

# TAX REVENUE AND ECONOMIC GROWTH IN NIGERIA 1970- 2022: VECTOR ERROR CORRECTION MODEL

**Asian Asian Umobong\***

University of Port Harcourt,  
Port Harcourt, Nigeria  
asian.umobong@uniport.edu.ng

*Received:* August 2024

*1st Revision:* December 2024

*Accepted:* December, 2024

## ABSTRACT.

**Background:** Tax revenue is a major source of funding for governments globally. The impact of tax revenue on economic growth has been a subject of debate amongst scholars largely because of a lack of consensus on findings from prior studies and effects on the lives of citizens. **Aim:** The aim of the study was to determine the effect of direct taxes on the long-run economic growth of Nigeria for the period 1970 to 2022 using CBN and World Bank data publications for Nigeria. **Methods:** Direct taxes were proxied as company tax, petroleum profit tax, education tax, and personal income tax while economic growth variables considered were real GDP, unemployment, and the VAR method of vector error correction model was used. **Sample:** The population of the study covered tax and economic data for the period of Nigeria's independence 1960-2022 and in all sixty-three years. However using a purposive sampling technique to determine sample size, the researcher focused on data for the post-war period which covered 1970-2022, and eliminated the period of war. **Results:** Company income tax and education tax have significant positive impacts on real GDP growth in Nigeria, while the effects of personal income and petroleum profit taxes are insignificant. The effects of taxes on economic growth are more long-term rather than short-term. **Conclusions:** The author concludes that company and education taxes improve economic growth in Nigeria with these impacts more glaring in the long run rather than in the short run while petroleum and personal taxes play minor roles. **Implications:** The tax system for companies should be designed and implemented in a way to minimize distortions and inefficiencies taking into account any constraints that may arise, thus enhancing revenue collections. Also, policymakers should re-appraise current tax policies and formulate new policies on petroleum and personal income taxes that will improve GDP growth.

**Keywords:** Direct Taxes, Gross Domestic Product, Money Supply

**JEL Classification:** B22

**DOI:** 10.54933/jmbrp-2024-16-2-5

---

Umobong, A. (2024). Tax revenue and economic growth in Nigeria 1970- 2022: vector error correction model. *Journal of Management and Business: Research and Practice*, 16(2),. doi: 10.54933/jmbrp-2024-16-2-5

## Introduction

Governments raise revenue, stabilize the economy, and promote economic advancement through taxation (Minh et.al 2022). These functions ensure that the economy operates effectively and fairly and that the advantages of economic progress are dispersed in a way that promotes societal well-being. The increased tax will constrain individual taxpayers' ability to contribute to economic progress, while the same holds for business taxpayers, since greater taxes may limit their capacity to release more goods onto the market. The government states that the raised tax would provide funding for infrastructure, health, education, and basic information technology investments, which are expected to generate future economic productivity gains.

According to the Solow Growth Model (Solow, 1956), variations in the rates of population increase, savings growth, and technical advancement all impact economic development. Barro (1991) and Jones et al.(1993) developed the economic model into endogenous growth models, which explored the economic consequences of tax composition. The economic model was expanded to account for the impact of personal income tax on the saving rate. According to economic theory, all taxes impact how quickly the economy grows. Examining the connection between fiscal policy and economic growth in industrialized and emerging nations is attractive to many academics and researchers. These studies shed light on the effects of various fiscal policies, including capital flow regulations, government spending programs, and tax policies, on variables such as investment, employment, and productivity growth. Taxes impact household income and economic production. The taxpayer's capacity to labor is significantly reduced when taxation is high. Additionally, because higher taxes will significantly cut their income, many doubt their decision to put in additional hours at the office. Governments should thus consider taxation's economic and social effects by observing how raising taxes may make taxpayers work harder to balance their income levels. The link between taxes and economic development is complicated and has prompted extensive research and analysis. Numerous studies have been conducted to investigate the influence of taxes on economic growth. Myles (2000) defines economic growth as the foundation for increased prosperity, and the gross domestic product is typically used as a proxy for a country's growth. According to some research, high tax rates discourage labor, savings, and investment and harm economic development. This is because high taxes can lower the incentives for individuals and enterprises to engage in productive economic activities, resulting in a decrease in economic growth. Lee and Gordon (2005) examined seventy nations between 1980 and 1997, and discovered that corporation taxes are related to poorer economic development. At the same time, their findings revealed that a 10% drop in the statutory corporate rate enhances annual GDP per capita growth by 0.7% to 1.1%. Arnold (2008) revealed that income taxes are often associated with poorer economic growth than consumption and property taxes. Hakim et.al (2022) pointed out the negative effect of direct and indirect taxes on the economic growth of developing countries and the existence of a positive relationship for developed countries. Gemmell, Kneller, and Sanz, (2011) examined 17 OECD nations from 1970 to 2004 and revealed that direct taxes, particularly personal and corporate income tax, are damaging to economic growth. Poulson, and Kaplan, (2008) higher marginal tax rates had a detrimental influence on economic growth. Li and Lin (2015) estimated the long-run and short-run elasticity of sales tax on growth in the United States from 1960 to 2013. The findings imply that a sales tax is detrimental to economic growth in the long term but beneficial in the short term. Some studies, however, have concluded that taxes can have a favorable impact on economic development. This conflicting empirical research motivates further research to examine the long-run implication of direct taxes across various political and military governments in Nigeria.

## Theoretical background

Lin and Lin (2023) evaluated the influence of tax on the growth and development of China. The study employed a systematic review design and evaluated 50 studies in China. The study shows that the introduction of a housing property tax in China increases physical and human capital accumulation and the growth rate of output in the long run no matter whether the revenue from housing property tax is used for reducing government debt, personal income tax, or capital income tax, or for increasing government education expenditure. The tax reform has a strong inter-generations redistribution effect, i.e., it increases the welfare of future generations but reduces the welfare of current generations.

Adefolake and Omodero (2022) assessed the effects of tax revenue on Nigeria's economic growth by utilizing time series data spanning from 2000 to 2021. The study variables which comprise Gross domestic product, Petroleum profit tax, corporate income tax, and Value added are found to be

stationary at first difference. Thus, a Johansen co-integration test was conducted and it reveals a long-run relationship. Consequently, the study utilizes the Vector Error Correction Model to evaluate the effects of PPT, CIT, and VAT on GDP. The findings reveal that PPT and VAT have positive and significant effects on GDP. It also reveals that CIT has a negative and significant effect on GDP.

Nguyen and Darsono (2022) focused on the correlation between tax revenue, investment, and economic growth, taking into account the non-linear effects of tax revenue. The study used Macro data of nine countries in ASEAN (Brunei, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, and Vietnam) in 2000 -2020. The study found statistical evidence of a negative effect of tax revenue on economic growth. However, when considering the non-linear effects of tax revenue, the empirical findings showed that higher tax revenue could reduce the disadvantages of tax impacts to boost economic growth. Peterson and Bair (2022) examined the impacts of tax and other economic variables on economic well-being in the USA. Through a series of multiple regression models, the study found that increases in the highest statutory corporate and personal income tax rates reduce real GDP per capita. Growth in net exports of goods and services, M2 money supply, multifactor productivity, and cost, collectively increase real GDP per capita, while, the personal savings rate, and the market value of gross federal debt decrease real GDP per capita.

Rahman (2022) examined the effects of the corporate tax rate on sustainable development in the BRIC and CIVETS countries. The research employed a panel dataset for 2000–2021 years and applied a panel data regression model to analyze the data. The research finds that the corporate tax rate is positively and significantly associated with sustainable development goals (SDG). The result implies that a higher rate of corporate tax plays a vital role in achieving sustainable development goals in emerging economies. By including personal income tax, sales tax, and theoretical arguments, the study contributes to the debate on the corporate tax rate and the achievement of SDG in emerging countries.

Dramane (2022) examined the nexus between military spending, tax revenues, and economic growth in the G5 Sahel countries. To this end, a VAR model was estimated on a panel of five countries over the period 2000 - 2018. The analysis led to three main results. First, economic growth helps finance military spending, while military spending has a negative effect on economic growth. Second, military spending lagged by a period has a positive effect on tax revenues, while tax revenues have no effect on military spending. Third, tax revenues promote economic growth, and in return, economic growth contributes to increased tax revenues.

Shabani et al., (2022) analyzed the impact of the structure of tax revenues on economic growth in the Republic of Kosovo findings indicate that the structure of tax revenues and tax policy reform at the end of 2015 has positively affected economic growth in the Republic of Kosovo for the analyzed period (2010-2020).

Mubanga (2022) evaluated the effect of taxation on the economic growth of Zambia following various policy changes aimed at achieving middle-income status as enshrined in Vision 2030. The study revealed that despite various tax types giving varying results on how they affect economic growth both in the short-run and long-run, they have a positive effect on the growth of the Zambian economy.

Le (2022) examined the impact of taxes on economic growth in developing countries of Malaysia, Thailand, Vietnam, Philippines, and Cambodia for the period 2000-2019. The results of the study show that increasing tax revenue has a negative impact on economic growth. Tax-based fiscal policies are policy tools to overcome fiscal deficits in developing countries. Fiscal revenues are used to finance unnecessary expenditures, which may be caused by the political system or by inefficient redistributive policies. The tax effect is not reflected in the GDP growth rate. Thus, tax revenue can be a viable source of deficit correction but will reduce economic growth.

## Methodology

### 3.1 Research Design

The study adopts a longitudinal research design because of the number of years of study and an ex-post facto design because the data to be used is based on past events that have already occurred. This study is based on secondary data obtained from annual reports covering the years 1970-2022. The main source of data is the World Bank data website, the Central Bank of Nigeria Bulletin, the Federal Office of Statistics, and the Federal Inland Revenue Services. Information is collected from annual reports from the Central Bank of Nigeria Bulletin, World Bank country report, and Federal Office of statistics

To analyze the impact of direct taxes and economic growth in Nigeria, the study employed the Vector error correction model. The data component is divided into series to capture breaks and shocks

for the period of the oil boom to the structural adjustment program, the fall in oil prices, the economic recession, the COVID-19 era, and the present economic era in Nigeria.

### 3.2 Variables of Study

The independent variables used in the study are petroleum profit tax, company income tax Personal income tax, and Education tax while the dependent variable is real gross domestic product.

Table 3.1: Measurement of Variables

Independent Variable	Measurement	Expected Sign
Company Income Tax (CIT)	Natural log of total revenue collected from company income tax	Positive
Petroleum Profit Tax (PPT)	Natural log of total revenue from petroleum profit tax	Positive
Personal income tax	Natural log of total revenue collected from taxes paid by individuals	Positive
Education tax	2.5 of profit before tax paid by companies to tax authorities	Positive
<b>Dependent Variable</b>		
Gross domestic product (GDP)	Products (GDP) Defined as the value of the goods and services produced by the nation's economy less the value of the goods and services used up in production	Positive
<b>Control Variables:</b>		
Money supply	Total amount of a country's currency in circulation	Negative/Positive
Public debt (PUD)	Total internal debt stock plus total domestic debt stock	Negative/positive
Interest Rate	The average rate of the interest rate applicable in a given year	Negative/Positive
Exchange Rate)	The rate of naira compared to other countries in a given year.	Negative/positive

The control variables for the study are money supply and public debt. This represents total foreign and domestic debts. When there is a budget deficit the gap between revenue and expected expenditure is normally filled through borrowing and is referred to as deficit financing. Public debt plays a role in economic development when it does not exceed the allowed threshold. In view of the impact public debt will have on economic growth, it is controlled in this study so that it will not affect the result of the study. Other control variables in the study are money supply, exchange rate, and interest rate. The summary of the variables and unit of measurement are shown in Table 3.1

### 3.3 Model specification

To examine the effect of direct taxes on economic growth, the study modifies the model in the works of Idris and Suleiman (2019) and Inyama (2013). In line with their models, the model for this study is formulated as follows:

$$GDP = \beta_0 + \beta_1 LogCIT + \beta_2 LogPPT + \beta_3 LogPIT + \beta_4 PLogEDT + \beta_5 PLogPUD + \beta_6 PLogMSU + \beta_7 LogINT + \beta_8 LogEXC + U_t \tag{i}$$

For hypotheses, our focus is on the model that expresses Growth in Gross Domestic Product as an econometric function of its own one-period lagged value, direct tax components which in this study are CIT, PPT, PIT, and EDT with the control variable Public Debt, interest rate, exchange rate, and Money supply., we expect that the proceeds of taxes are channeled to infrastructural development. Hence our expectation is that all direct taxes (CIT, PPT.PIT, and EDT) would enter the growth model positively and significantly. In other words, we expect apriori, that all will be positive and statistically different from 0

## Results

### 4.1 Trend Analysis

The trend analysis presents the pattern and direction of movement of variables in the empirical analysis with the focus of indicating individual points or episodes for the variables. Figure 4.1 shows the trend in annual patterns of direct tax revenues for the government over the years. The trend shows that generally, the direct tax revenue of government only took a significant rise after the year 2000. This shift in direct tax revenue inflow may be related to the movement into civilian government that considered taxation as an important aspect of government revenue streams as well as the fiscal reforms that followed the new democratic government in the era. The trend also shows that, over the entire period, petroleum profit taxes (PPT) were the main direct tax component of the government. Interestingly, this component of direct tax revenue for the government was also the most unstable in size over the period. The sharp movements in the trend in PPT show that there is a high variation in the revenues from petroleum profits. This can significantly influence the ability to plan for development with resources from this stream of tax revenue. This implies that although it is the largest component of direct taxes in Nigeria, petroleum profit taxes do not present a significant economic development planning strategy for the country. In this direction, company income taxes (which is the second largest source of direct taxes) and customs and excise duties are the most stable direct tax components in the country. These tax inflows appear to be more stable for the economy and they have both increased significantly over the years.

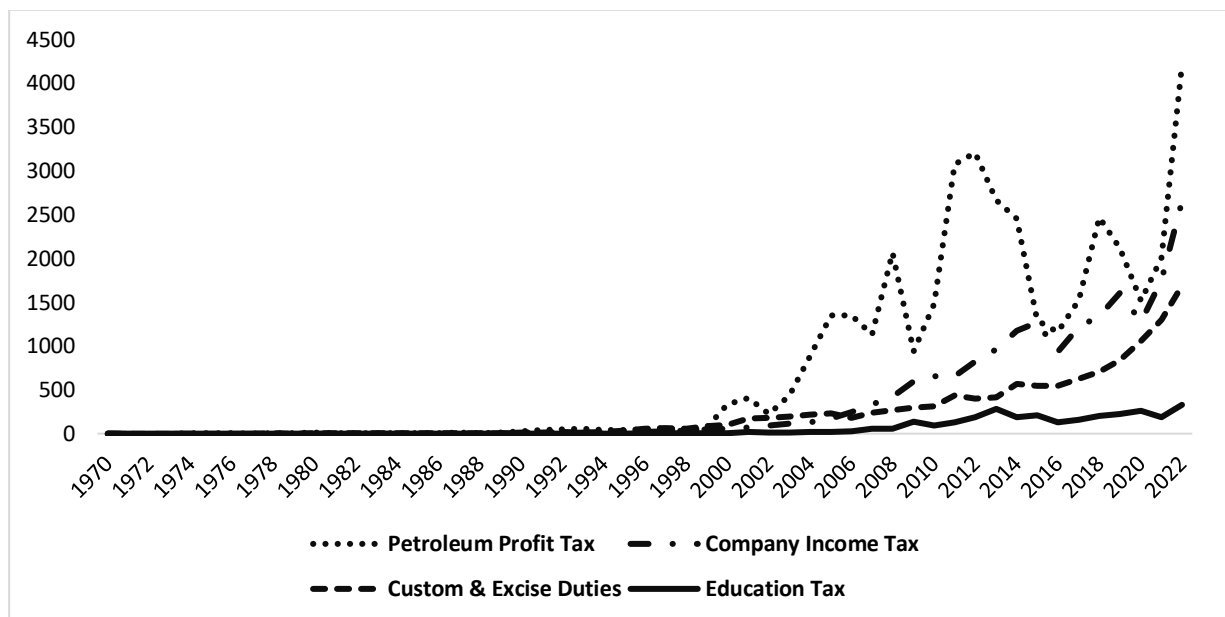


Fig. 4.1: Trend in Direct Tax Revenues in Nigeria

Source: Author's computation based on data from CBN

Figure 4.2 also shows the trend in the shares of the direct tax components in total direct taxes. These clearly show the relevance or importance of each tax component in total direct taxes in the country. As expected, petroleum profit taxes have had the largest share in total direct taxes over the period of the study, apart from the early 1970s (when oil played a lesser role in fiscal activities) and between the late 1990s when oil prices were generally low. The share of customs and excise duties in total direct taxes declined drastically once petroleum profit taxes took center stage in revenue share. The custom and excise duties had the second largest share in total direct tax revenues up till 2006 when company income taxes became more prominent in its contribution to tax revenue. Education tax revenue has remained the lowest contributor to total tax revenue over the years. The share of petroleum profit taxes is also the most unstable among the four direct tax contributions, while the education tax share has been more stable over the period.



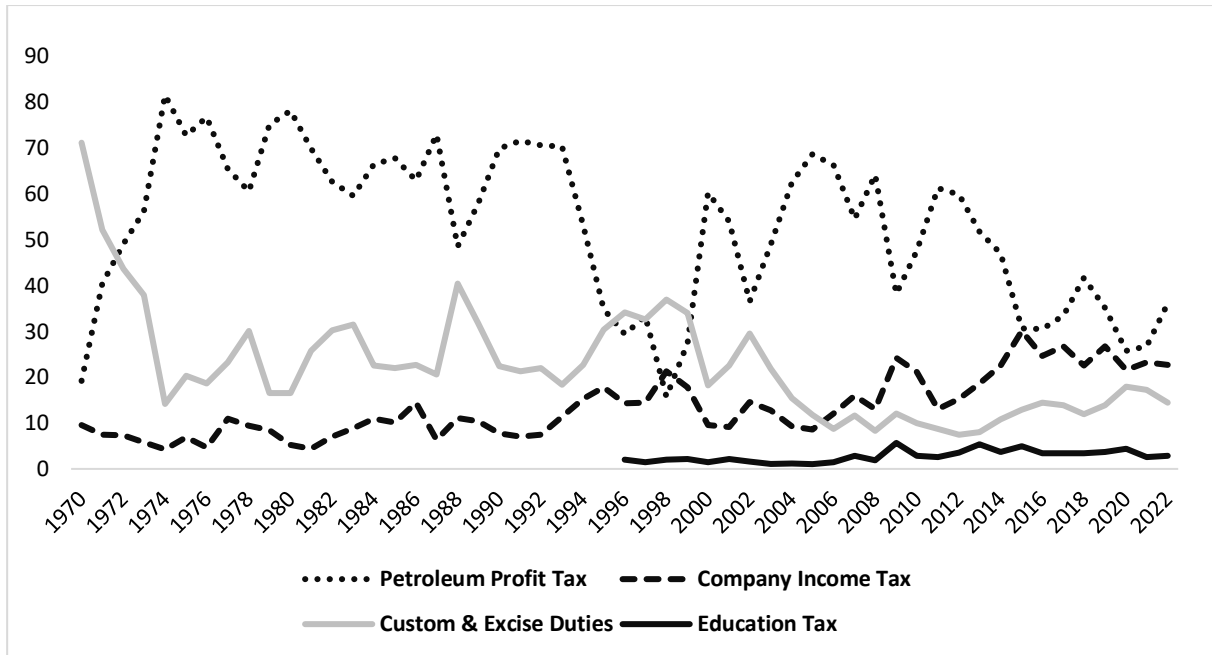


Fig. 4.2: Share of tax revenues in total direct taxes

Source: Author’s computation based on data from CBN

## 4.2 Summary Statistics

The descriptive statistics of the time series data for the variables used in the study are reported in Table 4.1. The Table shows the mean and other moment conditions for each of the variables. Average real GDP growth is 3.603 percent over the period of the study. This is a relatively average growth rate, although the maximum rate shows there were periods of very high growth rates (14.6 percent at maximum). There were also periods of very low growth rates with a minimum value of -13.13 percent indicating that a sharp decline in economic performance was experienced in some of the years. The standard deviation of 5.57 for the growth rate of GDP is lower than the mean value, indicating that the reported growth rates for many of the years were generally similar to the reported mean value. This outcome is also demonstrated in the low skewness value of 0.722 (close to zero), although the kurtosis value of 4.035 indicates that there are many outlier growth patterns over the years in Nigeria.

Table 4.1: Descriptive Statistics

Variable	Mean	Max.	Min.	Std. Dev.	Skew.	Kurt.	J-B	Prob.
GDPG	3.603	14.60	-13.13	5.571	-0.722	4.035	6.835	0.03
EDTG	11.14	119.43	-47.25	32.03	0.998	4.770	15.414	0.00
PITG	12.91	331.11	-61.23	56.17	3.857	21.73	889.00	0.00
PPTG	20.53	154.94	-128.67	59.12	-0.013	3.048	0.006	0.84
GMS	22.25	72.88	-99.88	23.78	-2.194	14.92	349.30	0.00
GDEBT	17.10	628.73	-259.1	105.81	3.556	23.79	1045.7	0.00
EXRT	100.8	476.1	0.550	123.2	1.435	4.485	22.635	0.00
INTR	19.45	36.09	6.000	8.312	-0.273	1.984	2.880	0.24

Source: Author’s computation

For the tax variables, we reported averages for annual changes in the measures in order to obtain better reports. The average growth in company income taxes is 20.93 percent which is very high and suggests that CIT has increased rapidly over the years in Nigeria. The average growth rate of CIT is the

highest growth rate among the components of direct taxes in the study, with education taxes (with an annual average growth rate of 11.14 percent) being the least. Thus, the CIT component of direct taxes appears to be the most robust, although petroleum profit taxes, at an annual growth rate of 20.53 percent on average are also impressive. Some of the tax components experienced years of very rapid growth, especially personal income taxes with a maximum annual growth rate of 331.1 percent, and PPT with a maximum rate of 154.94 percent. PPT also had the most rapid decline in terms of growth with a -128.67 percent decline in one of the years. The average growth in money supply is 22.25 percent, while the average growth in public debt is 17.1 percent, with a high standard deviation of 105.8. The average interest rate for the period is also high at 19.45 percent.

Another important statistic computed in descriptive statistics is the Jacque-Bera (J-B) statistic which indicates a pattern of probability distribution of the datasets. This pattern of probability distribution is important for the system of estimation adopted in the analysis. In Table 4.1 the J-B statistic for most of the variables is significant, which means that the hypothesis of non-normality of the data series cannot be rejected at the 5 percent level for these variables. Thus, it can be seen that most of the series are non-normally distributed. The application of a VECM technique in the analysis of data however overcomes the problem of non-normality in the time series-based estimation framework.

### 4.3 Correlation Analysis

In order to further present a robust analysis of the study, the unconditional correlations among the revenue and tax variables in the study are computed and the results are shown in Table 4.2.

For the direct tax variables, there is a clear significant and positive correlation among the four components. For instance, the correlation between EDT and CIT is high at 93 percent, while the correlation between PIT and CIT is 91 percent and that of PPT with CIT is 98 percent. These high positive correlations indicate that all direct tax revenue components move together in Nigeria. When any one of the components is increasing, the others are also rising. The highest correlation among the tax revenue variables is between PPT and CIT which is at 98 percent, suggesting that petroleum taxes and company taxes are highly related in Nigeria. An important outcome of the correlation table refers to the correlation among the independent variables. The Table shows very high correlations among the variables for explanation which may suggest the presence of multicollinearity in an equation with all the variables included. However, the application of VECM implies that all the variables are considered to be endogenous in the system of equations, which makes the problem of multicollinearity redundant.

Table 4.2: Correlation Matrix

	LGDP	CIT	EDT	PIT	PPT	DEBT	LMS	EXRT	INTR
LGDP	1								
CIT	0.97 (0.00)	1							
EDT	0.96 (0.00)	0.93 (0.00)	1						
PIT	0.87 (0.00)	0.91 (0.00)	0.79 (0.00)	1					
PPT	0.94 (0.00)	0.98 (0.00)	0.90 (0.00)	0.87 (0.00)	1				
DEBT	0.64 (0.00)	0.62 (0.00)	0.68 (0.00)	0.63 (0.00)	0.61 (0.00)	1			
LMS	0.76 (0.00)	0.62 (0.00)	0.76 (0.00)	0.48 (0.00)	0.59 (0.00)	0.51 (0.00)	1		
EXRT	0.88 (0.00)	0.84 (0.00)	0.88 (0.00)	0.82 (0.00)	0.79 (0.00)	0.76 (0.00)	0.70 (0.00)	1	
INTR	0.71 (0.00)	0.79 (0.00)	0.61 (0.00)	0.89 (0.00)	0.77 (0.00)	0.53 (0.00)	0.24 (0.09)	0.64 (0.00)	1

Note: Probability values are in parentheses. Source: Author's computation

### 4.4 Unit Root and Cointegration Analysis

The unit root test for the variables is used to examine the level of stationarity of the time series used in the empirical analysis., the test for stationarity of the data series is performed using two different methods namely, the Augmented Dickey Fuller (ADF) and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) procedure. While the ADF test is an indirect process of testing for unit roots, the KPSS tests are more direct in terms of the null hypothesis. The results of the unit root tests are presented in Table 4.3. From the results of the ADF tests reported in the first panel of the Table, it can be seen that the ADF test statistics for each of the variables in levels are less than the 95 percent critical values indicating that they are insignificant. On the other hand, the test statistic values for the series in the first differences are greater than the critical values at the 5 percent significance level (please, refer to the Appendix for the t-statistics). Thus, those variables are non-stationary in levels but their first differences were found to be stationary. This implies that most of the variables in the study are integrated of order one (or I[1]).

Table 4.3: Unit Root Test for Variables

Variable	ADF Test		KPSS		Order of Integration
	Levels	First Difference	Levels	First Difference	
GDP	-0.484	-6.592**	0.820**	0.119	I(1)
CIT	-1.036	-7.622**	0.861**	0.150	I(1)
EDT	0.548	-8.193**	0.771**	0.402	I(1)
PIT	-0.535	-8.694**	0.894**	0.078	I(1)
PPT	-1.831	-6.141**	0.979**	0.235	I(1)
INTR	-1.891	-8.004**	0.754**	0.069	I(1)
DEBT	0.219	-5.890**	0.771**	0.402	I(1)
EXRT	1.111	-4.810**	0.854**	0.359	I(1)
MSU	-1.012	-7.003**	0.512**	0.140	I(1)

Note: \* indicates signifies at 5 percent; 95% critical values are reported in parentheses below each test value  
 Source: Author’s computation

As noted earlier, the KPSS test for stationarity tends to improve the robustness of the unit root tests. The result shown in the second panel of Table 4.3 indicates that for each of the series, the null hypotheses of stationarity cannot be rejected for the variables in the first differences (the test statistics fail the test). This indicates that the series are difference-stationary and that all the variables are actually I[1]. This implies that a dynamic long-run relationship may be estimated based on the ARDL approach to cointegration for the dynamic analysis (Akinsokeji, Adegboye & Edefe, 2016). Essentially, it is appropriate to use cointegration analysis to estimate the relationships between the variables.

.For the purpose of this study, the Johansen cointegration test procedure is employed. The tests are performed for each of the equation sets on the basis of the economic development variable of interest. The results of the tests are reported in Table 4.4. In the result, both the Trace and the Max-Eigen statistics are deployed for testing for cointegration. The result for the real GDP set indicates that at least one cointegrating vector exists among the relationships (since the statistic for “none” is significant). This indicates that there is cointegration for the GDP equation and that a long-run relationship is also established by the time series. s. Hence, the result reveals the presence of cointegration among the datasets. A long-run relationship is established for the series. The cointegration among the variables therefore implies that the error correction form of VAR needs to be employed in the analysis. Thus, the vector error correction model (VECM) is used for the empirical analysis in this study.



Table 4.4: Johansen Cointegration Test Result

<i>Equation</i>		<i>RGDP</i>
Hypothesized No. of CE(s)		Trace Statistic
None *		83.01
At most 1		46.27
At most 2		23.53
At most 3		7.92
At most 4		0.70
Hypothesized No. of CE(s)		Max-Eigen Statistic
None *		36.74
At most 1		22.74
At most 2		15.61
At most 3		7.21
At most 4		0.70

### 4.5 Lag Length Selection

Given that the collections of variables in the study are assumed to be cointegrated, the lag selection test is performed to determine the maximum lag that can generate optimum values for VECM relationships. In the lag selection, the optimality of the model was determined using both the Akaike Information Criterion (AIC) and Schwarz–Bayesian Criterion (SC). The optimum lag length is determined by considering the least values for the test coefficients. The result is shown in Table 4.5 and indicates that, for each of the equations (using the four economic development variables), the second lag possesses the minimum value. This implies only the first two lags are expected to be retained for the VECM estimation.

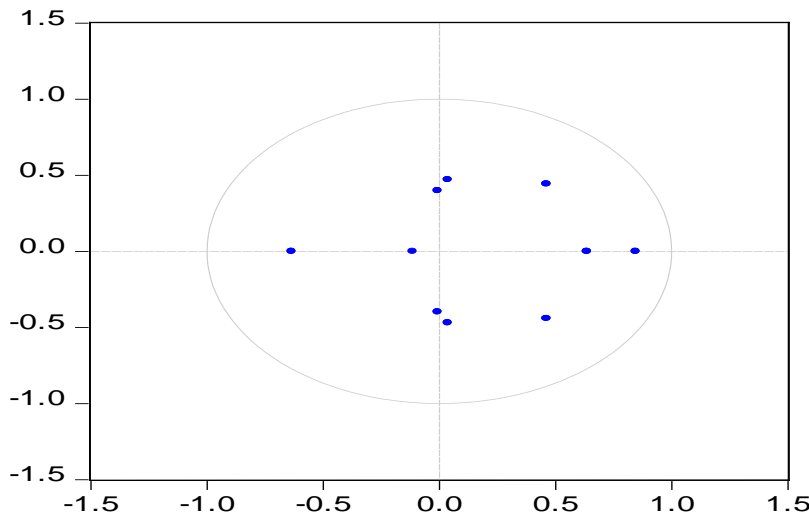
Table 4.5: Lag Length Selection Criteria

<i>No of Lags</i>	<b>GDP</b>	
	<i>AIC</i>	<i>SC</i>
0	3.88	4.18
1	-2.68	-0.83
2	-4.81*	6.74*
3	-3.93	-1.44
4	-0.62	-0.09

Note: \* indicates selected lag. Source: Author, computation.

In the lag selection analysis of the ARDL model, the study proposed a one-lag period for the estimation of the dynamic relationship. In order to further evaluate the appropriateness of the selected lag structure, the inverse root of the lag length selection is also reported in Fig. 4.5. Since the roots from the various dots lie within the circumference of the circle, then it can be said that the selected lag length for the study is acceptable.

Fig. 4.5: AR Test for Lag Selection



Source: Author, computation

### 4.6 Granger Causality Testing

The first process in the VECM analysis is to test the level or patterns of causality among the variables included in the system of equations. Hence, the Granger causality test, which is a preliminary aspect of an endogenous vector-based analysis, is used to provide the background for estimating dynamic relationships. The results of the Granger causality tests are reported in Table 4.6 below. As is generally the case, the F-test is conducted on the null hypotheses of one variable not Granger-causing another variable. This implies that the rejection of a null hypothesis (based on the significance of the F-value for the particular relationship) shows that causality actually exists – i.e., runs from one variable to the other. Note that the causality test is conducted only for the critical variables in the analysis (economic development and tax variables). It can be seen that all forms of causality exist among the variables, including unidirectional causality, reverse causality and no causality.

The hypothesis of causality running from GDP to EDT is significant at the 1 percent level, although the reverse hypothesis of causality running from EDT to GDP is not significant. This shows that economic growth stimulates changes in education tax revenues, but education tax does not appear to generate changes in economic growth. There is also the uni-direction relationship between CIT and economic growth, with causality running from PIT to economic growth and not the other way around. Similarly, causality is shown to run from both PPT and CIT to economic growth. This clearly demonstrates unidirectional causality between economic growth and most of the direct tax variables, although the result for education tax suggests that reverse causality of direct tax component to economic growth also exists.

Table 4.6: Granger Causality Test Result

Null Hypothesis:	Obs	F-Statistic	Prob.
EDT does not Granger Cause LGDP	51	0.51	0.61
LGDP does not Granger Cause EDT		7.86	0.00
PIT does not Granger Cause LGDP	51	5.80	0.01
LGDP does not Granger Cause PIT		0.14	0.87
PPT does not Granger Cause LGDP	51	8.10	0.00
LGDP does not Granger Cause PPT		1.81	0.17
CIT does not Granger Cause LGDP	51	14.13	0.00
LGDP does not Granger Cause CIT		1.15	0.33

Note: \* and \*\* indicate rejection of the null hypothesis at 5% and 1% respectively

## 4.7 The Vector Error Correction Mechanism

The Vector Error Correction (PVECM) involves different processes in order to perform the dynamic analysis. The existence of cointegration among the variables allows us to implement the Vector Error Correction Modeling technique, which describes the systematic disequilibrium adjustment process and the short-run transmission mechanism. All the variables in the study are treated as endogenous within the VECM analysis. The use of lags is expected to internalize the implications of expectations and dynamic impacts among the variables. Note that the optimal lag length of 2 lags was selected in the study based on the AIC and the SIC criteria.

### 4.7.1 The Parsimonious VECM Results

The initial estimates of the PVECM are reported in this section – including the cointegrated short and long-run results. In Table 4.7, the cointegrated long run results are presented in terms of the steady state effects of the direct tax components on each of the economic development variables using four different co-integration equations. The estimates reveal the long run  $\beta$  coefficients on the individual variables in the cointegrating equations for the relationships. For the equation, the cointegrating vectors are all normalized on the coefficients of the economic growth variable in order to determine the long run impacts of the variable within a vector. The long-run coefficient therefore shows the stable relationships between the tax variables and economic growth. For the GDP growth equation, the coefficients of CIT and EDT are significant at the 5 percent level. This shows that over time, both company income taxes and education taxes have significant positive impacts on economic growth in Nigeria. The long-run impacts of personal income taxes and petroleum profit taxes are however insignificant.

Table 4.7: Vector Error Correction Model Result (long run)

	CIT	EDT	PIT	PPT
<i>Coefficients of cointegrating equation (<math>\beta</math>) – long run results for GDP Equation</i>	2.099* (2.99)	1.190* (2.93)	0.644 (1.63)	-0.267 (-0.42)
<i>Coefficients of cointegrating equation (<math>\beta</math>) – long run results for Inflation Equation</i>	0.177 (0.06)	6.803** (4.01)	-4.616* (-2.62)	-1.798 (-0.66)
<i>Coefficients of cointegrating equation (<math>\beta</math>) – long run results for Unemployment Equation</i>	28.36** (4.73)	-10.82** (-3.32)	-10.25** (-3.22)	-18.22** (-3.33)
<i>Coefficients of cointegrating equation (<math>\beta</math>) – long run results for HDI Equation</i>	-0.0001 (-0.02)	0.0141** (3.53)	-0.0124* (-3.11)	0.029** (4.86)

Note: t-ratios in parentheses. Source: Author’s computation

The long-run effects of the other direct tax variables are negative, which shows that increased education, personal income, and petroleum profit taxes improve economic development over time in Nigeria.

Table 4.8 shows the short-run estimates of the VECM relationships which also gives the  $\alpha$  or speed-of-adjustment coefficients on the long-run ECT in the error correction model (ECM) for each equation in the structural model. This coefficient further demonstrates the pattern of time-varying relationships for economic growth variables in the model. The ECT for all the equations (except PIT and PPT) possesses the expected negative signs that indicate long-run adjustments after any short-run disequilibrium in the system. However, only the ECT for the CIT and EDT equations are significant at the 5 percent level. Given that the ECT terms possess the expected negative signs, there is an indication that any short-term shock in economic growth, including CIT and EDT will result in a long-run adjustment procedure that ensures long-run stability. The statistically significant and negative error-correction terms confirm the existence of long-run relationships between the tax components and economic growth in Nigeria.

Table 4.8: Vector Error Correction Model Result (Short run)

	$\Delta LGDP$	$\Delta CIT$	$\Delta EDT$	$\Delta PIT$	$\Delta PPT$
$ECM_{t-1}$	-0.033	-0.036*	-0.055*	0.054	0.035
$\Delta LGDP_{t-1}$	-0.340*	0.158	-0.156	-0.139	-0.404
$\Delta LGDP_{t-2}$	-0.324*	0.018	-0.075	-0.069	-0.379
$\Delta INFL_{t-1}$	0.003	0.002	0.003	0.004	0.000
$\Delta CIT_{t-1}$	0.491*	-0.128	0.396	0.073	0.957*
$\Delta CIT_{t-2}$	0.592*	-0.067	0.101	-0.325	0.394
$\Delta EDT_{t-1}$	-0.009	0.116	-0.182	-0.357	-0.015
$\Delta EDT_{t-2}$	-0.006	0.112	-0.012	-0.175	-0.573
$\Delta PIT_{t-1}$	0.104	-0.042	0.097	-0.079	-0.057
$\Delta PIT_{t-2}$	0.082	-0.117	0.068	0.166	-0.006
$\Delta PPT_{t-1}$	0.089	-0.040	0.269*	0.060	-0.023
$\Delta PPT_{t-2}$	0.109	-0.092	-0.027	0.160	-0.028
<i>R-sq.</i>	0.291	0.299	0.455	0.234	0.295
<i>Adj. R-sq.</i>	0.186	0.174	0.166	0.174	0.180
<i>F-statistic</i>	0.772	0.802	1.574	0.574	0.787

Note: \* and \* indicate significance at 5% and 1% respectively. Source: Author's computation

The other aspect of the short-run VECM estimates is the direct effects of the lags of the variables on the individual variables, which show short-term transmissions among the variables. In particular, the results show that only the lags of CIT have any significant impact on GDP. The coefficients of all the other variables fail the test. These results therefore indicate that the direct effects of the direct tax components on the economic development variables are quite weak in the short run. Thus, there is evidence that although the long-run effects of direct tax components on economic growth are strong, those of short-run effects are weak and mostly insignificant. Among the tax variables, the short-run effects of other tax variables are also weak and insignificant. In general, the short-run VECM estimates show that the effects of taxes on economic growth are more long-term rather than short-term. This has implications for policymakers in terms of using taxation to drive economic growth in Nigeria.

#### 4.7.2 The Forecast Error Variance Decomposition (FEVD)

The final set of analyses for the dynamic set-up of the VECM is the forecast error variance decomposition (FEVD). The results of the variance decomposition based on the estimated VECM where all variables are considered to be endogenous are reported in this section. As noted by Nguyen (2011,), Variance Decomposition “tells how much a given variable changes under the impact of its own shock and the shock of other variables.” Therefore, the variance decomposition defines the relative importance of each random innovation in affecting the variables in the VECM. Table 4.9 presents the estimated forecast error variance decomposition of key variables in the study.

Table 4.18: FEVD Results

Period	LGDP	EDT	PIT	PPT	CIT
Variance decomposition of RGDP					
1	100.00	0.00	0.00	0.00	0.00
2	94.79	0.02	1.28	0.45	2.83
4	86.68	0.39	5.31	2.15	2.44
8	69.89	2.09	12.80	1.86	1.86
10	62.84	3.07	16.30	1.47	1.55

Source: Author's computations

In the decomposition of GDP, the results show the variable is explained mainly by itself within the shorter period (94.8 percent and 86.7 percent of the variances were explained by itself in the second and fourth periods respectively). It was after the fourth period that other variables were able to explain

the considerable proportion of the variances in GDP. More prominently is the contribution of PIT, which explained variances in GDP for up to 13.9 percent and 16.3 percent respectively in the tenth period. This shows that PIT is the main variables that contribute to variances in GDP over time. More interestingly, the contributions of the tax variables to the variances in GDP are stronger. This shows that the tax components can also explain variances in economic growth over the years in Nigeria. Each of the tax components contributed significantly, with EDT contributing 6.64 percent to the variances in the tenth period, PPT contributing 8.0 percent in the tenth period, and CIT contributing 6.4 percent to the variances in the fourth period. In general, there is evidence that the direct tax variables contribute significantly to the variances in each of the economic growth variables.

## 4.8 Test of Hypotheses

There is no significant effect of Education tax, personal income tax, company income tax, and petroleum profit tax on real gross domestic product in Nigeria.

The hypothesis is tested based on the estimates from the VECM, especially the long-run estimates in Table 7. From the result, it is seen that the coefficients of EDT and CIT are significant at the 5 percent level, while those of PPT and PIT failed the significance test at the 5 percent level. Based on this outcome, the null hypothesis is rejected for education tax and company income tax, indicating that there is a significant effect of education tax and company income tax on real gross domestic product in Nigeria. The null hypothesis for personal income tax and petroleum profit tax however cannot be rejected. This implies that there are no significant effects of personal income tax and petroleum profit tax on real gross domestic product in Nigeria.

## 4.9 Discussion of Results

The results obtained from the empirical analysis provide the grounds for discussing important aspects of direct taxes on the economy. First, the result has shown that both company income tax and education tax have significant positive impacts on real GDP in the long run in Nigeria. Thus, the increased commitment of firms to tax obligations as well as increased tax commitment is shown to directly improve GDP growth over the long-term in Nigeria. There is evidence that Company Income Tax incentives in Nigeria are being applied to attract and retain local and foreign investors to engage in productive activities thereby increasing economic growth (Dickson & Rolle, 2014). The finding of the favorable impact of these direct taxes on economic growth is in line with previous studies by Fossati (2020), Levaggi and Menoncin (2020), and Hum (2020). The positive effects of CIT and EDT on real GDP also imply that taxation gives governments the resources needed to spend on public goods and infrastructure which results in higher productivity, innovation, and competitiveness. These are the main components for building long-term and sustainable growth in real GDP in a country (Babatunde et al, 2017).

## Conclusion

The mobilization of tax revenue is an important policy objective for any government or economy in a drive to ensure sustained economic growth and development. In this study, the effect of direct tax components in the Nigerian fiscal system on economic growth was examined. It is argued that the role of direct taxes on the economy may be different from those of indirect taxes. Moreover, Nigeria is at a developmental stage where direct taxes (especially taxes related to income are expected to yield greater outcomes for fiscal revenues at all levels of government. In the study, economic growth is considered in terms of real GDP growth, four direct tax components are considered including company income tax, education tax, personal income tax, and petroleum profit taxes. Taxes used covered the period from 1970 to 2022, while a dynamic framework was devised for the analysis. Thus, the vector error correction (VECM) technique was adopted for the analysis. In general, there is evidence from the study that direct taxes are important for driving long-run economic growth in Nigeria. The conclusions findings are:

1. That company income tax and education tax have significant positive impacts on real GDP growth in Nigeria, while the effects of personal income and petroleum profit taxes are insignificant.

2. That the effects of taxes on economic growth are more long-term rather than short-term. While the short-run effects are mostly insignificant, the long-run effects are highly significant.

## 5.2 Recommendations

The findings of the study provide grounds for suggesting pertinent recommendations. First, the study shows that company income taxes and education taxes are critical for improving real GDP growth in Nigeria. This indicates that more streamlined tax systems are important for driving economic growth. There is therefore need to focus on company income taxes with improved administration. The tax system for companies must be designed and implemented in a way that will minimize distortions and tax administration inefficiencies taking into account the constraints that may arise from the tax administration.

Second, the dynamically divergent impacts of many of the factors on tax revenue effort show that there is a need for tax administrators to be cautious about the pattern of procedures and focus sectors in the Nigerian system. Tax rules aimed at certain sectors of the economy must take into cognizance both the long-run and short-run implications. Indeed, rules that are too narrowly applied in certain sectors may eventually become inimical for overall tax effort performance in the country over time. Thus, tax policies should be produced in well well-guided framework in terms of collection and participation.

## 5.3 Implication of the Study for Practice

Finally, the study has demonstrated that the effects of taxes on economic growth are more long-term rather than short-term. This has implications for policymakers in terms of using taxation to drive economic growth in Nigeria. Policymaking that focuses on the tax regime in the country must focus on long-term outcomes rather than short-term outcomes in the economy. Taxes should not be used to address short-run adjustments in the Nigerian economy.

## 5.4 Contribution to Knowledge

The goal of the research was to determine the effect of direct taxes on the Macroeconomy. Direct tax components were personal, company, petroleum, and education tax whilst Macroeconomic growth was measured by real gross domestic product The study contributes to knowledge by establishing the pattern of relationship between the variables and brings to the fore the variables that enhance economic growth and the factors that mitigate economic growth thus laying a foundation for proper policy fiscal policy formulation and administration of taxes.

## References

- Abdul, M and Rahman, H (2022). The effect of taxation on sustainable development goals: evidence from emerging countries. *Heliyon* 8 (9), September 2022
- Adefolake,A. and Omodero, C( 2022). Tax Revenue And Economic Growth In Nigeria,. *Cogent Business & Management*, Taylor & Francis Journals, vol. 9(1), pages 2115282-211, December.
- Arnold, J. (2008). Do tax structures affect aggregate economic growth? Empirical evidence from a panel of OECD countries. In *OECD Economics Department Working Papers*; OECD Publishing: Washington, DC, USA, 2008; Volume 643, pp. 1–3.
- Babatunde, O. A., Ibukun, A. O. and Oyeyemi, O. G., 2017. Taxation Revenue and Economic Growth in Afrika. *Journal of Accounting and Taxation*, 9(2), 11-22
- Barro, R. J. (1991). Economic growth in a cross section of countries. *Quarterly Journal of Economics*, 106(2), 407–444. <https://doi.org/10.2307/2937943>
- Cueva, T.N.P.; Cruz, A.D.C.B. Inter-business Association and Its Effect on Local Economic Development. *Contab. Neg.*2020,15, 92–106.



- Dickey, D. A. and Fuller W. A., 1979. Distribution of the Estimators for Autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association*, 74(366), 427-431
- Engle, R. F. and Granger, C. W., 1987. Co-Integration and Error Correction: Representation, Estimation, and Testing. *Econometrica*, 55(2), pp. 251-276
- Ferede, E. and Dahlby B., 2012. The Impact of Tax Cuts on Economic Growth: Evidence from the Canadian Provinces. *National Tax Journal*, 65(3), pp. 563-594 .
- Flaaen, A., Hortacsu, A., & Tintlenot, F. (2020). The production relocation and price effects of U.S. Trade policy: The case of washing machines. *American Economic Review*, 110(7), 2103–2127. <https://doi.org/10.1257/aer.20190611>
- Fossati, S.M. The effects of taxes on economic growth: An analysis of the Swiss case. *J. Int. Bus. Econ.* 2020,20, 14–25.
- Gemmell, N.; Kneller, R.; Sanz, I. (2011). The Timing and Persistence of Fiscal Policy Impacts on Growth: Evidence from OECD Countries. *Econ. J.* 2011,121, 33–58. 39.
- Hakim, T. A. (2020). Direct versus indirect taxes: Impact on economic growth and total tax revenue. *International Journal of Financial Research*, 11(2), 146–153. <https://doi.org/10.5430/ijfr.v11n2p146>
- Hakim, T., Karia, A., David, J., Rainah, Ginsad, R., Norziana, Lokman, N., Zolkafli, S. (2022). Impact of direct and indirect taxes on economic development: A comparison between developed and developing countries, " *Cogent Economics & Finance*, Taylor & Francis Journals, vol. 10(1), pages 2141423-214, December
- Handley, K., Kamal, F., & Monarch, R. (2020). Rising imports tariffs, falling export growth: When modern supply chains meet old-style protectionism. *International Finance Discussion Papers (IFDP)*, Board of Governors of the Federal Reserve System, United States, 1270. <https://doi.org/10.17016/IFDP.2020.1270>
- Hang Thi Thuy Le (2022). Effects of Taxation on economic growths in developing countries in South East Asia. *Science and Technology Development Journal; Economic- Law and Management.* 6(2)2540-2549
- Hossain, M.A.; Uddin, M.S.(2022). Public debt and economic growth nexus: Evidence from the emerging economies. *Econ. Anal. Policy*, 72, 341–357.
- Johansen, S. and Juselius, K., 1990. Maximum Likelihood Estimation and Inference on Cointegration-- With Applications to the Demand for Money. *Oxford Bulletin of Economics and Statistics*, 52(2), 169-210
- Keynes, W. (1970). *The General Theory of Employment, Interest, and Money*; Palgrave Macmillan: London, UK,
- Kim, E.H.; Lyon, J.D. Sustainability and Corporate Tax Avoidance: Evidence from Carbon Disclosure. *J. Account. Res.* 2021,59, 5–42.
- Lee, Y., & Gordon, R. H. (2005). Tax structure and economic growth. *Journal of Public Economics*, 89(5–6), 1027–1043. <https://doi.org/10.1016/j.jpubeco.2004.07.002> [Crossref], [Web of Science ®], [Google Scholar]
- Levaggi, R.; Menoncin, F. Fiscal policy, growth and income distribution in OECD countries *Empiric* 2020, 47, 549–568.
- Li, J.F.; Lin, Z.X. The Impact of Sales Tax on Economic Growth in the United States: An ARDL Bounds Testing Approach. *Appl. Econ. Lett.* 2015, 22, 1–5.
- Lopez-Ruiz, M.; Artazcoz, L.; Martinez, J.M.; Rojas, M.; Benavides, F.G. Ocuparea informal ăsi starea de sănătate în America Central ă. *BMC Sănătate Publică* 2015, 15, 12.
- Minh Ha, N.; Minh, P.T.; Binh, Q.M.Q.; Ercolano, S.(2022). . The determinants of tax revenue: A study of Southeast Asia. *Cogent Econ. Finance* 2022, 10, 2026660
- Maganya, M.H.(2022). Tax revenue and economic growth in developing country: An autoregressive distribution lags approach. *Cent. Eur. Econ. J.* 2020, 7, 205–217.
- Mercer-Blackman, V., & Camingue-Romance, S. (2020). The impact of United States tax policies on sectoral foreign direct investment to Asia. *Asian Development Bank (ADB), Economic Working Paper Series*, 628. <https://doi.org/10.22617/WPS200388-2>
- Minh Ha, N., Minh, P. T., Binh, Q. M. Q., & Ercolano, S. (2022). The determinants of tax revenue: A study of Southeast Asia. *Cogent Economics & Finance*, 10(1). <https://doi.org/10.1080/23322039.2022.2026660>
- Myles, G. D. (2009). Economic growth and the role of taxation-theory. <https://doi.org/10.1787/222800633678>
- Myles, G.(2000). Taxation and Economic Growth. *Fiscal Stud.*, 21, 141–168.

- Mubanga, Evans (2022). Evaluating the Relationship Between Taxation and Economic Growth in Zambia," *International Journal of Economics and Finance*, Canadian Center of Science and Education, vol. 14(6), 1-22, June. <https://doi.org/10.14207/ejsd.2022.v11n2p51>
- Nagy, B.; Vasilescu, D.(2022). Fiscal policy, economic growth and income inequality: Evidence from European Union countries. *Econ.Re.*,35, 4959–4979.
- Nguyen, A.D.; Onnis, L. and Rossi, R (2021). The macroeconomic effects of income and consumption tax changes.*Am. Econ. J. Econ. Policy* ,13, 439–466.
- Nguyen, H.T., and Darsono, S.N.A.C. (2022). The Impacts of Tax Revenue and Investment on the Economic Growth in Southeast Asian Countries. *Journal of Accounting and Investment*, 23(1), 128-142
- Ocran, M. (2011). Fiscal policy and economic growth in South Africa fiscal policy and economic growth in South Africa. *Journal of Economic Studies*. <https://doi.org/10.1108/01443581111161841> [Google Scholar]
- OECD.It Together: Why Less Inequality Benefits All; OECD Publishing: Washington, DC, USA, 2015.
- Oriakhi, D and Ahuru, R. (2014). 92 The Impact Of Tax Reform On Federal Revenue Generation In Nigeria. *Journal of Policy and Development Studies* 9,1
- Pei-Fen Chen, Chien-Chiang Lee, Yi-Bin Chiu (2014). The nexus between defense expenditure and economic growth: New global evidence,*Economic Modelling*,36, Pages 474-483,<https://doi.org/10.1016/j.econmod.2013.10.019>.
- Pesaran, M. H. (2004). General diagnostic tests for cross section dependence in panels. University of Cambridge, Faculty of Economics, Cambridge Working Papers in Economics No. 0435.
- Pesaran, M. H. and Shin, Y(1998) An Autoregressive Distributed-Lag Modelling Approach to Cointegration Analysis. *Econometric Society Monographs*, 31, 371-413
- Pesaran, M. H., Shin, Y. and Smith, R. J., 2001. Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, 16(3), 289-326
- Poulson, W., and Kaplan, G. (2008). State income taxes and economic growth. *Cato Journal*, 28(1), 53–71 <https://heinonline.org/HOL/>
- Romer, C.; Romer, D. The Macroeconomic Effects of Tax Changes: Estimated Based on a New Measure of Fiscal Shocks.*Am.Econ. Rev.*2010,100, 763–801
- Shabani, H. ., Misiri, V. ., Kilaj, D. ., & Morina, F. . (2022). The Impact of The Tax Revenue Structure on The Economic Growth of The Republic of Kosovo. *European Journal of Sustainable Development*, 11(2), 51.
- Schneider, F. (2005). Shadow Economies of 145 Countries all over the World: What Do We Really Know? (No. 2005-13); CREMA Working Paper; CREMA: Kansas City, MI, USA, 2005.
- Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, 70(1), 65–94. <https://doi.org/10.2307/1884513>
- UN. 2030 Agenda for Sustainable Development. United Nations Development Programme. 2015. Available online:<https://www.undp.org/sustainable-development-goals?>
- Vartia, L. (2008). How do taxes affect investment and productivity? An industry-level analysis of OECD countries. *OECD Economics Department Working Papers*, (656). <https://doi.org/10.1787/230022721067>