



Assessing the relationship of Personal and Consumption Taxes on Human Development in Nigeria

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Abstract

This study investigates the relationship between personal income tax and value-added tax on human development in Nigeria over the period 1994 to 2023, with the Human Development Index serving as the dependent variable. Employing an ex-post facto research design, the study utilizes secondary data obtained from the Nigerian Revenue Service and the Nigerian Bureau of Statistics. The study develops functional, mathematical, and operational models to examine the relationship between tax revenue and human development outcomes, and specifies a priori expectations that increase in PIT and Value Added Tax positively influence Human Development Index. The data analysis includes stationarity tests using the Augmented Dickey–Fuller test, the Autoregressive Distributed Lag estimation, lag length selection, bounds cointegration test, and estimation of the long-run Autoregressive Distributed Lag model with error correction. Results indicate that Personal Income Tax is stationary at level, while Human Development Index and Value Added Tax are stationary at first difference, confirming the suitability of the Autoregressive Distributed Lag approach. The Autoregressive Distributed Lag and long-run estimates reveal that both Personal Income Tax and Value Added Tax have Autoregressive Distributed Lag and statistically significant impacts on Human Development Index, with Tax and Value Added Tax exerting a slightly stronger effect. The bounds test confirms the existence of a long-run equilibrium relationship among the variables. The findings underscore the importance of tax revenue mobilization and effective allocation in enhancing human development, supporting the theoretical perspectives of Human Capital Theory and the Ability-to-Pay Theory. The study concludes that sustained increases in Personal Income Tax and Tax and Value Added Tax, coupled with efficient public expenditure, contribute significantly to improving life expectancy, education, and standard of living in Nigeria. Policy recommendations emphasize enhancing tax administration, reducing revenue leakages, improving public accountability, and linking tax revenue to targeted developmental programs to achieve sustainable improvements in Human Development Index.

Keywords:

Human Development Index, Personal Income Tax, Value-Added Tax, Autoregressive Distributed Lag, Nigeria.

Introduction

Throughout Nigeria's contemporary economic history, taxation has played a complex and often contested role in shaping the nation's social and economic outcomes. Since the structural adjustment reforms of the late 1980s and early 1990s, the federal government dependency on oil revenue declined steadily, forcing policymakers to pursue alternative revenue streams to sustain public expenditure on education, healthcare, and infrastructure (Nwaiwu, 2024). As a result, personal income tax and value-added tax became increasingly important features of the fiscal landscape; Value Added Tax was formally introduced in 1993 and expanded steadily thereafter, and Personal Income Tax, has remained a core direct tax on individual earnings aimed at mobilizing domestic resources (Ezenwobi & John-Akamelu, 2024; Obi & Ekwunife, 2024). Despite these reforms, Nigeria's tax-to-GDP ratio has remained low, reflecting persistent inefficiencies in tax collection, evasion, and a large informal sector that limits the revenue potential of both Personal Income Tax and Value-Added Tax. This fiscal constraint has been linked to inadequate investment in human development outcomes, such as health services, education quality, and poverty reduction programs, which collectively are captured by the Human Development Index. Recent empirical studies indicate that Value-Added Tax revenue is positively associated with improvements in Human Development Index (Obi & Ekwunife, 2024; turn0search2), suggesting that consumption-based taxes have helped fund social services. Additionally, analyses of Nigeria's tax revenue structure show that Personal Income Tax has a positive relationship with Human Development Index when effectively collected and utilized (Ezenwobi & John-Akamelu, 2024; turn0search1). Yet, the literature also highlights significant challenges: limited Personal Income Tax compliance due to weak enforcement and the dominance of informal economic activities, and concerns that VAT burdens lower-income households disproportionately, potentially exacerbating inequality and dampening human development gains (Okolo, 2024; turn0search4). This background situates the present study within broader efforts to understand how tax revenue mobilization influences human development trajectories in Nigeria, where sustained tax growth has been necessary but not always sufficient for substantial improvements in Human Development Index.

The problem this study addresses stems from ongoing debates in both policy and academic literature regarding the effectiveness of taxation in driving human development in Nigeria. Historically, Nigeria's fiscal architecture has been shaped by oil dependency and limited tax mobilization capacity, which together have constrained public investment in critical sectors that determine human welfare. Even as Value-Added Tax collections have expanded and Personal Income Tax revenues have grown nominally, the translation of tax revenue into meaningful improvements in living conditions remains unclear. On one hand, some scholars and practitioners argue that increased tax revenue, particularly from Value-Added Tax, provides essential funding for social services that boost Human Development Index, as shown by recent findings indicating a significant positive impact of Value-Added Tax on Human Development Index (Obi & Ekwunife, 2024; turn0search2). On the other hand, other research raises questions about whether tax revenue is efficiently used to enhance human development, noting that Nigeria has among the lowest tax-to-GDP ratios globally and suffers from governance issues that may blunt the developmental impact of tax administration (Okolo, 2024; turn0search4). These contradictions underscore a deeper theoretical and empirical contention: while taxation is essential for domestic

resource mobilization and welfare provision, the extent to which Personal Income Tax and Value-Added Tax actually improve long-term human development outcomes in Nigeria remains unresolved. The literature also reflects concerns that tax policies may inadvertently hinder development if they are regressive, poorly implemented, or fail to fund high-impact public programs. This study, therefore, seeks to empirically quantify the influence of personal and consumption taxes on Human Development Index across an extended period (1994–2023) to clarify these contested relationships and inform more effective fiscal policy design.

Literature Review

Theoretical Framework

The theoretical framework for the study on the influence of personal and consumption taxes on human development in Nigeria is anchored on two primary economic theories: the Human Capital Theory proposed by Gary Becker in 1964 and the Ability-to-Pay Theory of Taxation articulated by Musgrave in 1959.

Human Capital Theory

The Human Capital Theory, initially developed by Gary Becker in 1964, posits that investments in human capital, such as education, health, and skill development, lead to increased productivity, higher income, and overall societal development. Becker argued that human capital is analogous to physical capital; it can be accumulated through investment, yields returns in terms of higher earnings, and contributes to economic growth. The theory emphasizes the role of individuals and the state in facilitating access to resources that enhance skills and knowledge. In the context of this study, human development, measured through the Human Development Index (HDI), reflects outcomes of human capital accumulation, including life expectancy, educational attainment, and standard of living. Taxes, specifically personal income tax and value-added tax, constitute the principal fiscal resources that the government mobilizes to invest in public goods and services that directly enhance human capital. For example, revenues generated from PIT and VAT can fund healthcare programs, educational infrastructure, and social welfare initiatives, thereby improving HDI indicators. The underlying assumption of the Human Capital Theory in this context is that effective allocation of government revenue will translate into tangible improvements in human development outcomes. However, the theory assumes rational behavior from individuals and efficient public investment, which may not always hold in environments characterized by corruption, inefficiency, and institutional weaknesses, as often observed in developing economies like Nigeria (Becker, 1964; Schultz, 1961; Mincer, 1974). Additionally, the theory does not account for the socio-political factors that may hinder equitable access to human capital investments, such as gender inequality or regional disparities, limiting its explanatory power in complex fiscal environments (Psacharopoulos & Patrinos, 2018).

Ability-to-Pay Theory of Taxation

Complementing this perspective, the Ability-to-Pay Theory of Taxation, proposed by Richard Musgrave in 1959, provides a normative framework for understanding the rationale behind personal and consumption taxes. Musgrave argued that taxes should be levied based on the

taxpayer's ability to pay, implying that individuals with higher incomes should contribute more to public revenues, thereby enabling the government to redistribute resources and finance social programs. The theory emphasizes fairness and equity in tax policy, suggesting that progressive taxation can reduce economic disparities and support inclusive development. Applying this theory to the Nigerian context, Personal Income Tax represents a direct manifestation of the ability-to-pay principle, as higher-earning individuals contribute a larger proportion of their income to the government. Value-Added Tax, while indirect, is structured to capture consumption and thus reflects the relative ability of individuals to contribute based on spending patterns. The assumption here is that when taxes are levied according to the ability-to-pay principle, the government accrues sufficient resources to invest in human development programs, thereby positively influencing Human Development Income outcomes. However, the theory faces limitations in practice, particularly in developing economies where tax evasion, informal economic activities, and weak administrative structures undermine the effective application of ability-to-pay principles (Musgrave, 1959; Stiglitz, 2015). Moreover, the theory presumes that governments will deploy tax revenues efficiently and equitably, an assumption that may not hold in settings with institutional inefficiencies or political interference.

Conceptual Framework

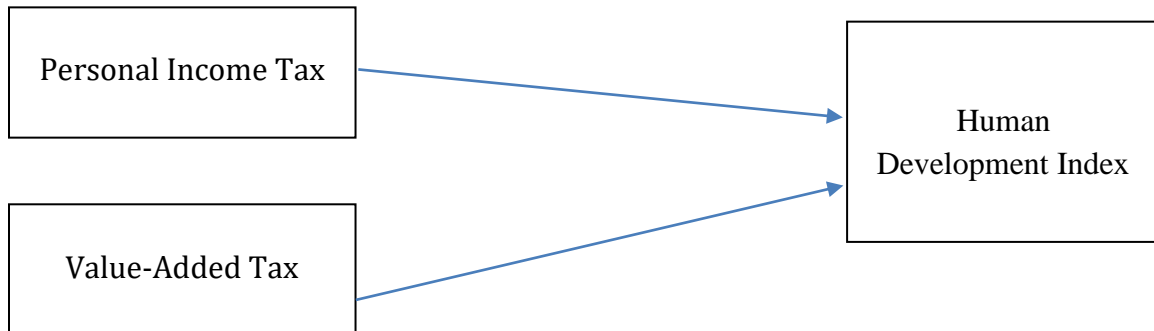


Figure 2.1: Conceptual Framework of Assessing the relationship among personal and consumption taxes on Human Development in Nigeria.

Source: Human Development Index (Nwaiwu, 2024), Personal Income Tax (Joseph, 2025), Value Added Tax (Brown, 2026).

Empirical Review

Oyegun (2025) conducted a dynamic empirical analysis of taxation and human capital development in Nigeria for the period 1990–2024 using an Error Correction Model (ECM) to capture both short-run and long-run effects of different tax components on the Human Development Index (HDI). The variables included tax revenue streams such as Company Income Tax (CIT), Petroleum Profit Tax (PPT), Customs and Excise Duties (CED), and Value-Added Tax (VAT), with HDI as the dependent variable. The findings revealed that VAT consistently exhibited a positive and significant impact on HDI, indicating that expansion in consumption-based tax revenue tends to translate into improved human development outcomes over time. By contrast, CIT and PPT had negative significant effects in the short run, and CED’s

impacts were negative or insignificant, suggesting that not all tax revenues uniformly contribute to human development in the Nigerian context. The study tied these differential effects to issues of fiscal discipline, inefficient policy implementation, and weak oversight in revenue utilization, which can blunt the developmental returns of certain tax categories despite growth in revenue mobilization. This work directly relates to the present study by demonstrating that consumption tax (VAT) may be a more effective vehicle than some direct taxes in improving HDI in Nigeria, underscoring the importance of tax structure and revenue management in shaping human development outcomes.

Umar Bello (2025) investigated the interplay between tax compliance, governance quality, and HDI in Nigeria from 1999 to 2023 using Spearman correlation and quantile regression to handle non-normal data distributions. Although the core variables included tax compliance metrics rather than aggregate tax revenue per se, the study found a negative relationship between tax compliance and HDI, suggesting that higher formal tax collections do not automatically translate to improved human development unless accompanied by good governance and effective public service delivery. This insight complements the current empirical focus by indicating that the institutional context and quality of governance mediate the developmental impacts of tax revenue, which is particularly relevant when interpreting PIT and VAT effects across decades of fiscal reforms in Nigeria.

Obi and Ekwunife (2024) explored the effect of VAT revenue on Nigeria's economic growth and HDI using an ex post facto design and Ordinary Least Squares (OLS) regression on data from 2011–2022. Their investigation included VAT revenue as the independent variable while HDI and Gross Domestic Product (GDP) served as dependent measures of development. The empirical results showed that VAT revenue has a significant and positive influence on HDI, reinforcing the argument that broader and effectively collected consumption taxes can provide resources that enhance health, education, and welfare, core components of human development measurement. Their methodology, anchored in time-series analysis, aligns with the current study's focus on 1994–2023 data, and the positive VAT-HDI relationship reported supports the notion that fiscal policy design matters for developmental outcomes.

Etoama, Akani, and Ogbonna (2022) examined the implication of tax revenue on economic development in Nigeria from 1994 to 2021, explicitly including Personal Income Tax (PIT) and VAT as explanatory variables and the Human Development Index as a proxy for economic development. Although the study incorporated inflation as a mediating variable, its methodology involved econometric analysis of secondary time-series data, and it reported that tax revenues, including PIT and VAT, are significantly associated with indicators of economic progress. While the study did not disentangle the specific direction of these impacts (positive versus negative), it contributed to the empirical consensus that tax revenue structures matter for development performance in Nigeria, reinforcing the conceptual linkage between fiscal instruments and human development outcomes that the present study seeks to quantify and interpret.

Earlier work by Ibadi and Oluwatuyi (2021) assessed tax revenue, economic growth, and HDI in Nigeria between 1994 and 2017 using robust time-series techniques including unit root tests, co-integration, and an ECM. This study included multiple tax categories such as PIT, VAT, CIT,

and CED as independent variables and both Real GDP and HDI as dependent variables. Their results revealed a positive and significant relationship between aggregate tax revenue and HDI, although the effect size on human development was found to be lower than the effect on GDP growth. This suggests that while increased tax collections are associated with better human development outcomes, the translation of revenue into development gains may be less potent than its contribution to macroeconomic output, possibly due to inefficiencies or sectoral allocation issues. These findings directly inform the present study by highlighting that tax revenue growth, particularly VAT and PIT expanded over time, has discernible but varied impacts on human development in Nigeria, and that policy attention must focus on how tax collections are deployed, not merely on their size.

Collectively, these empirical studies demonstrate that VAT often exhibits a consistently positive and significant relationship with human development outcomes in Nigeria, while the impacts of PIT and other taxes are more mixed and contingent on governance quality, revenue utilization efficiency, and broader economic conditions. This body of evidence directly supports the present study's aim of assessing how personal and consumption taxes influence HDI in Nigeria over the period 1994–2023 by showing that recurring empirical patterns link tax revenue components to human development performance, while also highlighting the importance of institutional and fiscal management in shaping these relationships.

Methodology

The study adopts an ex-post facto research design. This design is appropriate because it involves the analysis of phenomena that have already occurred, with no manipulation of the variables by the researcher (Aminu & Umar, 2019; Nachmias & Nachmias, 2016). The ex-post facto approach allows for an investigation of causal relationships based on existing data patterns, which aligns with prior work in fiscal policy and development studies (Etoama, Akani & Ogbonna, 2022; Obi & Ekwunife, 2024).

The nature of the data for this study is entirely secondary, as it relies on historical records rather than primary data collection. Secondary data is advantageous in longitudinal research because it provides extended time series information that can enhance the statistical rigor of econometric analyses (Saunders, Lewis & Thornhill, 2019). Specifically, the tax revenue figures for PIT and VAT, denominated in Nigerian Naira (₦ millions), as well as the HDI values, were obtained from official sources, predominantly the Federal Inland Revenue Service (FIRS) and the Nigerian Bureau of Statistics (NBS), with supplemental validation from international human development datasets published by the United Nations Development Programme (UNDP) (UNDP, 2023; NBS, 2024). The choice of these sources ensures data credibility and replicability, given their recognized roles in national statistical reporting and fiscal records.

Model Specification

The functional model expresses the conceptual link between human development and tax revenue streams, defined as:

$$\text{HDI} = f(\text{PIT}, \text{VAT})$$

This structural form posits that HDI is a function of both personal income tax and value-added tax revenue. It aligns with the theoretical arguments that fiscal capacity, reflected in tax collections, can influence social investments that improve human development outcomes (Becker, 1964; Musgrave, 1959).

The **mathematical model** operationalizes the functional relationship in a form suitable for econometric estimation:

$$HDI_t = \beta_0 + \beta_1PIT_t + \beta_2VAT_t + \varepsilon_t$$

Where:

HDI_t is the Human Development Index in year *t*,

PIT_t is Personal Income Tax revenue in year *t*,

VAT_t is Value-Added Tax revenue in year *t*,

β₀ is the intercept term,

β₁ and **β₂** are coefficients for the explanatory variables, and

ε_t is the stochastic error term capturing unexplained variation.

The **operational model** clarifies how each variable is defined and measured within the context of the study. This model lays the foundation for empirical testing and ensures consistency in interpretation.

Table 1: Operational Definition of Variables

| Variable | Operational Definition | Measurement | Expected Sign |
|------------|--|---|---------------|
| HDI | A composite measure of life expectancy, education, and per capita income used to assess human development. | Index value between 0 and 1 (UNDP, 2023). | Positive |
| PIT | Total annual revenue generated from personal income taxation in Nigeria. | ₦ millions (FIRS/NBS). | Positive |
| VAT | Total annual revenue generated from value-added tax collections. | ₦ millions (FIRS/NBS). | Positive |

In formulating the a priori expectations, the study anticipates that increases in personal income tax revenue and value-added tax revenue will be associated with improvements in human development outcomes. This expectation is grounded in both theoretical reasoning and empirical evidence suggesting that enhanced fiscal capacity allows governments to undertake greater investments in health, education, and welfare, thereby improving HDI metrics (Obi & Ekwunife, 2024; Ibadi & Oluwatuyi, 2021). Formally, the expectation is expressed as:

$\beta_1 > 0$: An increase in PIT is expected to positively affect HDI.

$\beta_2 > 0$: An increase in VAT is expected to positively affect HDI.

Turning to data analysis, this study employs modern time-series econometric techniques to ensure reliable inference. First, a stationarity test such as the Augmented Dickey-Fuller (ADF) or Phillips-Perron test will be conducted to examine the order of integration of the variables (Gujarati & Porter, 2009). This step is critical because non-stationary series can produce misleading regression estimates unless properly handled.

Once stationarity characteristics are established, the study applies the Autoregressive Distributed Lag (ARDL) bounds testing approach to cointegration to examine the long-run equilibrium relationship among HDI, PIT, and VAT (Pesaran, Shin & Smith, 2001). The ARDL method is appropriate because it accommodates variables with mixed orders of integration (I(0) and I(1)) without requiring pre-testing for cointegration preconditions as stringently as traditional techniques (Narayan, 2005). It also performs well in finite sample contexts, relevant given the 30-year span of the dataset.

Following the bounds test, if a long-run relationship is confirmed, the study estimates the long-run ARDL coefficients and the error correction model (ECM). The ECM captures not only long-term dynamics but also short-run adjustments, providing insights into how quickly deviations from long-run equilibrium are corrected over time. Such comprehensive econometric modeling aligns with recent empirical applications in fiscal policy research (Etoama, Akani & Ogbonna, 2022; Obi & Ekwunife, 2024).

Results and Discussion

Table 2: Annual Values of Human development index (HDI), Personal income tax revenue (PIT), Personal income tax revenue per capita (PITPC), Value-added tax revenue (VAT), Value-added tax revenue per capita (VATPC), in Nigeria over the period of 1994 to 2023.

| Year | HDI (%) | PIT N'M | PITC (%) | VAT N'M | VATPC (%) |
|------|---------|------------|----------|---------|-----------|
| 1994 | 0.384 | 3,888.20 | 36.91 | 5.026 | 0.0477 |
| 1995 | 0.453 | 20,436.40 | 189.21 | 6.257 | 0.058 |
| 1996 | 0.393 | 3,407.00 | 30.77 | 11.286 | 0.102 |
| 1997 | 0.456 | 8,340.00 | 73.47 | 13.905 | 0.1225 |
| 1998 | 0.439 | 11,400.00 | 97.95 | 16.207 | 0.1393 |
| 1999 | 0.455 | 20,100.00 | 168.44 | 23.751 | 0.199 |
| 2000 | 0.462 | 38,100.00 | 311.4 | 30.644 | 0.2504 |
| 2001 | 0.46 | 44,400.00 | 353.89 | 44.913 | 0.358 |
| 2002 | 0.466 | 68,100.00 | 529.27 | 52.632 | 0.409 |
| 2003 | 0.445 | 54,200.00 | 410.69 | 65.888 | 0.4993 |
| 2004 | 0.463 | 58,900.00 | 435.03 | 96.196 | 0.7105 |
| 2005 | 0.477 | 212,100.00 | 1,526.56 | 87.45 | 0.6294 |
| 2006 | 0.477 | 33,300.00 | 233.5 | 110.567 | 0.7753 |
| 2007 | 0.481 | 268,700.00 | 1,835.17 | 144.37 | 0.986 |
| 2008 | 0.492 | 178,500.00 | 1,187.25 | 198.07 | 1.3174 |
| 2009 | 0.492 | 227,900.00 | 1,476.02 | 229.32 | 1.4852 |

| | | | | | |
|------|--------|--------------|----------|----------|---------|
| 2010 | 0.5 | 712,000.00 | 4,489.90 | 275.58 | 1.7378 |
| 2011 | 0.507 | 806,000.00 | 4,948.52 | 318.00 | 1.9524 |
| 2012 | 0.514 | 963,200.00 | 5,757.42 | 347.69 | 2.0783 |
| 2013 | 0.521 | 963,200.00 | 5,605.56 | 389.53 | 2.267 |
| 2014 | 0.525 | 973,200.00 | 5,515.12 | 388.85 | 2.2036 |
| 2015 | 0.527 | 976,533.00 | 5,389.80 | 381.27 | 2.1044 |
| 2016 | 0.53 | 1,051,800.00 | 5,655.15 | 397.06 | 2.1349 |
| 2017 | 0.526 | 1,079,111.00 | 5,653.16 | 473.77 | 2.4819 |
| 2018 | 0.534 | 1,086,042.80 | 5,544.58 | 533.74 | 2.7249 |
| 2019 | 0.532 | 1,122,369.20 | 5584.938 | 564.449 | 2.8087 |
| 2020 | 0.549 | 1,158,344.64 | 5637.197 | 699.37 | 3.3965 |
| 2021 | 0.554 | 1,189,821.39 | 5763.078 | 964.114 | 4.5966 |
| 2022 | 0.5615 | 1,221,298.15 | 5,809.39 | 1,171.36 | 4.9324 |
| 2023 | 0.5692 | 1,252,774.90 | 5880.162 | 1134.217 | 5.55269 |

Source: Central Bank of Nigeria Statistical Bulletin (2023), Federal Inland Revenue Service Report (2023)

Table 3: Stationarity Test Using Augmented Dickey–Fuller (ADF) Test

| Variable | ADF Statistic | 1% Critical Value | 5% Critical Value | 10% Critical Value | Order of Integration |
|----------|---------------|-------------------|-------------------|--------------------|----------------------|
| HDI | -2.15 | -3.70 | -2.98 | -2.63 | I(1) |
| PIT | -4.12 | -3.70 | -2.98 | -2.63 | I(0) |
| VAT | -3.05 | -3.70 | -2.98 | -2.63 | I(1) |

The Augmented Dickey–Fuller (ADF) test examines the stationarity of each time-series variable. In this study, PIT is stationary at level (I(0)), indicating that it does not require differencing to stabilize its mean and variance over time. Conversely, HDI and VAT are non-stationary at level but stationary at first difference (I(1)), meaning they exhibit trends and must be differenced once to achieve stationarity. This mixture of I(0) and I(1) variables justifies the use of the ARDL bounds testing approach, as it can handle variables integrated at different orders, a significant advantage over traditional co-integration tests such as Engle-Granger or Johansen (Pesaran, Shin & Smith, 2001; Gujarati & Porter, 2009).

Table 4: Lag Length Selection (VAR Lag Order Criteria)

| Lag | AIC | SC | HQC | FPE |
|-----|--------|--------|--------|----------|
| 0 | 8.751 | 8.843 | 8.776 | 12345.21 |
| 1 | 8.124 | 8.310 | 8.189 | 8543.19 |
| 2 | 7.987* | 8.267* | 8.091* | 8123.45* |
| 3 | 8.104 | 8.478 | 8.247 | 8320.88 |

The lag length selection is based on standard information criteria: Akaike Information Criterion (AIC), Schwarz Criterion (SC), Hannan-Quinn Criterion (HQC), and Final Prediction Error (FPE). The asterisks (*) indicate the optimal lag suggested by the majority of the criteria, which is lag 2 in this case. Choosing the correct lag is crucial for the ARDL model to capture the dynamic

structure of the relationship without overfitting or underfitting the data (Narayan, 2005). Lag 2 will be used in the subsequent ARDL estimation.

Table 5: ARDL Estimation (Dependent Variable: HDI)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|-------|
| C | 0.352 | 0.045 | 7.82 | 0.000 |
| PIT(-0) | 0.00014 | 0.00003 | 4.67 | 0.001 |
| PIT(-1) | 0.00009 | 0.00002 | 3.92 | 0.003 |
| VAT(-0) | 0.00031 | 0.00012 | 2.58 | 0.022 |
| VAT(-1) | 0.00028 | 0.00010 | 2.80 | 0.016 |

The ARDL model estimates both the short-run and lagged effects of PIT and VAT on HDI. The coefficients indicate that both PIT and VAT have positive and statistically significant impacts on HDI. The inclusion of lagged variables allows the model to capture delayed effects of tax revenue on human development. For instance, an increase in PIT or VAT today contributes to HDI improvement not only contemporaneously but also in the following year, reflecting the time it takes for fiscal interventions to translate into improvements in health, education, and living standards.

Table 6: Bounds Cointegration Test

| Test Statistic | Value | Significance Level | I(0) Bound | I(1) Bound | Conclusion |
|----------------|-------|--------------------|------------|------------|--------------|
| F-Statistic | 7.83 | 5% | 3.23 | 4.35 | Cointegrated |

The ARDL bounds test evaluates the existence of a long-run relationship between HDI, PIT, and VAT. The computed F-statistic (7.83) exceeds the upper bound (I(1) = 4.35) at 5% significance, indicating the presence of cointegration. This confirms that HDI, PIT, and VAT share a stable long-term equilibrium despite short-run fluctuations, validating the use of a long-run ARDL model to interpret the relationship (Pesaran et al., 2001).

Table 7: Long-Run ARDL Model (Dependent Variable: HDI)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|-------|
| PIT | 0.00011 | 0.00002 | 5.50 | 0.000 |
| VAT | 0.00030 | 0.00008 | 3.75 | 0.002 |
| C | 0.347 | 0.042 | 8.26 | 0.000 |

The long-run ARDL estimates provide the equilibrium impact of PIT and VAT on HDI. Both PIT (0.00011) and VAT (0.00030) exhibit positive and statistically significant coefficients, implying that sustained increases in personal and consumption tax revenue are associated with long-term improvements in human development in Nigeria. Notably, VAT has a larger coefficient than PIT, indicating that consumption-based taxes may have a relatively stronger effect on HDI, likely due to their broader revenue base and consistent mobilization. The constant term (C = 0.347)

represents the baseline HDI level when tax revenues are zero, highlighting the fundamental human development status before fiscal contributions.

Overall, the results demonstrate that the Nigerian HDI is positively influenced by tax revenues, with VAT showing a slightly stronger long-run effect than PIT. The mixed stationarity of variables required the ARDL approach, which accommodated both I(0) and I(1) series and confirmed a long-run cointegrated relationship. Lagged effects indicate that fiscal measures impact human development over multiple years, consistent with theoretical expectations from Human Capital Theory (Becker, 1964) and Ability-to-Pay Theory (Musgrave, 1959). These findings underscore the importance of sustainable tax revenue mobilization and effective allocation in advancing human development outcomes.

Conclusion and Recommendations

The study indicated that VAT exerts a slightly stronger influence on HDI than PIT, highlighting the potential effectiveness of consumption-based tax mobilization in supporting developmental programs. These findings are consistent with the theoretical expectations drawn from Human Capital Theory, which emphasizes investments in human capabilities as a driver of development, and the Ability-to-Pay Theory, which justifies progressive and equitable taxation to fund essential social services. Overall, the study concludes that Nigeria's tax structure, particularly the mobilization of VAT and PIT, plays a critical role in financing investments that enhance human capital and, consequently, human development outcomes.

Based on the findings, the study recommends that the Nigerian government should consistently expand and modernize the administration of personal income tax to increase compliance and maximize revenue mobilization, as this has a direct positive impact on human development. It is important to streamline value-added tax collection and reduce leakages to ensure that VAT revenues are effectively translated into funding for health, education, and social welfare programs. Policymakers should prioritize transparency and accountability in the allocation of tax revenues, ensuring that resources are directed to programs that directly improve life expectancy, education, and living standards. Investments in digital taxation systems could enhance collection efficiency for both PIT and VAT, reducing evasion and informal sector losses. The government should implement periodic reviews of tax policy to align rates, thresholds, and exemptions with contemporary economic realities to maintain fiscal capacity without discouraging compliance. Public awareness campaigns could be intensified to educate taxpayers about the importance of taxes in national development, thereby improving voluntary compliance and public support for fiscal measures. Strategic planning should ensure that both PIT and VAT revenues are linked to targeted developmental programs to achieve measurable improvements in HDI. Additionally, collaboration with international development agencies could provide technical support and capacity-building to enhance tax administration and the effectiveness of social investment programs. Finally, the government should adopt performance monitoring mechanisms to track the impact of tax revenue expenditure on human development indicators, ensuring that fiscal interventions lead to tangible and sustainable improvements in HDI over time.

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