The descriptive results demonstrated that taxpayers had to shoulder a greater share of the tax load before the advent of electronic filing. The findings show that implementing electronic tax filing has not led to a substantial change in Nigeria's tax income. In the same year, Chijioke, Leonard and Henry (2018) investigated how the implementation of digital tax administration in Nigeria affected the country's gross domestic product and government revenue. The dataset was segmented into pre-implementation and post-implementation periods to assess the impact. Means were compared between the pre- and post-intervention samples using the paired sample t-test. Results show that neither tax income nor federally collected funds have increased in Nigeria after computerized taxes were implemented.

Akpubi and Igbekoyi (2019) employed primary data to examine the effect of digital tax filing on tax compliance among SMEs in Lagos State. The findings were analyzed using regression techniques. Electronic tax filing: Expenses, Level of Familiarity, and Costs of Compliance and increase in people's familiarity with e-filing were shown to positively and significantly enhance tax compliance whereas an increase in people's opinions of how easy it is to use was found to be linked to a positive effect, although it was not statistically meaningful. The study's authors draw the conclusion that taxpayers are put off using e-filing because of the cost involved, but that encouraging taxpayers to do so and improving their view of the process can increase tax compliance. Olaoye and Atilola (2019) conducted an analogous investigation in Oyo, a state in southwestern Nigeria, to gauge the effect of e-taxation on the state's fiscal income collection. Survey research method was employed as the study gathered 100 samples in total for the purpose of the analysis. The study revealed that individuals with higher education levels were more likely to adopt electronic filing, thereby significantly contributing to revenue generation, whereas those with lower education levels tended to rely on traditional paper-based methods, suggesting that e-filing may not be equally effective across all taxpayer demographics. Ajayi and Oyeniyi (2020) examined the impact of electronic tax filing on Nigeria's revenue from 2011 to 2019 using quarterly data from the FIRS. Their findings indicated that while e-filing positively influenced petroleum-related tax

collection, it had no significant effect on overall tax revenue or non-oil tax revenue. Tina and Osasu (2023) investigated the effect of digital tax imposition through online channels on revenue generation in Nigeria, drawing primary data from selected tax experts in Lagos State. Using an exploratory research design and Structural Equation Modeling (SEM) for analysis, the study found a positive but statistically insignificant relationship between e-taxation and revenue from content providers, whereas e-taxation on digital advertisers showed a positive and significant impact on revenue generation.

Ezeala, Opara and Omaliko (2024) assessed the relationship between e-taxation and revenue generation efficiency in Anambra State. Employing a descriptive survey design and analyzing data with the Kolmogorov-Smirnov test, they concluded that the e-tax system significantly enhanced revenue potential while mitigating tax fraud. Similarly, Akadakpo and Imonite (2024) explored the connection between technological advancements, including blockchain and digital currencies, and the efficiency of Nigeria's e-tax system. Using primary survey data and linear regression analysis, they reported a strong positive association between technological integration and e-tax effectiveness. The most recent study by Olanrewaju et al. (2025) examined the correlation between tax digitalization and revenue generation in Nigeria. Utilizing a sample of 737 staff from a total population of 10,342 at the FIRS Headquarters, multiple regression analysis revealed a statistically significant and favorable relationship between features of tax digitalization and enhanced government revenue.

3. Methodology

Ex post facto research design which explores causal relationship between or variables using existing quantitative data was used. The study employed quarterly time series data obtained from the Federal Inland Revenue Service (FIRS), CBN statistical bulletin and World Bank's World Governance Indicators (WDI), covering the period 2005Q3 to 2024Q4. The timeframe from 2005Q3 to 2015Q1 represents the pre-e-tax regime, while 2015Q2 to 2024Q4 corresponds to the post-e-tax regime. The analysis focused on the variables, which include: the dummy variable: e-tax system (ETAX) such that $ETAX = 0$ for pre-e-tax (2005Q3 and 2015Q1) and $ETAX = 1$ for post-e-tax (2015Q2 and 2024Q4); the selected three tax indicators: petroleum profit tax (PPT), companies income tax (CIT), and value added tax (VAT); other variables considered for controlling effects: institutional quality (INQ) index, inflation rate (INF), real GDP (GDP) and exchange rate (EXCR). As regards

the institutional quality index, the average of world governance indicators was used, which include regulatory quality, voice and accountability, government effectiveness, control of corruption, rule of law and political stability. Descriptive statistical measures such as the mean, standard deviation, and the Jarque-Bera statistic were first applied to understand the distributional properties of the variables. The study employed autoregressive distributed lag (ARDL) modelling technique prior to which unit root test, using Augmented Dickey Fuller (ADF) tests, were conducted. Along with the model estimation, cointegration was conducted using ARDL bounds test.

The ARDL ($p, q_1, \dots, q_5$) Error Correction Model (ECM) specification for without-interaction condition is given as:

$$\begin{aligned} \Delta TR_t = \theta + \sum_{i=1}^p \alpha_i \Delta TR_{t-i} + \sum_{i=0}^{q_1} \phi_{1i} \Delta ETAX_{t-i} + \sum_{i=0}^{q_2} \phi_{2i} \Delta INQ_{t-i} + \sum_{i=0}^{q_3} \phi_{3i} \Delta INF_{t-i} \\ + \sum_{i=0}^{q_4} \phi_{4i} \Delta GDP_{t-i} + \sum_{i=0}^{q_5} \phi_{5i} \Delta EXCR_{t-i} + \phi ECM_{t-i} + \epsilon_t \end{aligned} \quad (3.1)$$

Where TR = Tax revenue (PPT, CIT and VAT)

As shown in equations (3.18), the ARDL short-run coefficients are represented by $\alpha_i, \phi_{1i}, \dots, \phi_{5i}$, at various lags ($i = 1, 2, 3, \dots, q$). The long-run specification was given as:

$$TR_t = \beta_0 + \beta_1 ETAX_t + \beta_2 INQ_t + \beta_3 INF_t + \beta_4 GDP_t + \beta_5 EXCR_t + \mu_t \quad (3.2)$$

4. Results and Discussion

4.1. Summary Statistics

The study summarizes the behaviour of the variables being examined, which include: Dummy variable: e-tax system (ETAX) such that $ETAX = 0$ for pre-e-tax (2005Q3 and 2015Q1) and $ETAX = 1$ for post-e-tax (2015Q2 and 2024Q4); the three tax indicators: petroleum profit tax (PPT), companies income tax (CIT), and value added tax (VAT); other variables considered for controlling effects: institutional quality (INQ) index, inflation rate (INF), real GDP (GDP) and exchange rate (EXCR). Their descriptive measures were generated for the entire period as well as for two separate phases representing the pre- and post-e-tax regimes.

Table 1. Summary Statistics
Pre-E-Tax Sample Period: 2005Q3 – 2015Q1

Statistics	PPT	CIT	VAT	INQ	INF	GDP	EXCR
Obs.	39	39	39	39	39	39	39
Mean	630.14	148.79	114.05	-1.273	10.828	13443.68	234.74
Median	638.09	143.10	125.41	-1.269	11.292	13765.48	207.81
Maximum	1156.70	556.27	174.03	-1.065	17.863	17250.58	604.79
Minimum	283.00	35.08	48.180	-1.846	5.388	9767.586	24.537
Std. Dev.	254.04	103.54	36.52	0.169	2.849	2338.393	131.003
Skewness	0.2851	1.9484	0.4501	-1.556	0.278	-0.031	0.822
Kurtosis	2.1140	7.8281	2.0795	5.630	2.896	1.684	3.0495
Jarque-Bera	1.8041	62.555	2.6938	26.966	0.5199	2.8191	4.3921
<i>p</i> -value	0.4057	0.0000	0.2600	0.0000	0.7711	0.2443	0.1112

Source: Authors' computation, 2025

Table 1 presents the summary statistics for the pre-e-tax system of 39 quarters (2005Q3 – 2015Q1) and the post e-tax regime of 25 quarters (2015Q2 – 2021Q2). It could be observed PPT has the highest mean value of 630.14, indicating that it generates more revenue for the government compared to CIT (148.79) and VAT (114.05). This is consistent with the findings of Ogbonna and Appah (2012), which highlights the significant contribution of petroleum revenue to Nigeria's economy. The standard deviation of PPT (254.04) is higher than that of CIT (103.54) and VAT (36.52), indicating that PPT revenue is more volatile. This volatility can be attributed to fluctuations in global oil prices and production levels (Ariyo, 2017). The skewness and kurtosis values for PPT and CIT indicate that their distributions are positively skewed, while evidence from the shape parameters shows that VAT leans toward a left-heavy distribution. In contrast, CIT does not conform to normal distributional assumptions, as indicated by the Jarque–Bera outcome., but not for PPT and VAT, indicating that CIT's distribution is not normal (Jarque & Bera, 1980). Overall, the summary statistics suggest that PPT is a significant source of revenue for the Nigerian government during the pre-E-Tax period, but its volatility poses challenges for fiscal planning. CIT and VAT also contribute to government revenue, but their revenue streams are more stable. Meanwhile, before the e-tax system (2005Q3-2015Q1), institutional quality (INQ) averaged -1.273, hinting at governance challenges. Inflation rate (INF) was relatively high at 10.828% on average, with volatility (std dev 2.849). Real GDP (GDP) averaged 13443.68, showing economic activity level. Exchange rate (EXCR) averaged 234.74, with significant fluctuations

(std dev 131). These factors likely influenced tax performance. INQ's low mean and CIT's skewness (1.9484) stand out, suggesting areas for policy focus.

Table 2. Summary Statistics

Post-E-Tax Sample Period: 2015Q2 – 2024Q4

Statistics	PPT	CIT	VAT	INQ	INF	GDP	EXCR
Obs.	39	39	39	39	39	39	39
Mean	577.62	437.49	333.39	-1.230	16.423	18041.16	3864.51
Median	493.61	390.67	249.22	-1.228	15.400	17824.48	2851.95
Maximum	1608.34	1207.52	956.26	-1.052	33.242	22610.39	10279.18
Minimum	176.75	152.42	136.40	-1.465	8.528	15797.97	492.079
Std. Dev.	348.74	214.48	184.10	0.101	5.981	1637.31	3164.54
Skewness	1.3269	1.4947	1.3526	-0.338	1.205	0.841	0.9796
Kurtosis	4.1601	5.8110	4.7994	2.638	3.922	3.384	2.5815
Jarque-Bera	13.6320	27.36149	17.1535	0.9578	10.823	4.838	6.523
Probability	0.0011	0.0000	0.0002	0.6195	0.004	0.089	0.038

Source: Authors' computation, 2025

Table 2 presents the summary statistics for the post-e-tax system of 39 quarters (2015Q2 – 2024Q4). Compared to the pre-E-Tax period, the mean value of PPT has decreased to 577.62, while CIT and VAT have increased to 437.49 and 333.39, respectively. This shift suggests that the Nigerian government has diversified its revenue streams, with CIT and VAT becoming more significant contributors to government revenue. The standard deviation of PPT (348.74) remains higher than that of CIT (214.48) and VAT (184.10), indicating that PPT revenue is still more volatile. This volatility can be attributed to fluctuations in global oil prices and production levels. The skewness and kurtosis values for all three tax types indicate that their distributions are positively skewed and leptokurtic, suggesting that there are outliers in the data. The Jarque-Bera test rejects the null hypothesis of normality for all three tax types, indicating that their distributions are not normal. The increase in CIT and VAT revenue can be attributed to the government's efforts to diversify the economy and improve tax administration (Abiola & Asiweh, 2020). The decrease in PPT revenue may be due to the decline in global oil prices and production levels (Ariyo, 2017). Overall, the summary statistics suggest that the Nigerian government has made progress in diversifying its revenue streams, with CIT and VAT becoming more significant contributors to government revenue. However, PPT remains a volatile source of revenue. Meanwhile, post-e-tax (2015Q2-2024Q4), Institutional

quality (INQ) averaged -1.230, slightly better than pre-e-tax. Inflation rate (INF) rose to 16.423% on average, with higher volatility (std dev = 5.981). Real GDP (GDP) grew to 18041.16, indicating economic expansion. Exchange rate (EXCR) averaged 3864.51, showing significant depreciation and volatility (std dev 3164.54). These changes likely impacted tax revenues, with inflation and exchange rate pressures posing challenges. GDP growth could've boosted tax collections.

4.2. Pre-Tests: Unit Root Tests

Prior to conducting the regression analysis, a unit root test was employed to determine the stationarity properties of the time series data used in the study. Stationarity is essential in time series analysis to ensure that the results are not spurious. The Augmented Dickey-Fuller (ADF) test was adopted to test for the presence or otherwise of unit roots in the variables. The results of the ADF test are reported in Table 3.

Table 3. Unit Root Test Results
Realization-: $T = 78$ Quarters (2005Q3 – 2024Q4)

Level Form Test									
Specification		PPT	CIT	VAT	ETAX	INQ	INF	GDP	EXCR
Constant	<i>t</i> -stat.	-3.6867	-1.3214	-1.9663	-0.9869	-2.0806	-0.6714	-2.7252	-0.1459
	<i>p</i> -value	0.0061	0.6156	0.3009	0.7543	0.2530	0.8470	0.0747	0.9398
Constant & Trend	<i>t</i> -stat.	-3.7106	-5.4986	-3.8966	-2.0000	-2.1203	-2.3924	-2.1290	-6.9854
	<i>p</i> -value	0.0275	0.0001	0.0168	0.5919	0.5257	0.3805	0.5211	0.0000
None	<i>t</i> -stat.	-1.3828	0.0079	-0.2305	0.0000	-0.0004	0.4316	2.0485	1.0398
	<i>p</i> -value	0.1537	0.6821	0.6000	0.6796	0.6792	0.8046	0.9899	0.9205
First Difference Form Test									
Specification		$\Delta(\text{PPT})$	$\Delta(\text{CIT})$	$\Delta(\text{VAT})$	$\Delta(\text{ETAX})$	$\Delta(\text{INQ})$	$\Delta(\text{INF})$	$\Delta(\text{GDP})$	$\Delta(\text{EXCR})$
Constant	<i>t</i> -stat.	-	-	-	-8.7178	-4.2754	-2.5225	-2.9446	-
	<i>p</i> -value	-	-	-	0.0000	0.0010	0.1142	0.0452	-
Constant & Trend	<i>t</i> -stat.	-	-	-	-8.6586	-3.8014	-3.3687	-3.5685	-
	<i>p</i> -value	-	-	-	0.0000	0.0220	0.0634	0.0397	-
None	<i>t</i> -stat.	-	-	-	-8.6603	-4.3867	-2.4493	-2.0080	-
	<i>p</i> -value	-	-	-	0.0000	0.0000	0.0148	0.0434	-
Order: $I(d)$		I(0)	I(0)	I(0)	I(1)	I(1)	I(1)	I(1)	I(0)

Note: *** & * denote statistical significance at 1% and 10% at levels. Δ = First difference operator

Source: Research's computation (2025)

The test outcomes reveal that the three tax variables and exchange rate (EXCR) are stationary (contain no unit root) at level. More specifically, the variables are said to be integrated of order zero, $I(0)$. In others words, the impacts of shocks or impulses to the tax revenue variables (PPT, CIT and VAT) are transitory in the short-run. However, the dummy variable; ETAX and other controlling variables are integrated of one, $I(1)$, after first-differencing operation. Thus, the mix orders of integration, $I(0)$ and $I(1)$, advocates cointegration test to ascertain existence of long-run relationship or linear combination among the variables for each model (PPT, CIT and VAT models) in the presence of unit roots across pre- and post-e-filing periods.

4.3. Model Estimation

To analyse the impact of e-tax system, as a categorical variable, on tax revenue and the selected macroeconomic variables, the ARDL modelling approach was employed for the estimation. Table 4 presents the estimation results.

Table 4. Estimation Results

Sample: $T = 78$ Quarters (2005Q3 – 2024Q4)

Model/Response Variable	1-PPT	2-CIT	3-VAT
Optimal Model Selection	AIC	AIC	AIC
Criterion	13.3804	11.896	10.9017
Bounds Cointegration Test			
F-statistic	4.920***	8.7494***	9.1420***
$I(0) - I(1)$	3.06 – 4.15	3.06 – 4.15	3.06 – 4.15
Speed of Adjustment:			
ECT_{t-1}	-0.7719*** (0.0000)	-0.1052*** (0.0000)	-0.1180*** (0.0000)
Adjusted R-Squared	0.4586	0.6612	0.6057
Long-run Estimates			
<i>Intercept</i> – C (0, average in pre-ETAX)	1221.77*** (0.0039)	573.144*** (0.0006)	266.565** (0.0256)
ETAX: <i>Difference</i> – β (0, 1)	-490.322*** (0.0000)	91.300*** (0.0433)	81.562** (0.0371)
Average in post-ETAX (1, $C + \beta$)	731.448	664.444	348.127
INQ	840.223** (0.0132)	-296.210** (0.0358)	-242.158** (0.0121)
INF	52.148*** (0.0002)	-3.6597 (0.2804)	-0.3741 (0.8715)
GDP	-0.0015	0.0251***	0.0039

	(0.9228)	(0.0000)	(0.2988)
<i>EXCR</i>	0.0276 (0.2659)	0.0220** (0.0332)	0.0234*** (0.0023)
Model Diagnostics			
Serial Correlation Test (BG-LM)			
LM-Stat. (<i>T</i> *R-squared)	8.3442 (0.1383)	0.6539 (0.4257)	0.0119 (0.9133)
Heteroscedasticity Test – ARCH (1)			
LM Stat. (<i>T</i> *R-squared)	3.2677 (0.1952)	3.527 (0.0604)	3.9866 (0.1476)

Note: The values in the parentheses () are p-values of the respective coefficients and statistics while *** & ** denote statistical significance at 0.01 & 0.05, respectively.

Source: Researcher's computation (2025)

4.3.1. PPT Model

As shown in Table, the impact of e-tax system's on PPT is statistically significant but negative. ETAX's coefficient is -490.322 ($p < 0.01$), indicating a decrease in petroleum profit tax revenue post-e-tax adoption. This suggests the e-tax system hasn't boosted PPT collection, possibly due to oil sector complexities or external factors like global oil price fluctuations. The average PPT revenue post-ETAX is 731.448, down from 1221.77 pre-ETAX. This raises questions about the system's effectiveness in enhancing PPT revenue. The significant negative impact might be due to challenges in tax administration or economic factors affecting the oil sector. Besides, Institutional quality (INQ) has a positive and significant effect ($p = 0.132$), suggesting better governance boosts petroleum profit tax revenue. Inflation (INF) also shows a positive and significant impact ($p = 0.0002$), possibly due to higher oil prices. Real GDP ($p = 0.9228$) and exchange rate (EXCR: $p = 0.2659$) yielded insignificant effects on PPT.

4.3.2. CIT Model

As shown in Table 4, The e-tax system has a positive impact on CIT. ETAX's coefficient is 91.300 ($p = 0.0433$), indicating a statistically significant increase in companies' income tax revenue post-e-tax adoption. This suggests the e-tax system has improved CIT collection efficiency or compliance. The average CIT revenue post-ETAX is 664.444, up from 573.144 pre-ETAX. This indicates the e-tax system's effectiveness in boosting CIT revenue, likely due to streamlined processes and enhanced taxpayer compliance. The finding highlights the system's potential in

improving tax administration for corporate taxes. Besides, institutional quality (INQ) has a negative impact on CIT ($p = 0.0358$), suggesting governance issues might hinder corporate tax collection. Real GDP has a positive impact ($p < 0.01$), indicating economic growth boosts CIT revenue. Exchange rate (EXCR) also positively impacts CIT ($p = 0.0332$), likely due to export-oriented sectors. Inflation (INF), however, yielded statistically insignificant ($p = 0.2804$) on CIT. This suggests CIT is more tied to economic activity and exchange dynamics than inflation.

4.3.3. VAT Model

As shown in Table 4, the VAT model shows that e-tax system has a positive impact on VAT. ETAX's coefficient is 81.562 ($p = 0.0371$), indicating a statistically significant increase in value-added tax revenue post-e-tax adoption. This suggests the e-tax system has improved VAT collection efficiency or compliance. The average VAT revenue post-ETAX is 348.127, up from 266.565 pre-ETAX. This indicates the e-tax system's effectiveness in boosting VAT revenue, likely due to streamlined processes and enhanced taxpayer compliance. The finding highlights the system's potential in improving tax administration for consumption-based taxes. Besides, institutional quality (INQ) yielded a significant effect on VAT ($p = 0.0121$), possibly indicating governance issues hinder VAT collection. Exchange rate (EXCR, $p = 0.0023$) positively impacts VAT, likely via imports. Inflation (INF, $p = 0.8715$) and real GDP ($p = 0.2988$) yielded insignificant effects on VAT, suggesting VAT is more influenced by exchange dynamics and governance. This highlights VAT's sensitivity to external trade factors.

4.4. Discussion of Findings

This research examines how the adoption of an electronic taxation system influences government revenue in Nigeria. It focuses on the differential effects on Petroleum Profit Tax (PPT), Companies Income Tax (CIT), and Value Added Tax (VAT), assessing changes in revenue before and after the implementation of the e-tax framework. It was observed that e-tax system's impact on Nigeria's tax revenues is mixed, with varying effects across tax types. The Petroleum Profit Tax (PPT) saw a significant decline post-e-tax adoption, possibly due to oil sector complexities or external factors like global oil price fluctuations, aligning with findings from Ibrahim, Lamidi and Alias (2017) and Ofurum et al. (2018). In contrast, Companies Income Tax (CIT) and Value Added Tax (VAT) revenues increased significantly,

consistent with the Technology Acceptance Model (TAM) theory and studies by Olanrewaju et al. (2025) and Akadakpo and Imonite (2024). This suggests the e-tax system works better for taxes with simpler structures and broader bases like CIT and VAT. Institutional quality and exchange rates influenced tax revenues differently across categories, highlighting the need for tailored digital reforms to maximize effectiveness.

5. Conclusion and Recommendations

This research explored the impact of adopting the electronic tax (e-tax) system on tax revenue generation in Nigeria, focusing on Petroleum Profit Tax (PPT), Companies Income Tax (CIT), and Value Added Tax (VAT). The empirical findings reveal that while the electronic tax system yielded negative impact on PPT revenue on a significant level while it demonstrated significant positive effects on both CIT and VAT collections. These results indicate that the benefits of digitization in tax administration are not uniform across all tax types. The lack of significant impact on PPT may be attributed to the inherent complexities of the petroleum sector, including specialized reporting requirements, production-based assessments, and the dominance of large multinational corporations that already operate within highly structured compliance frameworks. Therefore, technological improvements alone may not be sufficient to drive noticeable changes in PPT revenue. On the other hand, the significant improvements observed in CIT and VAT revenues underscore how effective the e-tax system is in enhancing taxpayer compliance, reducing inefficiencies, and strengthening administrative capacity. The findings also support the expectations outlined by the Technology Acceptance Model (TAM), which explains that when users perceive a system as practical and user-friendly, they are more inclined to embrace it, leading to better overall results.

The study therefore concludes that while e-tax adoption has strengthened revenue performance in certain areas, its impact is contingent on the administrative characteristics and compliance environments of different tax types. Targeted reforms are therefore necessary to maximize the benefits of digital tax systems across Nigeria's broader fiscal landscape.

The findings have important implications for tax policy and administration in Nigeria. They highlight how necessary it is for policymakers to take into account the particular features and complexities of each tax type during the design and

implementation of tax reforms. Considering the outcomes and insights of this research, the following recommendations are presented:

- **Enhance the Digital Infrastructure for PPT Administration:** Since PPT did not show significant improvement under the current e-taxation system, the Federal Inland Revenue Service (FIRS) should develop specialized digital modules tailored to the oil and gas sector. These modules should support complex reporting formats, production-based assessments, and automated cross-verification with regulatory agencies such as the NNPC and DPR.
- **Strengthen Enforcement and Compliance Measures:** To complement the effectiveness of e-tax platforms, especially for CIT and VAT, there is a need for stronger enforcement strategies. This includes automated penalty systems, improved taxpayer audits, and integration of third-party data sources to reduce underreporting and evasion.
- **Improve System Reliability and User Support:** To sustain the gains in CIT and VAT revenue, the e-tax platform must remain accessible, stable, and user-friendly. FIRS should invest in system upgrades, responsive customer support, and continuous monitoring to minimize downtimes and technical challenges.
- **Foster Inter-Agency Data Integration:** Integrating e-tax systems with databases from agencies such as CAC, banks, customs, and state tax authorities will enhance data accuracy and reduce opportunities for tax evasion. A centralized digital ecosystem supports seamless reconciliation and enhances overall revenue quality.
- **Conduct Periodic Assessments of Digital Tax Reforms:** The government should institutionalize periodic evaluations of the e-tax system to identify gaps, measure performance, and inform policy adjustments. Evidence-based improvements will ensure the system remains aligned with evolving economic and technological realities.
- **Expand Digital Tax Reforms to Other Tax Categories:** Given the positive effect on CIT and VAT, similar digitization efforts could be extended to other taxes such as excise duties, stamp duties, and personal income taxes administered at the state level.

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