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CONNECTIVITY AMIDST TAX REVENUE AND EDUCATION DEVELOPMENT: ASSESSMENT THROUGH ARDL

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Abstract. This study examines the impact of tax revenue on the education development in Plateau state, Nigeria. The major data for the study are obtained through the secondary source. The monthly data relevant for the study were extracted from the Plateau State Internal Revenue Service, and Plateau State Ministry of Finance from 2018 to 2023 where 72 observations were generated. The data collected were analyzed using regression, linear regression and ARDL. The population of this study covers the major sources of government tax revenue in Plateau State. It was discovered from ARDL analysis that PAYE has negative and significant effect on expenditure on education but Road tax and direct assessment have positive and significant effect on expenditure on education. With this submission, it is concluded that tax revenue significantly impacted expenditure on education positively in Plateau State, Nigeria. Government needs to formulate new proactive regulatory framework, and review or update the existing policies regularly for effectiveness and efficiency in Plateau state taxes administration in order to ensure that tax rates are kept moderate for easy compliance of the tax payers in the state. Also, public enlightenment should be done in Plateau state to educate and motivate tax payers for fulfilment of their civil righteousness promptly in order to ultimately enhance influx of revenue into the Plateau State' purse for education development projects in the state.

Key words: tax revenue, education development, direct assessment, PAYE, road tax.

Introduction

The obstacles of generating tax revenue and effective, productive, and efficient management of generated tax revenue is vital and important to all government (Adegbite et al., 2022). Education in every state is one of the vital area of the government to financing for the benefits of the society at large. Formidable education globally dispenses development in terms of skill empowerment, country progress, economic stability, technology enhancement, and industrial improvement. According to Adegbite, (2021), education investment significantly enhances the productivity of workers in every settlement. Education investment by the government eradicates state industrial, and social problems, fosters character development, individual personality, knowledge acquisition for taking rightful position in society. The deterioration of educational standards as well as decayed educational facilities and other pertinent infrastructure at state level of educational system which invariably inhibited development ignited brain drain, robbery, taut, insurgence and other society vices which have been currently experiencing in the state. It has been noted that education sector generally at all level in plateau state urgently needs for exigent finance to develop both educational infrastructure and facilities, resuscitate teachers morale, retain, and attract experienced, committed, and disciplined educational personnel, enhances education curriculum and establish conducive teaching/learning enabling environment for quality education.

Funds are needed by the state government to finance and develop education quality, provide educational facilities, and enhance infrastructural development. Numerous institutions' buildings have dilapidated, libraries are equipped with empty textbooks, state experienced teachers' strikes, infrastructural facilities and other educational capital expenditure are ineffective and inefficient in the

state. To that effect, financial resources needed to realize the indispensable motives can be gotten from taxation in the state. Plateau state government realized tax income from the income of the employees, individuals (PAYE), motorists (road tax), informal sectors (non-registered sectors (direct assessment) and other organizations in the state. Plateau state government placed great reliance on taxation as the only revenue source realized in the state aside from allocation from federal government (Maimako et al., 2019). The significance of tax revenue has not been felt in public school in state as it was discovered recently that refurbishment of schools and renovation of furniture, and persistent payment of teachers' salaries are thirst which had emitted crisis in the past. Revenue derived by plateau state government from numerous taxation components is not only to support in boasting the overall government revenue generation but also subsequently needed in achieving other social and developmental welfare projects, in which education is a subset, for good benefit of the populace but reverse has been horrendous and appalling. With the above, this study is engaged to investigate the effect of tax Revenue on the development and enhancement of education sector in Plateau state. This state is examined due to the facts that plateau state economic structure is embedded with mining, tourism and agriculture which is distinctly from other states that heavily depended on oil revenue which influence tax income, and ultimately affects education expenditure and financing. Also, the policy framework and government structure of Plateau state in terms of tax administration, tax policy implementation, budget allocation and local government policies especially on education make this study a unique. Lastly, the state is currently experiencing education unrest in terms of insurgency, infrastructural deficits, teachers' inadequacy, inequality, poverty and strike which invariably necessitated this study to gauge how education was influenced. Infrastructural decay, insurgency, teachers' inadequacy, educational inequality, and government's impotency to meet educational responsibilities in plateau state has ignited concern on the effect on tax revenues on education expenditure in Plateau state. By understanding the influenced of tax revenue on education expenditure in plateau state, the solution and formidable policy implication are provided to the policy makers and the government for effective and productive education enhancement in the state.

Literature review

Education Expenditure

Education is a basic human right for all the children in the state irrespective of social class of the parents, and guardians. This dispensed that primary education is mandatory and free for all the children so that the element of illiteracy is not given chance in the state. Adegbite et al., (2022) opined that education is indispensable to development of the state and country at large. It was stated further that it is pertinent instrument or important sector where knowledge and skills are acquired to solve state social, economic, and technological problems. Education give birth to economic development, economic stability, employment generation, skill empowerment, human capital enhancement, political progress, and technological development (Maimako et al., 2019). According to Adegbite, (2016), human capital accumulation through education influences many sectors significantly, productively and efficiently in the country. It is further advocated that accumulation human capital especially from training and education investment principally, progressively enhances individual growth through salaries enhancement, improve organizations' productivity, and finally develop national economy.

Taxation in Plateau State

Government imposed taxes in Plateau state through government agents in order to achieve government objectives. According to Adegbite, (2017) taxes are compulsory levied on consumption, production, and income of individual and organizations in order to provide certain and essential output to the entire population in the state. Maimako et al., (2019) opined that plateau state government collected taxes from property, transactions, or individuals for enhancement of government revenue for effective utilization in the state. According to Orbunde et al., (2022), every tax is based on legal statute that is without a legal statute, tax can be enforced in any country or state. It was opined further that PIT is charged on salaries, interest income, dividends, business profits, royalties, rents and commissions which ultimately yields more significant income to government. This displays that bearing of PIT on education as a standard gauge for economic development and well-being. Tax is an instrument for social engineering which stimulates general development in education,

health and bridge the income gaps in the country (Ganyam & Ivungu, 2019). Plateau state employs PIT, direct assessment, PAYE and road tax as well as royality to generate income in order to finance expenditure in the state where education is considered as most desirable. The income realized through PIT offers the most important, dominant and reliable revenue for government for enhancing development in education in the state.

Personal Income Tax (PIT)

PIT is usually based on the individual's total income from all sources, including wages, salaries, investments, and other forms of income. The amount of tax that an individual pays is based on their tax bracket, which is determined by their taxable income. There are usually different tax rates for different levels of income, with higher incomes being taxed at a higher rate. PIT is usually collected on PAYE basis, with individuals paying their taxes throughout the year based on their income. One important concept is the standard deduction, which is a fixed amount that individuals can deduct from their taxable income, regardless of their actual expenses. This deduction is designed to simplify the tax filing process and reduce the amount of taxes that individuals pay. Another concept is itemized deductions, which are deductions that individuals can claim for specific expenses such as medical expenses, charitable donations, or mortgage interest. Individuals can choose to itemize their deductions or take the standard deduction, whichever results in a lower tax liability. Maimako et al., (2019) advocated that positive correlation between development and the revenue from PIT taxes but relative reduced comparing to other taxes. Therefore, it is postulated that:

HO1: PIT significantly influences education development in Plateau State

Direct Assessment (DIRASSMT)

Direct assessment refers to the process of calculating and assessing an individual's income tax liability directly from the income reported on their tax return, without the use of a standard deduction or exemption. This method is often used in countries with a progressive tax system, where the tax rate increases as income increases. Under a direct assessment system, individuals must report their income directly to the government, and the tax liability is then calculated based on the reported income. This differs from a standard deduction system, where individuals are allowed to deduct a certain amount of income from their taxable income, regardless. First, individuals must report their income to the government, usually through a tax return form. Once the income is reported, the government will use a set of rules and formulas to calculate the tax liability. The final tax amount is then paid directly to the government by the individual. The exact process may vary depending on the specific country and its tax laws. One of the main advantages is that it allows for a more accurate assessment of an individual's tax liability, since it is based directly on their reported income (Osinimu & Olayiwola, 2022) . This can help to ensure that everyone pays their fair share of taxes. Direct assessment is more transparent, since individuals can see exactly how their tax liability is calculated. This can help to build trust and confidence in the tax system. On the other hand, one of the main disadvantages is that it can be more time-consuming and complex than other methods of assessment, since individuals must report their income in detail and calculate their own tax liability. In the same vein, Mamuda & Alhassan, (2021) opined that direct assessment is more difficult to enforce, since individuals may not report their income accurately or may try to claim deductions that they are not entitled to. This can lead to increased tax evasion and decreased tax revenue. It is postulated that:

HO2: Direct assessment significantly influences education development in Plateau State

Pay as You Earned (PAYE)

PAYE (pay-as-you-earn) system, which is the way that most personal income tax is collected in many countries, including the United States. Under this system, individuals pay taxes throughout the year as they earn income, rather than paying a lump sum at the end of the year. The taxes are usually withheld from the individual's paycheck by their employer and remitted to the government. This system helps to ensure that individuals pay their taxes in a timely manner and helps to prevent them from owing a large amount of money at the end of the year. PAYE system determine the individual's tax rate based on their taxable income. This rate is usually determined by the individual's filing status (single, married, etc.) and their number of dependents. The employer then withholds the appropriate amount of taxes from the individual's paycheck each pay period and remits it to the government (Osinimu & Olayiwola, 2022). The

individual can also make adjustments to their withholding if they think they will owe more or less than the amount being withheld. The main advantage of the PAYE system is that it makes it easier for individuals to pay their taxes, since they don't have to come up with a large sum of money at the end of the year. It also helps to prevent individuals from underpaying their taxes, since the taxes are deducted from their paycheck throughout the year. One potential disadvantage of the PAYE system is that it can result in individuals overpaying their taxes if their income changes during the year, since the tax withholding doesn't automatically adjust to reflect these changes. Another potential benefit of PAYE to the government according to Mamuda & Alhassan, (2021); and Osinimu & Olayiwola, (2022) is that it can create a significant amount of paperwork and administrative costs for employers but increase the government revenue. For instance, employers must calculate the appropriate amount of tax to withhold for each employee, and they must keep track of the payments and remit them to the government. They may also be required to file quarterly or annual reports with the government. Therefore, it is posited that:

HO3: PAYE significantly influences education development in Plateau State

Road Tax (ROADTAXES)

A road tax, also known as a vehicle excise duty, is a tax charged on vehicles based on their emissions. The money collected from road taxes is typically used to fund the construction and maintenance of roads. Road taxes are usually charged at the time of vehicle registration, and the amount of tax to pay is determined by the vehicle's emissions rating. In some cases, road taxes can also be based on the vehicle's weight, engine size, or other factors. Some countries, like the UK, have a road tax system that is designed to encourage people to buy more environmentally friendly vehicles. It is definitely a way to incentivize people to make more sustainable choices when it comes to their transportation (Adegbite & Shehu, 2022). In Nigeria, road taxes are regulated by the Federal Roads Maintenance Agency (FERMA). All vehicles are required to pay road taxes, and the amount to pay is based on the weight of the vehicle and the distance it's driven. For instance, vehicles that weigh less than 3,500 kilograms and travel less than 10,000 kilometers per year are required to pay a flat rate of 2,000 naira per year. Vehicles that weigh more than 3,500 kilograms or travel more than 10,000 kilometers per year are required to pay a higher amount (Adegbite & Azeez, 2021). According to Adegbite & Akande (2017), road taxes is established to raise money to maintain and repair roads and to provide financial assistance to other sectors like education. In Nigeria, road taxes are used to fund FERMA, which is responsible for maintaining federal roads. The funds are used to pay for things like resurfacing roads, fixing potholes, and improving road safety. In addition to this, road taxes can also be used to fund other initiatives, like public transportation or pedestrian infrastructure. Some people argue that road taxes should be used solely for road maintenance, while others argue that they should be used for a variety of transportation-related initiatives. Some of the existing literature on road taxes such as Adegbite & Azeez, (2021); and Osinimu & Olayiwola, (2022) found that road taxes are an effective way to raise revenue for government for actualize the government expenditures on education, road maintenance, health services in the country. Another study such as Adegbite & Akande, (2017); Ganyam & Ivungu, (2019); Herdiyana et al., (2020); Nsubuga et al., (2017) from 2017 found that road taxes can have a positive impact on government income which invariably empowered government financially to expand her expenditure on education and other sector in the state. However, it is postulated that:

HO4: Road tax significantly influences education development in Plateau State

Socio-Political Theory

The social-political theory of taxation was originally developed by John Stuart Mill, a British philosopher and economist who lived in the 19th century. Mill argued that taxes should be used to promote justice and equality, and he believed that the government had a duty to use taxes to help the poor and disadvantaged. He also believed that taxes should be used to fund public goods, such as education and infrastructure. Another important economist who contributed to the social-political theory of taxation is Adam Smith, who is often considered the father of modern economics. In his book, "The Wealth of Nations," Smith argued that taxes should be used to fund the basic functions of government, such as defense and justice. He also believed that taxes should be levied according to the ability of individuals to pay, and that they should be simple, easy to understand, and predictable. The

social-political theory of taxation is a way of thinking about taxes that considers the social and political implications of different tax policies.

This theory suggests further that taxes can be used to promote certain social and political goals, such as reducing inequality, promoting social welfare, or funding government programs. The theory also emphasizes the importance of fairness and equity in the tax system. In addition to the social and political implications of taxes, the social-political theory of taxation also considers the economic implications. For instance, this theory suggests that taxes can be used to promote economic growth by encouraging investment, or they can be used to control inflation by reducing the money supply. This theory also suggests that taxes can be used to redistribute wealth and income. One specific aspect of the social-political theory of taxation is the concept of vertical equity. This concept suggests that taxpayers with a higher income or wealth should pay more in taxes than those with a lower income or wealth. The idea behind this concept is that those who have more resources should contribute more to the government, since they have benefited more from society. One strength of the social-political theory of taxation is that it takes into account the impact of taxes on economic and social outcomes. By considering the effects of taxes on growth, equality, and social welfare, the theory provides a more comprehensive understanding of the impact of taxation. Another strength of the social-political theory of taxation is that it can be used to justify progressive tax systems, which are designed to reduce inequality by taxing higher-income individuals at higher rates. Another strength of the social-political theory of taxation is that it can be used to justify the provision of public goods and services, which can benefit the entire society. This includes things like education, infrastructure, and education care.

A potential weakness of the theory is that it may not provide enough guidance on how to design an efficient tax system. The theory may also be criticized for its reliance on government intervention in the economy, which some economists believe can lead to inefficiency and waste. Another potential weakness of the theory is that it may not adequately consider the efficiency of taxes. The theory may also be criticized for its focus on social and political goals, rather than on economic efficiency. Also, the theory may not take into account the trade-offs involved in allocating scarce resources between different government programs. Another potential weakness is that the theory may be difficult to implement in practice, as it requires careful consideration of how taxes will affect different groups of people.

Empirical Review

Hanif et al., (2024) investigated tax knowledge influence on taxpayer compliance in Surakarta which employed perceptions of tax fairness as moderating variables. Purposive sampling was employed to gather data from respondents using questionnaire which were analyzed with Multiple Regression. It was realized that tax fairness' perception and tax knowledge influenced tax compliance positively, significantly and statistically in Surakarta. However, the study was emanated from Surakarta which was limited to knowledge influence on taxpayer compliance which is distinct to the current study.

Olaoye et al., (2023) examined tax revenue effect on economic development of Nigeria from 2003 to 2020. The results of the necessary data obtained from FRIS, CBN, and NBS statistical bulletins explained that taxes from petroleum, company income, education, and value added taxes possessed significant effect on Nigeria economic development. The study invariably concluded that revenue from taxes in Nigeria significantly affected Nigeria economic development positively. Basically, the study examined the effect of tax revenue on the whole country, Nigeria, as not in tandem with the current study which examined one state out of all the states in Nigeria.

Ihenyen et al., (2023) examined the effect of tax income on Nigeria government spending between employing ten years' time series. The results from Vector Error Correction Model (VECM) displayed long-term connection amidst Nigeria government spending and tax collection. Also, government expenditure, population, debt, and tax income all displayed positive correlations statistically and significantly. The study employed ten years' time series and VECM as against the current study which employed monthly data of 72 observations and ARDL.

Using time series data on variables deemed significant indicators of both public spending and economic growth, Anderu & Tosin, (2023) investigated the factors influencing public spending on educational infrastructure and economic growth in Nigeria. The ordinary least squares (OLS) method

was applied in the construction and testing of a public expenditure model. To find out whether regime in Nigeria gave more money to the education sector during the research period–the military or the civilian one–a dummy variable was added to evaluate the expenditure variability between regime changes. The World Bank, National Bureau of Statistics, and Central Bank of Nigeria provided data for the study. The analysis's findings demonstrated that public spending on education had a major effect on economic expansion. Thus, the study employed ordinary least squares (OLS) for analysis but the current study employed potential econometric tools for analysis.

Adamu & Turawa, (2020) investigated the causal association amid government expenditure and tax revenue in Nigeria. The results of Toda-Yamamoto causality analysis which was employed showed a unidirectional causality from tax revenue components to Nigeria government expenditure. Consequentially, the study concluded tax revenue components possessed positive impact on Nigeria government expenditure. Methodologically, the study employed Toda- Yamamoto causality analysis to examine the causality between tax revenue components and Nigeria government expenditure as differed from the current study which employed ARDL.

David & Joseph, (2020) regressed economic growth variables such as labor force participation, FDI and domestic investment on tax revenue in order to study the relationship amid tax revenue and Nigeria's economic growth during the years 1970 to 2011. The outcome demonstrated that there was a positive and substantial correlation among all of the variables and Nigeria's economic growth. Conceptually, the study investigated labor force participation, FDI and domestic investment on tax revenue which is different to the current study which is restricted to tax revenue in plateau state and education expenditure.

Osho & Olaoye, (2020) examined tax system administration's effect on Nigeria government expenditure. Data which were sourced from CBN and National Bureau of Statistics (NBS) publications, and analysed with regression model displayed that tax administration possessed significant influenced on Nigeria government expenditure. in Nigeria. The study eventually concluded that tax revenue increment has positive influence on Nigeria government expenditure. Geographically, the study examined tax revenue which covered entire country Nigeria as against the current study on plateau state, a single state in Nigeria.

Adegbite & Araoye, (2020) assessed the imported goods impact on the income realized from Value Added Tax in Nigeria. The study further examined causality direction among imported goods, VAT revenue, exchange rate, inflation, and interest rate in Nigeria. Adegbite & Araoye, (2020) actively engaging Units root, Granger causality, Johansen co-integration and VECM tests. Results from VECM disclosed that imported goods positively and significantly affected VAT revenue in Nigeria, and bi-directional causality existed amid imported goods and VAT revenue. Nevertheless, the study examined imported goods impact on the income realized from Value Added Tax in Nigeria but not in tandem with the current study.

Etale & Bariweni, (2019) investigated the connected amidst selected tax components' revenue and Nigeria educational development between 2010 and 2018. Secondary data which was collected through FIRS, MOE and CBN, were analyzed with multiple regression. Etale & Bariweni, (2019) publicized that positive relationship ignited amidst education tax, education development and value added tax but with inexistence of significant relationship. The study conclusion displayed that education tax possessed insignificant contribution to education development in Nigeria. The study only employed regression analysis which is not in line with the current study which employed series of econometric analysis for the study.

Ordu & Nkwoji, (2019) determined education tax income impact on Nigeria economic development from 2006 to 2017 using data garnered from FIRS, CBN, and United Nations development bulletins which were analyzed with thematic and Regression analyses. The results exposed that education tax income dispensed significant impact on Nigeria economic development. The study concluded that education tax income positive, strongly and significantly connected with Nigeria economic development. However, the study was confined to education tax and Nigeria economic development as distanced absolutely from this study which is ignited to examine education development and Plateau state. In another study of Yaro & Adeiza, (2021) which also investigated the association amidst economic growth and taxation in Nigeria. The data collected through CBN and FIRS were analyzed with simple parentage. The finding

showed that taxation income through FIRS effectiveness possessed positive influences on Nigeria economic growth.

Folorunso et al., (2019) used tax revenue's influence on infrastructure development to study how tax revenue affected Nigeria's economic growth from 1980 to 2017. They stated that there are links among tax income, infrastructure development and GDP. It was contended that GDP, foreign direct investment, and infrastructure development are the three main ways that tax revenue influences Nigeria's economic growth. They emphasized that having access to infrastructure encourages investment, which fuels economic expansion. Owolabi and Okwu (2011) looked at the value added tax's only contribution to the growth of the Lagos state economy between 2001 and 2005. Every development indicator, including those related to transportation, agriculture, youth and social welfare, education, environmental management, and agriculture, were regressed in the study. They discovered that during the study period, value-added tax revenue had a favorable impact on the growth of the corresponding economic sectors in Lagos State. However, the study is different to the current study because it was carried out in Lagos.

Adegbite et al., (2019) surveyed tax compliance effect on Oyo state PIT return. Primary data majorly sourced through questionnaire administered on the staff of Board of Internal Revenue Oyo State and selected taxpayers. Data realized from questionnaire were scrutinized with chi- square, MANOVA and descriptive statistics, the results generated from scrutinized analysis displayed that positive effect of Tax Compliance on PIT was discovered. That is, any added effort on tax compliance invariably enhances PIT income returns in Oyo state. The study however employed primary data as absolutely distanced from the current study that employed secondary data through Plateau state Board of Inland Revenue.

Adegbite and Akande (2017) examined PIT impact on Oyo government expenditure. Where the data absolutely sourced from Oyo state approved budgets between 1990 and 2015. The results from multiple regressions and PPMC dispensed the positive significant effect of PIT on Oyo state government expenditure. However, the study was ignited from Oyo state as against the current study which emanated from Plateau state. Therefore, the policies in the two states are different from each other. In another study, Adegbite (2019) employed Johansen cointegration, Regression analysis, Units root, Granger causality and VECM test to gauge taxation effect on Nigeria investment. It was discovered that all taxation components positively and significantly impacted Nigeria investment. Thus, the study examined the entire country, Nigeria, which absolutely differed from the current study that examined only a state in Nigeria. Also, the current study engaged ARDL as analytical tool as against the study which engaged VECM.

Adegbite investigated in 2017 how the personal income tax (PIT) affected Oyo State's ability to generate revenue. It also examined the important aspects of Oyo State's personal income tax revenue realization. Data were taken from the Oyo State government's authorized budgets between 1990 and 2015. Revenue Generation in Oyo State was analysed in connection to PAYE, Road Tax, and CGT using Pearson product moment correlation and multiple regressions. Levies on business premises and registration, market fees, development levies, stamp duties, and taxes on gaming and betting were examined as the components PIT. Results indicated that PAYE significantly increased Oyo state government income significantly. But the study was established for Oyo state decision policy which cannot be emulated in Plateau state.

Adeyemi & Ogunsola (2016) engaged data from NBS, and World Bank indicator, covering the years 1980 to 2013, to investigate the connections among economic growth, education, and human capital indices. The results of ARDL, and Co-integration analysis employed to estimate the relationship among the variables recognized long-run co-integration amidst the variables, and positive long-run relationship existed among enrolment, education, life expectancy, economic growth and gross capital formation but statistically insignificant and negative. However, the data was collected by the study through NBS, and World Bank indicator as distinctly separated from the current study which engaged data from Plateau state.

Adegbite, (2015) conducted an empirical analysis of the effects of corporate tax on Nigeria's revenue profile and also looked at how corporate tax income affects the country's economic growth. From 1993 to 2013, secondary data were gathered from CBN Statistical Bulletin. The link among GDP, corporation tax, VAT, inflation, petroleum tax was examined using multiple regression analysis. According to the study's findings, corporate income tax significantly improves Nigeria's revenue profile

which in turn spurs the country's growth. The government uses the money received from company tax to fulfill its obligations by sponsoring public education, education, and infrastructure, all of which contribute to Nigeria's economic growth. However, the study limited its coverage to corporate tax under the purview of the country as against the current study which examined different components of taxation within the custody of the Plateau state.

The gaps in the literature are being created by this study in order to bridge the gaps inadequate research on education enhancement in Plateau state. All the existing literature examined and reviewed were unable to establish the potency of taxes on the education enhancement in plateau state, and majority of the study reviewed both in the country and other country stick to tax compliance, economic development, corporate tax and infrastructure development as against the current study on expenditure on education. Also, the econometric analysis packages such as regression, correlation, linear regression and ARDL regression to examine taxes impact on education in plateau state make the study exceptional.

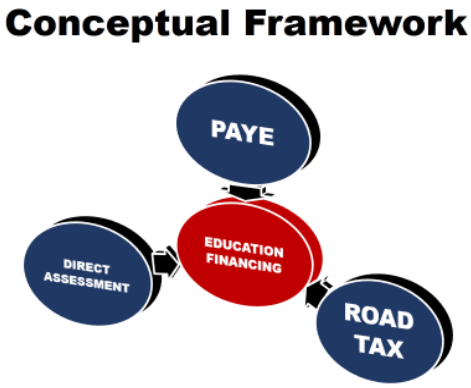

Figure 1 – The effect of tax revenue on education financing

Methodology

The major data for the study are obtained through the secondary source. Secondary data relevant for the study were extracted from the Plateau State of Internal Revenue Service Jos (PSIRS), and Plateau State Ministry of Finance. The monthly data collected were carefully examined and verified to ensure that there were not any form of abnormality and inaccuracy. The data was embedded with various taxes that made up the revenue of the government of Plateau State and income expended on education monthly from 2018 to 2023 where 72 observations were generated. No data of the variables involved were missing during the analysis. The data collected were also validated through cross verification which checked for accuracy and consistency. Time frame was also involved to ensure that data are current and relevant to the research hypotheses. In addition, data cleaning was also conducted to remove duplication, irrelevance and outliers in order to enhance data accuracy and quality. Taxes under study are PAYE, Direct Assessment and Road tax. The data collected were analyzed using regression, correlation, linear regression and ARDL regression. According to rule of tongue, the mixture of first level and level difference called for ARDL as displayed in Table 6. That is ARDL regression was employed because of mixture of I(0) and I(1). The choice of ARDL is based on the fact that variables incorporated are stationary in different levels. Some variables are stationary at level while others are stationary at first different. This called for ARDL because of these dichotomies in stationary level.

Model Specification

To examine the effect of tax revenue on education in Plateau State, education is considered as dependent variable where Pay as You Earn, direct assessment and road tax are independent variable. The model employed to establish the effect of tax revenue on education expenditure in Plateau State is stated below:

$$EDUC = f\ (PAYE, DIRASSMT, ROADTAXES, \mu_1) \quad (1)$$

$$EDUC = \alpha_0 + \beta_1 PAYE + \beta_2\ DIRASSMT + \beta_3\ ROADTAXES + \mu_1 \quad (2)$$

ARDL MODEL

$$\Delta PAYE_t = \sum_{k=1}^{n} \alpha 1 \Delta PAYE_{t-k} + \sum_{k=1}^{n} \alpha 2 \Delta DIRASSMT_{t-k} + \sum_{k=1}^{n} \alpha 3 \Delta ROADTAXES_{t-k} +$$

$$\sum_{k=1}^{n} \alpha 2 \Delta PAYE_{t-s} + \lambda_1 PAYE_{t-1} + \lambda_2 DIRASSMT_{t-1} + \lambda_3 ROADTAXES_{t-1} + \varepsilon_t \quad (3)$$

Whereas EDUC - Education Expenditure
PAYE - Pay as You Earned
DIRASSMT - Direct Assessment
ROADTAXES - Road Tax

Results

The effects of Taxes on Expenditure on Education in Plateau State, Nigeria

This session explained the effects of taxes expenditure on education in Plateau state, Nigeria. The results of Correlation Analysis, VIF, Unit Root Test, Regression, Linear regression and ARDL regression were explained in this session.

In order to examine the relationship between taxes and expenditure on education, correlation analysis was analyzed. According to Table 1 PAYE has effect and significant relationship on education tax with the value of 0.3687. Also, ROADTAXES has positive significant relationship with expenditure on education with the value of 0.4243. This shows no existence of multicollinearity between road taxes and expenditure on education but DIRASSMT has positive but insignificant relationship with expenditure on education. In conclusion, all variable employed in this study has positive relationship on education expenditure in Plateau state, Nigeria.

Table 1 – Correlation Analysis

	EDU	PAYE	DIRASSMT	ROADTAXES
EDUC	1.0000			
PAYE	0.3687*	1.0000		
DIRASSMT	0.1926	0.0110	1.0000	
ROADTAXES	0.4243*	0.2473	0.1214	1.0000

Source: Researcher's Computation (2024)

Table 2 – Variance Inflation Factor

Variable	VIF	1/VIF
ROADTAXES	1.08	0.924730
PAYE	1.07	0.938452
DIRASSMT	1.02	0.984872
MEAN	VIF	1.05

Source: Researcher's Computation (2024)

Table 2 confirmed the report of correlation analysis on the absence of multicollinearity. According to Table 2, Variance Inflation Factor (VIF) confirmed that ROADTAXES has a VIF value of 1.08, PAYE of 1.07 and DIRASSMT 1.02. All these Values are less than 10 which confirmed and authenticated that there is absent of multicollinearity.

Table 3 – Unit Root Test

Variable	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	p value	Level	Decision
PAYE	-4.264	-3.689	-2.975	-2.619	0.0005	I(0)	Stationary
DIRASSMT	-5.118	-3.689	-2.975	-2.619	0.0000	I(0)	Stationary
ROADTAXES	-4.100	-3.696	-2.978	-2.620	0.0010	I(1)	Stationary
EDUC	-4.079	-3.696	-2.978	-2.620	0.0017	I(1)	Stationary

Source: Researcher's Computation (2024)

The essence of unit root test is to determine the stationarity of the variables selected for this study. From Table 3 it was discovered that PAYE has no unit root among the observation, and it is stationary at level difference because the test statistic value -4.264 is greater than all 1%, 5% and 10% Critical Values of -3.689, -2.975 and -2.619 respectively with P-Value of 0.0005 which is far lesser than 0.05. It was also discovered that DIRASSMT has no unit root among the observation, and it is stationary at level difference because the Test statistic value -5.118 is greater than all 1%, 5% and 10% Critical Values of -3.689, -2.975 and -2.619 respectively with P-Value of 0.0000 which is far lesser than 0.05. In contrary, ROADTAXES was not stationary at level but stationary at first level because the test statistic value -4.100 is greater than all 1%, 5% and 10% Critical Values of -3.696, -2.978 and -2.620 respectively with P-Value of 0.0010 which is far lesser than 0.05. in same vain, EDUC was not stationary at level but stationary at first level because the Test statistic value -4.079 is greater than all 1%, 5% and 10% Critical Values of -3.696, -2.978 and -2.620 respectively with P-Value of 0.0017 which is far lesser than 0.05.

Table 4 – Regression Results on the Effect of Taxes on Education Expenditure

Dependent Variable	Independent Variables	Coef.	Std. Err.	T	P>|t|	[95% Conf. Interval]
EDUC	PAYE	.0248943	.0136137	1.83	0.077	-.0028358 .0526244
	DIRASSMT	.442787	2.490716	0.98	0.334	-2.630637 7.51621
	ROADTAXES	2.896004	1.348367	2.15	0.039	.1494693 5.642539
	_CONS	-6.25e+07	4.65e+07	-1.34	0.188	-1.57e+08 3.22e+07
R-squared= 0.7759		Adj R-squared = 0.7080		Prob > F= 0.0149		Root MSE= 7.6e+07
Heteroskedasticity						
chi2(1) = 6.76		Prob > chi2 = 0.0093				

Source: Researcher's Computation (2024)

Regression analysis was done to capture the effect of tax revenue on education expenditure in Plateau state as showed in Table 4. According to the results, PAYE and road tax have positive effect on expenditure on education. 1% in PAYE increase expenditure on education by 0.02% but significant (β = .0248943, t: 1.83, P>|t| = 0.077 < 0.1) at 0.1% level, while road tax also has positive significant

effect of expenditure on education. 1% increase in road tax increases expenditure on education by 2.8% but is significant (β = 2.896004, t: 2.15, P>|t| = 0.039 < 0.05) at 0.05 significant level. But direct assessment has positively and insignificant impact (β = .442787, t: 0.98, P>|t| = 0.334 > 0.05) on expenditure on education. However, there is present of heteroskedasticity with value of Prob > chi2 = 0.0093 which called for linear regression as shown in Table 5.

Table 5 – Linear Regression Results on the Effect of Taxes on Education Expenditure

Dependent Variable	Independent Variables	Coef.	Robust Std. Err.	T	P>|t|	[95% Conf. Interval]
EDUC	PAYE	.0248943	.0057118	4.36	0.000	.0132598 .0365289
	DIRASSMT	2.442787	1.994004	1.23	0.229	-1.618867 6.50444
	ROADTAXES	2.896004	2.293936	1.26	0.216	-1.77659 7.568598
	_CONS	-6.25e+07	7.94e+07	-0.79	0.437	-2.24e+08 9.92e+07
R-squared= 0.7759		Prob > F= 0.0000		Root MSE= 7.6e+07		

Source: Researcher's Computation (2024)

Due to the existence of heteroskedasticity as showed in Table 4, linear regression came into existence to avert spurious of regression as exhibited in Table 5. According to linear regression, it is only PAYE that has significant effect (β = .0248943, t: 4.36, P>|t| = 0.000 < 0.05), others have insignificant effect of expenditure on education. ARDL was discovered from the unit root test due to the fact that all the variables involved has different level of stationary. PAYE and direct assessment were stationary at level, while road tax and expenditure on education were stationary at first level.

Table 6 – ARDL Results on the Effect of Taxes on Education Expenditure

Dependent Variable	Independent Variables	Coef.	Std. Err.	T	P>|t|	[95% Conf. Interval]
EDUC	EDUC L1.	.9313025	.0588962	15.81	0.000	.8104575 1.052147
	PAYE	-.0011616	-.0003585	-3.24	0.011	-.0110428 .0087196
	DIRASSMT	3.011996	.8384111	3.59	0.001	1.291718 4.732273
	ROADTAXES	.8746724	0.306903	2.85	0.035	-.0941344 1.843479
	_CONS|	-3.89e+07	1.62e+07	-2.40	0.023	-7.22e+07 -5686613
R-squared = 0.7270		Adj R-squared = 0.7162		Prob > F= 0.0000		Root MSE = 2.547e+07

Source: Researcher's Computation (2024)

According to rule of tongue, the mixture of first level and level difference called for ARDL as displayed in Table 6. That is ARDL regression was employed because of mixture of I(0) and I(1). According to ARDL regression result, PAYE has negative and insignificant effect of expenditure on education, but significant because p value is 0.011 (β = -.0011616, t: -3.24, P>|t| = 0.011 < 0.05) which is far lesser than 0.05 level of significant. Direct assessment has positive significant impact on education (β = 3.011996, t: 3.59, P>|t| = 0.01 < 0.05) with p value of 0.001 which is less than 0.05, that is, 1% increase in direct assessment increases education by 3.0%. Road taxes also has positive significant impact on expenditure on education (β = .8746724, t: 2.85, P>|t| = 0.035 < 0.05) with p value of 0.035 which is less than 0.05% significant level. That is 1% increase on road tax increases expenditure on education by 0.8%. But, lag of expenditure on education confirmed the significant

level of expenditure on education in the long run. R2 and Adjusted R2 with value of 0.727 and 0.716 confirmed the authenticity of the model for the study.

Discussion

This study examined the analysis of the effect of tax revenue on education development in Plateau state from 2018 to 2023. Secondary data relevant for the study were extracted from the Plateau State of Internal Revenue Service Jos, and Plateau State Ministry of Finance. The data collected were analyzed through time series which uses regression analysis, linear regression analysis, and ARDL Regression analysis. It was discovered from the analysis that according to this regression, it is only PAYE that has significant effect, others have insignificant effect of expenditure on education. Linear regression came into existence to avert spurious of regression. The mixture of first level and level difference call for ARDL. ARDL was employed because of mixture of I(0) and I(1). That is ARDL was involved because the unit root test displayed that all the variable involved has different level of stationary. PAYE and direct assessment were stationary at level, while road tax and expenditure on education were stationary at first level. According to ARDL regression result, PAYE has negative and significant effect of expenditure on education, but significant because p value is 0.811 which is greater than 0.05 level of significant. This is in tandem with submission of Adegbite et al., (2019); and Etale & Bariweni, (2019) but derailed from the submission of Ihenyen et al., (2023); Hanif et al., (2024); Osho & Olaoye, (2020); Ganyam & Ivungu, (2019); of Ordu & Nkwoji, 2019; and Yaro & Adeiza, (2021); Adamu & Turawa, (2020); and David & Joseph, (2020). Direct assessment has positive significant impact on education with p value of 0.001 which is less than 0.05, that is, 1% increase in direct assessment increases education by 3.0%. The income realized from direct assessment tax has been utilized judiciously by the government of Plateau state for effective actualization of education goals in the state. This results supports the view of Ihenyen et al., (2023); Osho & Olaoye, (2020); Ganyam & Ivungu, (2019); Adegbite et al., (2019); and Etale & Bariweni, (2019) but disregarded the view of Hanif et al., (2024); Olaoye et al., (2023); and Maimako et al., (2019). In the same vein, Road taxes have positive and significant effect on expenditure on education. This dispensed that road taxes embedded with revenues potency to actualize education expenditure in plateau state. This in line with the submissions of Adegbite & Akande, 2017; Adegbite & Azeez, 2021; Adegbite & Olatunji, 2021; Etale & Bariweni, 2019; Hanif et al., (2024); Maimako et al., 2019; and Olaoye & Atilola, (2018) but against the submissions of Ihenyen et al., (2023);Osho & Olaoye, (2020); Ordu & Nkwoji, 2019; andYaro & Adeiza, (2021).

Conclusion

The main objective of this research work is to examine the impact of tax revenue on the education development in Plateau state. Secondary data relevant for the study were extracted from the Plateau State of Internal Revenue Service Jos, and Plateau State Ministry of Finance. The data collected was invariably analyzed using regression and linear regression and ARDL regression. The population of this study covers the major sources of government tax revenue in Plateau State. ARDL was carried out because the unit root test that all the variable involved has different level of stationary. PAYE and direct assessment were stationary at level, while road tax and expenditure on education were stationary at first level. According to ARDL regression result, PAYE has negative and significant effect of expenditure on education. Road taxes and direct assessment have positive and significant effect on expenditure on education. According to the outcome of the study, it is concluded that tax revenue has positive significant impact on expenditure on education in Plateau State positively and significantly in Plateau State. With these submissions, tax revenue significantly impacted education development positively in Plateau State, Nigeria. The income realized from taxes has been utilized judiciously by the government of Plateau state for effective actualization of education goals in the state. Taxes in Plateau state are embedded with revenues potency to actualize education expenditure in the state. Government needs to formulate new proactive regulatory framework, and review or update the existing policies regularly for effectiveness and efficiency in Plateau state taxes administration in order to ensure that tax rates are kept moderate for easy compliance of the tax payers in the state. Also, public enlightenment should be done in Plateau state to educate and motivate tax payers for fulfilment of their civil righteousness

promptly in order to ultimately enhance influx of revenue into the Plateau State' purse for education development projects in the state.

This research is prone to numerous limitations, the accessibility to comprehensive and accuracy data on education expenditure and tax revenue became a challenge. Lack of transparency, inconsistent and incomplete records hindered the timely results which prolong the completion of the paper. Administrative inefficiency and political dynamics which were caused by the changing of government in plateaus state was another limitation to this study.

The discoveries are established on scientific literature where the case study analyzed. Hence, further research is suggested to expand the knowledge on this research. The future expansion of the research could be piloted by conducting longitudinal research on track dynamic on tax revenue and education financing overtime which can enlighten on the patterns and causality. Also, plateau state can be compared with another state in Nigeria to gauge the significant impact of tax revenue on education in order to swiftly enhance plateau state education system. In addition, examination of the impact of specific tax policy dynamics on education financing can provide formidable insights on how various taxes' structure impact education development in Nigeria.

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