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Tax Revenue and Economic Growth of Sierra Leone

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

The positive trend in world economic growth can be attributed to differential growth across the world. The Republic of Sierra Leone is one of the countries in the emerging sub-Saharan African region. Despite Africa's growth prospects, the region is still one of the global hubs of poverty. This study examined the effect of tax revenue and economic growth of Sierra Leone for the period 1987-2017. This study adopted the *ex-post facto* design. Data relating to revenues from different tax components and GDP were collected for the years 1987-2017. The study concluded that tax revenue has significant effect on the economic growth of Sierra Leone, although Companies Income Tax (CIT), Custom Excise Duties (CED) and Road Taxes have not contributed positively to economic growth of this nation over the period of study. The intent of government with such tax should be communicated to the general public. In so doing, a separate body should be set up to inspect and ensure that the funds generated by government through tax at each level of government is properly used and any level of government that fails to utilise such taxes as communicated to the public should be charged to court.

Keywords: Tax revenue; Sierra Leone; economic growth; *ex-post facto* design.

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1. INTRODUCTION

The positive trend in world economic growth can be attributed to differential growth across the world. Some regions of the world have been growing rapidly while others have experienced poor growth. According to Mesche [1], stated that most of the current world economic growth is derived from growth in South Asia and merging market. Sizemore [2] argues that African growth is real because per capita GDP has more than doubled in the past decade due to the fact that 7 of the 10 fastest-growing economies in the world are in Africa. This is why investment analysts have turned their hopes of world growth to the sub-Saharan region. Many have even gone as far as stating that Africa is now the new China implying that Africa is the most promising investment destination of the next 20 years [2].

The Republic of Sierra Leone is one of the countries in the emerging sub-Saharan African region. Despite Africa's growth prospects, the region is still one of the global hubs of poverty. Thus, it is no surprise that poverty is the major socio-economic pandemic that Sierra Leone is currently grappling with. However, Sierra Leone's case is somewhat ironic because the nation is greatly endowed with natural resources and has been politically stable for the past 50 years. One would think critically that an African nation, which has more mineral endowments such as diamond, gold, rutile, bauxite, and iron ore and has experienced peaceful democratic governance, to be at the top of most economically developed nations in the region [3].

In the opposite, Sierra Leone has had a poor economic growth track record since its independence and its poor economic performance is the major factor contributing to high poverty rates. Sierra Leone's economic growth has historically been one of many swings. Research has discovered the economic growth instability the nation has undergone. Upon independence in 1961, The Sierra Leonean government adopted a socialist economic model within an African context and initially generated considerable economic growth. According to the World Bank [4], Sierra Leone increased annual GDP growth from 12.2 percent in 1964 to 16.6 percent in 1965, a remarkable increase indeed [5], World Bank [4].

Sierra Leone has historically faced a great deal of challenges in increasing its level of gross domestic product. Even though the country has

been exporting massive amounts of minerals since before its independence in 1961, gross domestic product remained very low for the past 50 years. It is very disheartening to note that for almost 40 years, Sierra Leone could not significantly increase its Gross Domestic Product. Since 1961, GDP only crossed the US \$5 billion mark in 2004 Sarria-Pedroza [6].

One of the major drawbacks of the Sierra Leonean economy is over dependence on mineral exports. The manufacturing sector accounts for only 2.1 percent of exports as compared to the mining sector's 70 percent. This situation makes Sierra Leone very vulnerable to external shocks. "Sierra Leone needs to diversify its exports into manufactures and services" [7]. In line with this advice, the nation has been striving to expand its manufacturing sector but the sector's growth has been limited by a rising cost of doing business relative to that in other countries [8].

The IMF Team which assessed the 2015 Sierra Leonean economic challenges was also quick to point out that the economic hardships were partly due to poor fiscal management on the part of the government. Sierra Leone has had sustained and increasing budget deficits for the past couple years. In 2012, the nation recorded a deficit of 2.8 percent of GDP. This escalated to 6.7 percent in 2013 and 5.5 percent of GDP in 2014 (Trading Economics, 2015). "Sierra Leone needs to lower its fiscal deficit and improve fiscal discipline if it is to restore market confidence" [9].

Despite the political stability and resource endowment, the majority of Sierra Leoneans are still living in poverty. According to the World Bank [4], "60 percent of the Sierra Leonean population is below the poverty line and 42 percent are considered to be in extreme poverty. Moreover, the absolute number of the poor has increased from about 2.2 million in 2012 to 3.6 million in 2016, primarily due to population growth." poverty rates are higher in rural areas as compared to urban areas such as Freetown. To eradicate poverty, there is need to develop pro-poor development goals and implement them in a cost-effective manner.

The primary function of a tax system is to raise enough revenue to finance essential expenditures on the goods and services provided by government; and tax remains one of the best instruments to boost the potential for public sector performance and repayment of public debt

as enunciated by [10]. According to Azubike [11], a system of tax avails itself as a veritable tool that mobilizes a nation's internal resources and it lends itself to creating an environment that is conducive for the promotion of economic growth. Therefore, taxation plays a major role in assisting a country to meet its needs and promote self-reliance.

In Sierra Leone, tax revenue has accounted for a small proportion of total government revenue over the years compared with the bulk of revenue needed for development purposes that is derived from mining [12]. But here is the case the revenue accruing to the Government of Sierra Leone from taxation over the years has remained grossly insufficient to meet the expanding social and public spending required in fostering economic growth and development in the country. In the opinion of Kola [13], the tax system is grossly inefficient as it is characterized by tax evasion, avoidance and record falsifications which have led to consistent low tax revenue inflow. Gross inefficiency and leakages have hampered the amount of revenue realized from tax sources over the years which has been affecting the economy negatively [14].

In most countries, tax system is seen as an embodiment of contention and controversy whether in its policy formulation, legislation or administration as observed by Bariyama & Gladson [15].

The Sierra Leone experience a very terrible situation having witnessed a fall in its Gross Domestic Product (GDP) from a yearly average rate of 10.5 percent in 1995 to 3.2 percent in 2017 [16]. Currently, the country also observed a decline in its per capita income from US \$1600 in 1990 to US \$1160 in 2017 [16]. One of the major reasons of these low per capita income is the high rate of poverty which has increased from 28.1 percent in 1990 to about 88 percent in 2017 (FOS various issues).

2. LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Historical background

History of taxation is as old as humanity and it predates the Colonia era in Sierra Leone [17]. Taxation system is cuts across social, political and religious groups and divides as it has been shown that people pay taxes in one way on the

other to support the common good. In the history of the biblical times even before the birth of Jesus Christ, taxes have been ordained as part of the human existence and it was found out that the two major religions (Christianity and Muslim) support the payment of taxes. Before the advent of colonial rule in Sierra Leone, the native chiefs and kings extract taxes/tributes from their subjects either for the common good or as a form of right [18].

Steinmo [19], noted that every government needs fund. Most especially the Present governments need a lot of money. How to get this money and whom to take it from are the two most difficult political issues faced in any modern political economy. Taxes are one of the major ways governments get money to run its activities and provide for general good. Taxes are burdens that must be borne by everyone to sustain and maintain a decent and orderly society [20].

Probably to underscore the importance of taxes, Mauwa and Venanzi, [21] stated that; Taxes and Death are inevitable in America; this view was supported by Bartik [22]. However, just as no one wants to die, likewise, many people do not want to pay taxes thus leading to tax evasion and revenue loss. Owens [23] submitted that only few people are enthusiastic about paying taxes. In the views of Akintoye and Dada [24], people avoid tax as a result of feeling of injustice, which subject the rich to lower taxes while the poor pay higher percentage of their income as taxes. In the view of Abgineh and Britton [25], tax evasion is rampant in Sierra Leone because the system does not punish evaders heavily enough to deter others from engaging in the practice.

Public revenue consists of taxes, revenue from administrative activities like fines, fees, gifts and grants. Public revenue can be classified into two types including: tax and non-tax revenue [26]. Taxes are the first and foremost sources of public revenue. Taxes are compulsory payments to government without expecting direct benefit or return by the tax payer. The government collects tax revenue by way of direct & indirect taxes. Direct taxes include; Corporate tax; personal income tax capital gain tax and wealth tax.

2.1.2 Taxation

According to World Bank [27], taxes are compulsory transfer of resources to the government from the rest of the economy; it was also made known that no single tax structure can

possibly meet the requirements of every country. The best system for any country should be determined taking into account its economic structure, its capacity to administer taxes, its public service needs, and many other factors. Nonetheless, one way to get an idea of what matters in tax policy is to look at what taxes exist around the world. This is with a view to meet or provide for the common good, as noted by Miller and Oats [28], that taxation is required to finance public expenditure. The National Tax Policy defines tax as a financial charge or levy imposed upon an individual or legal entity by a State or a legal entity of the State; it is a pecuniary burden laid upon individuals or property to support government expenditure. The World Bank [27] reiterated that taxes are compulsory transfer of resources to the government from the rest of the economy. It may also be defined as a compulsory levy imposed by the government of a state for effective management of the government activities [29].

2.1.3 Sierra Leonean tax system

The Sierra Leone political environment embraces the State system of governance; hence her fiscal operations adhere to the same principle which has severe consequences on the tax management system in the country [17]. Government's fiscal policy is based on the two-tiered tax structure i.e. the State, and Local Governments, each of which has different tax jurisdictions [30]. Venanzi [17] opined that tax system in Sierra Leone is characterized by avoidable complexity, distortion and largely inequitable tax laws that have limited application in the informal sector that dominates the economy. According to Rashid [31], the Sierra Leonean tax system has experienced remarkable variations in recent times.

The tax system is the process of taxation which involve sets of rules, regulations and procedures with the organs of administration intermingling with one another to generate fund for government [32]. The Sierra Leonean tax system is of multi activities which include tax administration, tax laws, and tax policies [33]. Under current Sierra Leonean law, taxation is enforced by the two tiers of Government, that is. The Central, and Local governments with each tier of Government having its sphere clearly writing out in the Taxes and Levies [31]. Based on the structure of Sierra Leonean Tax system for revenue generation, Chang, [34] and Venanzi [17] opined that the system is lopsided, and dominated by Agriculture revenue.

2.1.3.1 Revenue generation of Sierra Leonean government

Carlson [33] stated that the development of any nation depends on the amount of revenue generated by the government for the provision of infrastructural facilities. Sierra Leone derives her revenue from different sources which includes internal and external sources. The internal sources of revenue in Sierra Leone can equally be categorized into two classes according to Binshan and Prieto [35], who posited that the revenue accruing to the government can be divided into two: non –Agriculture revenue (such as direct and indirect taxes, loans, trades, grants, aids) and Agriculture revenue (such as revenue from royalties, Mining Profit Tax (MPT)) [36].

Over the years Sierra Leone has depended on the revenue income from the agriculture sectors to the utter neglect of other source of revenue as asserted by Venanzi [17], such that over 70% of the total revenue comes from agriculture sector. However, the uncertainties of the revenue inflow from the agriculture sector due to various factors such as international politics, insecurity, price fluctuations, Agriculture theft, and endemic corruption in the system has made it difficult for Sierra Leone government to meet her ever increasing demand for public service and goods, therefore the development of Sierra Leone tax administrative system to produce greater tax yield becomes imperative [35].

Most developed economies around the world have relied on tax as a veritable source of revenue to meet its responsibilities. In Countries like USA, UK, France and a few others taxation has evolved to become the mainstay of the economy, while other developing and underdeveloped nations has not been able to evolve a tax system that would provide the much needed fund that can sustain the economy and provide a fulcrum on which the economy can take a progressive leap. The revenue accruing from taxation by government is grossly insufficient to meet her ever increasing social and public spending [37].

2.1.3.2 Reasons for insufficiencies of tax revenue

The insufficiencies of the tax revenue in Sierra Leone can be traced to various factors, according to Ruharah, Tamri, and Asian [38], lack of statistical data, poor tax administration, inability to prioritize tax effort, multiplicity of taxes, underground economy and corruption are

major obstacles to efficient and effective tax administration with the resultant effect of low tax revenue income. The inability of the tax administrators to harness the tax resources in the informal sector of the economy are another reason for insufficient tax revenue inflow as opined by Williams [39].

2.1.3.3 Tax revenue

Tax revenue refer to monies collected by a government through imposition of levies and taxes on facilities, incomes, sale of goods and services, transfers of properties, and other domestic transactions. Tax revenues to central governments are set out in the 1991 Constitution of the Republic of Sierra Leone. According to the Constitution, Districts are legally empowered to levy taxes partly or solely on the following: Capital gains Tax, Personal Income tax, Stamp Duties, Capital Transfer Tax, Pools Betting & Other Setting Taxes, Motor Vehicle and Drivers' Licenses, Entertainment Tax, Legal Registration & Survey Fees and Gift Tax.

Freeman [40] defined revenue as the fund required by the government to finance its activities. Tax revenues (TR) are revenues or funds generated by states within the Sierra Leonean government, independent of their share of revenue from the state account [41]. There are challenges that have affected TR collection in the Sierra Leone. These challenges have been identified below:

2.1.3.4 Problem of tax collection

Taxpayers can easily avoid reporting their income to the government (Sierra Leonean National Assembly Forum, 2015). Many taxpayers in Sierra Leone do not see payment of tax as their civic responsibility and an obligation to the government. This is because, they believe that on the part of the government, there is no adequate provision of public goods and services that the citizens need as part of their benefit from their tax payment [42]. It is obvious that the principle of fairness and equity in taxation do not apply in the Sierra Leonean tax practice and administration. As a result, most tax payers feel unjustifiably levied as there are no benchmarks for proper tax assessment in Sierra Leone (SLNAF, 2016).

Most tax official lack adequate training and communication skills. The uncivilized manner with which they relate with tax payers does not

encourage them to make payments that are due. They approach their job with selfish interest and aggression, thereby giving a taxpayer the option of defending his civic right (SLNAF, 2016). Tax laws in Sierra Leone have not been brought to the layman's understanding. Even among the elites it is still very complicated, such that tax liability becomes a difficult task to compute [43]. The conceptual review provides comprehensive definition and concept of economic growth, real gross domestic product, tax revenue from other authors and scholars as well as the TR inherent challenges.

2.1.3.5 National tax policy and fiscal responsibility

The National Tax Policy list some fiscal objectives of Sierra Leonean Tax System [44].

Sierra Leone tax system is structured to achieve the following fiscal objectives:

Promote fiscal responsibility and accountability: The tax system is to ensure that a government will transparently and judiciously accounts for the revenue it generates through taxation by investing in the provision of infrastructure and public goods and services. Sierra Leone tax system is designed to be a tool for national development.

To facilitate economic growth and development: The overriding objective of Sierra Leonean tax system is to achieve economic growth and development. As such, the system should allow for stimulation of the economy and not stifle growth, as it is only through sustained economic growth that the potential ability to offer improvements in the well-being of Sierra Leoneans will arise. The tax system should therefore not discourage investment and the propensity to save Taxes should not be a burden but should be applied proactively with other policy measures to stimulate economic growth and development.

To provide the government with stable resources for the provision of public goods and services: The Sierra Leonean tax system should generate sufficient resources for government to provide basic public goods and services (e.g. education, healthcare infrastructure, security etc). It is therefore a primary objective of taxation to provide the government with resources that it shall invest in judicious expenditure that will ultimately improve the well-being of all Sierra Leoneans.

To address inequalities in income distribution: Sierra Leone's tax system should take cognizance of our peculiar economic circumstances and seek to narrow the gap between the highest and lowest groups. Those with the highest incomes should pay the highest percentage of tax and tax revenue should be utilized to provide Sierra Leoneans with affordable social amenities, basic infrastructures and other facilities.

To provide economic stabilization: Sierra Leone should use its tax system to minimize the negative impacts of volatile booms and recessions in the economy and also to help complement the efforts of monetary policy in order to achieve economic stability.

To pursue fairness and equity: Sierra Leone tax system must be fair and shall institutionalize horizontal and vertical equity. Horizontal equity ensures equal treatment of equal individuals. The Sierra Leonean tax system should therefore seek to avoid discrimination against economically similar entities. Vertical equity on the other hand addresses the issue of fairness among different income categories. In this regard, the Sierra Leonean tax system shall recognize the ability-to-pay principle, in that individuals should be taxed according to their ability to bear the tax burden. Individuals and entities that earn high incomes should pay a correspondingly high percentage of tax. The overall tax system shall therefore be fair, so that similar cases are treated similarly.

2.1.3.6 Economic growth

Economic growth can be described as the increase in the ability of an economy to produce goods and services, when compared from one period of time to another. It is traditionally the percent rate increase in gross domestic product (GDP). In terms of economic growth can be in nominal terms, or in real terms. It is in nominal terms if it includes inflation while it is in real terms if there is adjustment for inflation. Measurement of economic growth in real terms (i.e. inflation adjusted terms) is preferable because the distorting effect of inflation on the price of good and services produced is eliminated [45].

2.2 Theoretical Review

The theoretical framework for this study is hinged on Revenue Productivity Theory (United Nations Summit, 2018). Anyanwu and Oaikhenan [46]

stated that economic growth, refers to the increase, over time, of a country's or an economic capacity to produce those goods and services needed to improve the well-being of the citizens in increasing numbers and diversity. This is the reason why government of many nations, Sierra Leone inclusive has placed more emphasis on ways of boosting their revenue sources given the high expectations from their citizens. Gómez-Johnson [47] noted that, more than ever before, there is now a great demand for the optimization of revenue from various tax sources in Sierra Leone.

Various theories exist to explain reasons for insufficient tax revenue income, among which are;

Benefit Received Theory: According to this theory, the state should levy taxes on individuals according to the benefit conferred on them. The more benefits a person derives from the activities of the state, the more she/he should pay to the government.

Cost of Service Theory: This theory implies that the Government should tax the citizens according to the cost of service rendered by it. The Government renders certain services to citizens and the cost of such services should be collectively met by the citizens the tax, an individual should bear, must be equal to the cost of benefit be receives.

Ability to Pay Theory: The most popular and commonly accepted principle of equity or justice in taxation is that citizens of a country should pay taxes to the government in accordance with their ability to pay. It appears very reasonable and just that taxes should be levied on the basis of the taxable capacity of an individual. For instance, if the taxable capacity of a person A is greater than the person B, the former should be asked to pay more taxes than the latter.

2.3 Empirical Review

Chris [48] analyzed the structural shift of government revenue in Sierra Leone from 1960-1982 linked direct government revenue to the level of economic development using growth in GDP as a proxy for economic growth. He used two sets of regression equation by breaking sample period into two, 1961-1971, and 1972-1982. First regression analysis indicated that a positive relationship exists between the variables. The second regression result indicates also rose from 81 % to 82%. He concluded that

result of the regression analysis indicates that external fund has been the single most important sources of government revenue. The study also found that economic development has a significant impact on direct government revenue.

Contrary to Chris [48], Fala [49] carried out a similar study for about the same time from 1960-1979 and breaking the sample period into two and adopting the same measures. He found out that the result differs from Chris [48] where the coefficient of elasticity obtained by Fala [49] for the first sample period 1960 – 1969 was 1.09 while that of Chis was 0.08 for the period of 1961 – 1971. The result premised on assumption of absence of any other significant change in the marginal values of direct tax in the period 1960-1971. Again, the elasticity of coefficient obtained by Fala 1970-1974 stood at 1.64 while that of Chis was 0.15. At this point one can conclude that the inference cannot be actually drawn between the two conflicting results because of certain statistical parameter use to facilitate observation.

Tamri and Bigirimana [50] examined the relationship between tax revenue and rate of economic growth in Sierra Leone from 1956-2002 using annual time series data and applying the multivariate VAR model and testing for granger causality among the variables. The result shows that there exists a causal relationship between tax revenue and economic growth in Sierra Leone.

This study thus extends the literature in this area by employing cointegration methodology alongside error correction mechanism to investigate the effect of non-mining revenue on economic growth in Sierra Leone. The study employed annual observations from 1987 to 2017. The non-mining revenue variables analyzed are: companies income tax, mining profit tax, custom and excise duty, value added tax and road taxes.

From the empirical works above, it was evident that a limited number of studies looked at an appraisal of the major revenue sources and their effect on economic growth in Sierra Leone and this is the essence of this study. The few existing literatures examined the effect of individual taxes handles on economic growth. This appraisal will capture most of the major sources of revenue in Sierra Leone. We also update the analysis by covering the period between 1987-2017.

The effect of tax administration and revenue generated on economic growth in Sierra Leone has been investigated in prior research studies. However, different factors have been used to measure the tax administration in relation to the tax revenue generated.

3. METHODOLOGY

This study examined the effect of tax revenue and economic growth of Sierra Leone for the period 1987-2017. This study adopted the *ex-post facto* design. This was because data needed for analysis already exists which are secondary data from government reports. The study covered Sierra Leone's economy with time series rather than cross-sectional data being used. Data relating to revenues from different tax components and GDP were collected for the years 1987-2017.

3.1 Model Specification

These following models were adopted in this study:

$$\begin{aligned} \text{GDP} &= f(\text{CIT}) \\ \text{GDP} &= f(\text{MPT}) \\ \text{GDP} &= f(\text{CED}) \\ \text{GDP} &= f(\text{VAT}) \\ \text{GDP} &= f(\text{RT}) \end{aligned}$$

From the above function, the following models are derived:

$$\begin{aligned} \text{Log GDP} &= \alpha + \beta_1 \text{CIT}_t + \epsilon & (1) \\ \text{Log GDP} &= \alpha + \beta_2 \text{MPT}_t + \epsilon & (2) \\ \text{Log GDP} &= \alpha + \beta_3 \text{CED}_t + \epsilon & (3) \\ \text{Log GDP} &= \alpha + \beta_4 \text{VAT}_t + \epsilon & (4) \\ \text{Log GDP} &= \alpha + \beta_5 \text{RT}_t + \epsilon & (5) \end{aligned}$$

Where GDP is the Gross Domestic Product
 CIT: Company Income Tax
 MPT: Mining Profit Tax
 CED: Customs and Excise Duties
 VAT: Value Added Tax
 RT: Road Tax

$\text{Log}(\text{GDP})_t$ is the natural of Gross Domestic Product (GDP) in time 't'
 $(\text{CIT})_t$ is the natural of Company Income Tax (CIT) in time 't'
 $(\text{CIT})_{t-1}$ is the natural of Company Income Tax (CIT) in time 't' minus 1
 $(\text{MPT})_t$ is the natural of Mining Profit Tax (MPT) in time 't'
 $(\text{CED})_t$ is the natural of Custom and Excise Duty (CED) in time 't'

$(VAT)_t$ is the natural of Value Added Tax (VAT) in time 't'

$(RT)_t$ is the natural of Road Taxes (RT) in time 't'

α is constant

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ are the coefficients of the parameter estimates.

ε is the error term

3.2 Measurement of Identified Variables

Tax Revenue: Companies Income Tax, Mining Profit Tax, Customs and Excise Duties, Value Added Tax, Road Taxes were used as proxies for tax revenues while the GDP was used as a proxy for economic growth in the study.

Gross Domestic Product (GDP) measures the total value of the final goods and services produced with a given Country's borders. It is the most popular method measuring an economy's output and is therefore considered a measure of the size of an economy. GDP can be calculated by using the following formula: $GDP = C + G + I + NX$, where C is consumer spending, G is government spending, I is firms spending on capital and NX is consumption by foreign consumers expressed in terms of net exports (Exports-Imports).

3.3 Ethical Consideration

Compliance with the relevant principles of acknowledging various authors used in the work to avoid plagiarism was ensured. Dishonest conduct includes manipulation of design and methods, retention or manipulation of data. The researcher avoided any form of dishonesty by using data as obtained by the research instrument.

4. RESULTS AND DISCUSSION

This study presents the descriptive statistics, the correlation coefficient and the unit root tests of the variables used in the study. In addition, the Autoregressive Distributed Lag (ARDL) approach to cointegration was used to assess the impact of tax revenue on economic growth in Sierra Leone. In this study, the tax revenue was disaggregated into company income tax, customs and excise duties, mining profit tax, value added tax and road tax.

4.1 Descriptive Statistics

The study consists of annual data for the period 1987-2017 for Sierra Leone. The descriptive

presented in Table 1 are the mean, maximum, minimum and standard deviations and Jarque-Bera (for normality test) and the numbers of observations for of each of the dependent and independent variables. The dependent variable is the natural logarithm of gross domestic product (LGDP) and the explanatory variables are logarithms of company income tax (LCIT), customs and excise duties (LCED), mining profit tax (LMPT), value added tax (LVAT) and road tax (LRT).

Interpretation:

LGDP: The mean value of the gross domestic product is 13.85. In addition, it shows that the maximum value is 17.27 and the minimum value 10.76. This implies that the levels of economic growth in Sierra Leone differ across time period. It also shows that the total value of goods and services produced follows upward trends during the period of study and the standard deviation of 2.08 shows that the level of growth is susceptible to change in Sierra Leone. In also shows that economic growth in Sierra Leone follows a normal distribution because the Jarque-Bera test shows that the variable is normally distributed.

LCIT: The mean value of the company income tax is 8.99. In addition, it shows that the maximum value is 12.72 and the minimum value 5.31. This implies that the company income tax in Sierra Leone differs across time period. The standard deviation of 2.46; shows that the company income tax is susceptible to change in Sierra Leone. In also shows that company income tax in Sierra Leone follows a normal distribution because the Jarque-Bera test of 2.43 shows that the variable is normally distributed.

LCED: The mean value of the custom and excise duties is 9.62. In addition, it shows that the maximum value is 11.70 and the minimum value 6.70. This implies that the custom and excise duties in Sierra Leone differ across time period covered for in the study. The standard deviation of 1.85; shows that the custom and excise duties is susceptible to change in Sierra Leone. Also, it shows that custom and excise duties in Sierra Leone follows a normal distribution because the Jarque-Bera test of 3.25 shows that the variable is normally distributed.

LVAT: The mean value of the value added tax is 10.88. In addition, it shows that the maximum value is 12.71 and the minimum value 8.20. This

implies that the value added tax in Sierra Leone differ across time period. The standard deviation of 1.26; shows that the value added tax is less susceptible to change in Sierra Leone. It also shows that value added tax in Sierra Leone follows a normal distribution because the Jarque-Bera test of 0.69 shows that the variable is normally distributed.

LRT: The mean value of the road tax is 9.62. In addition, it shows that the maximum value is 10.22 and the minimum value 8.736. This implies that the road tax in Sierra Leone differ across time period covered for in the study. The standard deviation of 0.45; shows that the road tax is less susceptible to change in Sierra Leone. In also shows that road tax in Sierra Leone follows a normal distribution because the Jarque-Bera test of 0.67 shows that the variable is normally distributed.

LMPT: The mean value of the mining profit tax is 10.78. In addition, it shows that the maximum value is 14.24 and the minimum value 7.54. This implies that the mining profit tax in Sierra Leone differ across time period. The standard deviation of 2.24; shows that the mining profit tax is susceptible to change in Sierra Leone. In also shows that mining profit tax in Sierra Leone follows a normal distribution because the Jarque-

Bera test of 2.60 shows that the variable is normally distributed.

4.2 Pearson Correlation

This section discusses the degree of association between logarithms of company income tax (LCIT), mining profit tax (LMPT), value added tax (LVAT), road tax (LRT) and customs and excise duties (LCED) with the log of gross domestic product (LGDP) for the period 1987- 2017 in Sierra Leone. The results in Table 2 show that company income tax, mining profit tax, value added tax, road tax and customs and excise duties have positive and significant association with economic growth in Sierra Leone. The implication of these results is that increases in company income tax, mining profit tax, value added tax, road tax and customs and excise duties will lead to increases in economic growth in Sierra Leone.

4.3 Result of the Stationary Test

Stationary test is conducted to examine the time series properties of the variables over the study period. Specifically, the Augmented Dickey Fuller (ADF) unit root test was used to test for stationary in the series and the result is presented in Table 3.

Table 1. Descriptive statistics

Variables	Mean	Max	Min	Std. Dev.	Jarque-Bera	Prob	Obs
LGDP	13.851	17.265	10.761	2.075	2.280	0.320	31
LCIT	8.992	12.716	5.306	2.455	2.428	0.297	31
LCED	9.616	11.701	6.695	1.847	3.251	0.197	31
LVAT	10.876	12.706	8.197	1.263	0.686	0.709	18
LRT	9.618	10.216	8.736	0.450	0.665	0.717	12
LMPT	10.779	14.244	7.536	2.244	2.601	0.272	31

Notes: Table 1 shows the mean, maximum, minimum, standard deviation and Jarque-Bera test for normality of the variables. The dependent variable is log of gross domestic product (LGDP) the explanatory variables are logarithms of company income tax (LCIT), customs and excise duties (LCED), mining profit tax (LMPT), value added tax (LVAT) and road tax (LRT) for the period 1987-2017 in Sierra Leone. The estimation process was facilitated using Eviews 10

Table 2. Correlation matrix for tax revenue and gross domestic product

Variables	LGDP	LCIT	LCED	LVAT	LRT	LMPT
LGDP	1.000					
LCIT	0.962	1.000				
LCED	0.677	0.707	1.000			
LVAT	0.967	0.989	0.786	1.000		
LRT	0.955	0.972	0.806	0.987	1.000	
LMPT	0.822	0.766	0.768	0.816	0.856	1.000

Notes: Table 2 shows the Pearson pairwise correlation matrix. The dependent variable is log of gross domestic product (LGDP) the explanatory variables are logarithms of company income tax (LCIT), customs and excise duties (LCED), mining profit tax (LMPT), value added tax (LVAT) and road tax (LRT) for the period 1987-2017 in Sierra Leone. The estimation process was facilitated using Eviews 10. The correlations are below the major diagonal and the bold coefficients denotes statistically significant at 1, 5 and 10 per cent

Table 3. Result of the unit root test

Variables	ADF	Remarks
LGDP	-2.189	
LGDP	-5.248***	I(1)
LCIT	-4.779***	I(0)
LCIT	-8.695***	
LCED	-0.819	
LCED	-5.199***	I(1)
LMPT	-3.297	
LMPT	-4.816***	I(1)
LRT	-2.790	
LRT	-4.466***	I(1)
LVAT	-2.659	
LVAT	-7.126***	I(1)

Source: Researcher's Computation, (2019)

Notes: Table 3 presents the unit root test. The dependent variable is log of gross domestic product (LGDP) the explanatory variables are logarithms of company income tax (LCIT), customs and excise duties (LCED), mining profit tax (LMPT), value added tax (LVAT) and road tax (LRT) for the period 1987-2017 in Sierra Leone. The estimation process was facilitated using Eviews 10. The critical value at 5 for intercept and trend is -3.50 and for intercept alone is -2.93. ** and *** indicates significant at 5 and 1 per cent respectively

Interpretation: The results show the economic growth proxied with the gross domestic product, mining profit tax, road tax, customs and excise duties and value added tax were stationary in their first differences, while company income tax is stationary at levels 5 per cent level of significance. It should be noted that because some of the different order of integration of the variables, the autoregressive distributed lag (ARDL) model approach to cointegration of Pesaran et al., [51] which allows for the of combination of levels and first difference stationary variables were used.

4.4 Test of Hypotheses

4.4.1 Hypothesis one

Research Question: To what extent does company income tax affect economic growth in Sierra Leone?

Interpretation: The value of F-Stat is 11.80 and it is greater than the critical values bound at upper bound (I1) of 4.26, 3.5 and 3.13 at 1 percent. This implies that the variables co-moved in the long run. Having found a long-run relationship between economic growth and company income tax, the study then estimates the long-run and the short-run elasticities. The empirical results for the model, obtained through normalizing economic growth and company income tax in the short and long run are reported in Table 4.

The Long-Run Dynamics: The estimated long-run coefficients (elasticities) for the UECM model

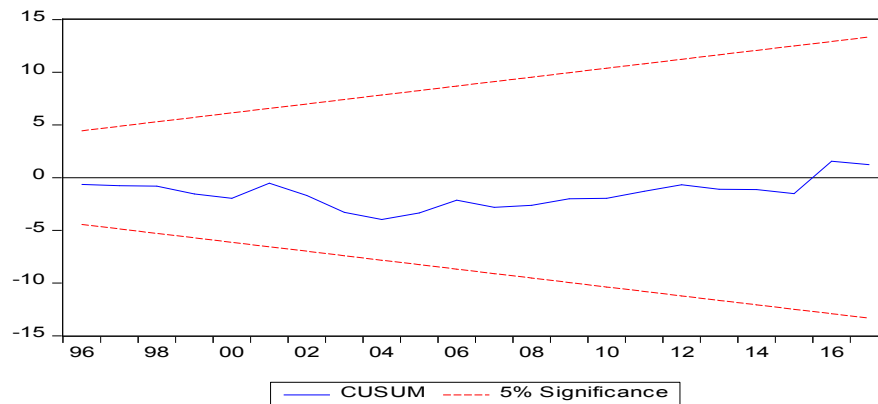
are given in the tables Panel A of Tables 4. In the long run, there is evidence of a positive relationship between economic growth and company income tax. This implies that increases in company income tax will lead to increase in the economic growth in Sierra Leone. Furthermore, there is evidence of a long-run significant relationship between economic growth and company income tax in Sierra Leone ($\beta_1 = 13.479$, t-test= 4.165, $p < 0.05$). This implies that company income tax is a significant factor influencing changes in economic growth in Sierra Leone. Also, a 1 per cent increase in company income tax will lead to 13.479 per cent increase in economic growth in Sierra Leone in the long run. Thus, the null hypothesis that there is no significant effect of company income tax on economic growth in Sierra Leone was rejected and accept the alternative hypothesis that there is significant relationship that between company income tax on economic growth in Sierra Leone.

Short-run Dynamics: The purpose of this section is for two reasons. First, is to examine if changes and the statistical significance experienced in the long run also exist in the short run model. Second, is to examine the degree of adjustment back to equilibrium using the error correction term. The short-run adjustment process is measured by the error correction term ECM_{t-1} and it shows how quickly variables adjust to a shock and return to equilibrium. For stability, the coefficient of ECM_{t-1} should carry the negative sign and be statistically significant.

Table 4. Full information on the effects of company income tax on economic growth

Panel A: Long Run Estimates				
Dependent Variable: LGDP				
Variable	Coefficient	S.E	t-stat	Prob
C	1.021	1.020	1.001	0.326
LCIT	13.479	3.236	4.165	0.000
Panel B: Short -Run Estimates				
Variable	Coefficient	S.E	t-stat	Prob
C	-0.854	0.343	-2.489	0.014
D(LCIT(-1))	0.581	0.070	8.334	0.000
ECM(-1)	-0.024	0.004	-6.167	0.000
Panel C: Diagnostic Tests		Statistic	Prob.	
Bound Test		11.804	0.050	
Serial Correlation		0.107	0.899	
Heteroscedasticity		0.367	0.676	
Linearity Test		0.621	0.541	
R-square		0.326		
Stability Test		CUSUM		
		Stable		

Notes: Table 4 reports the long-run estimates, short run estimates and the diagnostic tests for the relationship between company income tax and economic growth. The dependent variable is the logarithm of gross domestic product and independent variable is the logarithm of company income tax



The result shows that in the short-term company income tax has a positive and significance relationship with the economic growth ($\beta_1 = 0.581$, t-test= 8.334, $p < 0.05$). In addition, the estimated coefficient for the ECM_{t-1} reported in Panel B of 4.4 is negative and statistically significant ($ECM = -0.024$, t-test = -6.167, $p < 0.05$). This implies that deviations from economic growth equilibrium path are corrected by nearly 2 per cent over the following year. In other words, the adjustment process is slow for Sierra Leone. The statistical significance of the ECM_{t-1} confirms the presence of long-run equilibrium relationship between economic growth and company income tax in Sierra Leone. The R-square is 0.33, this implies that company income tax explains about 33 per cent changes in economic growth, while the remaining 67 per

cent were other factors affecting changes in economic growth but were not captured in the model.

Diagnostic Test:

The Linearity Test: The linearity assumption of ARDL test was estimated using **Ramsey Reset Test**, F-statistics of 0.621 and its p -value is being greater than 5 per cent chosen level of significance, thus the null hypothesis of linearity cannot be rejected. This implies that the model is correctly specified and that there is a linear relationship between the economic growth and company income tax in Sierra Leone.

The Heteroskedasticity Test: Breusch-Pagan Test for Heteroskedasticity was conducted to test

is the covariance of the estimated model error term is constant or not. The result suggests that a statistic of 0.367 is not statistically significant at 5 per cent level of significance, this implies that the null hypothesis of homoscedasticity could not be rejected; thus, there is evidence that the covariance of the error terms have a constant finite variance.

The Breusch-Godfrey Serial Correlation LM Test: The Breusch-Godfrey Serial Correlation LM Test was carried out to determine if successive error terms are correlated. The probability value of F-statistic of 0.899 is in favour of the null hypothesis that there is no serial correlation in the residuals up to the specified lag order at 5 percent significant level. Thus, the study concluded that the successive error terms were not correlated in the estimated

model for economic growth and company income tax.

Stability Test (CUSUM Residual Test): The CUSUM test for stability is meant to determine the appropriateness and the stability of the model. In addition, the CUSUM test is used to show whether the model is stable and is suitable for making long run decision. The CUSUM is also reported in Panel C. For the Sierra Leone, the CUSUM test also shows that the estimated model is stable; this is because the plot of CUSUM statistic stays within a 5% significance level portrayed by two straight lines.

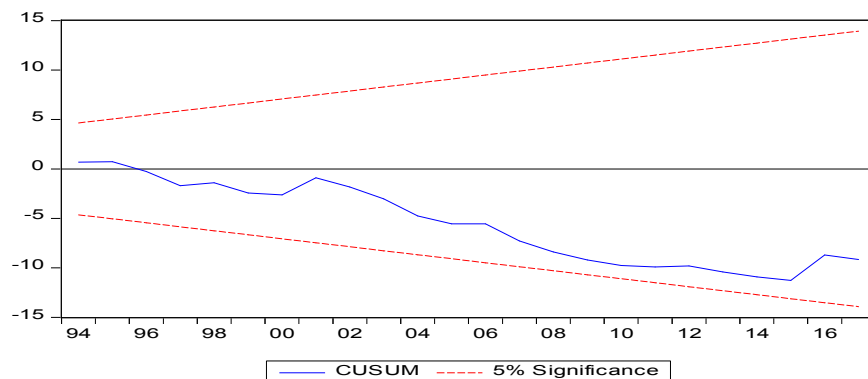
4.4.2 Hypothesis two

Research Question: To what extent does mining profit tax affect economic growth in Sierra Leone?

Table 5. Full information on the effects of mining profit tax on economic growth

Panel A: Long Run Estimates				
Dependent Variable: LGDP				
Variable	Coefficient	S.E	t-stat	Prob
C	7.321	5.262	1.391	0.177
LMPT	0.969	0.308	3.149	0.004
Panel B: Short -Run Estimates				
Variable	Coefficient	S.E	t-stat	Prob
C	0.133	0.067	1.977	0.060
D(LMPT(-1))	0.157	0.070	2.226	0.036
ECM(-1)	-0.057	0.010	-5.797	0.000
Panel C: Diagnostic Tests		Statistic	Prob.	
Bound Test		10.341	0.050	
Serial Correlation		0.648	0.533	
Heteroscedasticity		1.194	0.339	
Linearity Test		1.095	0.285	
R-square		0.224		
Stability Test		CUSUM	Stable	

Notes: Table 5 reports the long-run estimates, short run estimates and the diagnostic tests for the relationship between mining profit tax and economic growth. The dependent variable is the logarithm of gross domestic product and independent variable is the logarithm of mining profit tax



Interpretation: The value of F-Stat is 10.34 and it is greater than the critical values bound at upper bound (I1) of 4.26, 3.5 and 3.13 at 1 percent. This implies that the variables co-moved in the long run. Having found a long-run relationship between economic growth and mining profit tax, the study then estimates the long-run and the short-run elasticities. The empirical results for the model, obtained through normalizing economic growth and mining profit tax in the short and long run are reported in Table 5.

The Long-Run Dynamics: The estimated long-run coefficients (elasticities) for the UECM model are given in the tables Panel A of Tables 5. In the long run, there is evidence of a positive relationship between economic growth and mining profit tax. This implies that increases in mining profit tax will lead to increase in the economic growth in Sierra Leone. Furthermore, there is evidence of a long-run significant relationship between economic growth and mining profit tax in Sierra Leone ($\beta_1 = 0.969$, t-test= 3.149, $p < 0.05$). This implies that mining profit tax is a significant factor influencing changes in economic growth in Sierra Leone. Also, a 1 per cent increase in mining profit tax will lead to 0.969 per cent increase in economic growth in Sierra Leone in the long run. Thus, the null hypothesis that there is no significant effect of mining profit tax on economic growth in Sierra Leone was rejected and accept the alternative hypothesis that there is significant relationship that between mining profit tax on economic growth in Sierra Leone.

Short-run Dynamics: The purpose of this section is for two reasons. First, is to examine if changes and the statistical significance experienced in the long run also exist in the short run model. Second, is to examine the degree of adjustment back to equilibrium using the error correction term. The short-run adjustment process is measured by the error correction term ECM_{t-1} and it shows how quickly variables adjust to a shock and return to equilibrium. For stability, the coefficient of ECM_{t-1} should carry the negative sign and be statistically significant.

The result shows that in the short-term mining profit tax has a positive and significance relationship with the economic growth ($\beta_1 = 0.1571$, t-test= 2.226, $p < 0.05$). In addition, the estimated coefficient for the ECM_{t-1} reported in Panel B of 4.5 is negative and statistically significant ($ECM = -0.057$, t-test = -5.797, $p < 0.05$). This implies that deviations from

economic growth equilibrium path are corrected by nearly 6 per cent over the following year. In other words, the adjustment process is slow for Sierra Leone. The statistical significance of the ECM_{t-1} confirms the presence of long-run equilibrium relationship between economic growth and mining profit tax in Sierra Leone. The R-square is 0.22; this implies that mining profit tax explains about 22 per cent changes in economic growth, while the remaining 78 per cent were other factors affecting changes in economic growth but were not captured in the model.

Diagnostic Test:

The Linearity Test: The linearity assumption of ARDL test was estimated using **Ramsey Reset Test**, F-statistics of 1.095 and its p-value is being greater than 5 per cent chosen level of significance, thus the null hypothesis of linearity cannot be rejected. This implies that the model is correctly specified and that there is a linear relationship between the economic growth and mining profit tax in Sierra Leone.

The Heteroskedasticity Test: Breusch-Pagan Test for Heteroskedasticity was conducted to test is the covariance of the estimated model error term is constant or not. The result suggests that a statistic of 1.194 is not statistically significant at 5 per cent level of significance, this implies that the null hypothesis of homoscedasticity could not be rejected; thus, there is evidence that the covariance of the error terms have a constant finite variance.

The Breusch-Godfrey Serial Correlation LM Test: The Breusch-Godfrey Serial Correlation LM Test was carried out to determine if successive error terms are correlated. The probability value of F-statistic of 0.533 is in favour of the null hypothesis that there is no serial correlation in the residuals up to the specified lag order at 5 percent significant level. Thus, the study concluded that the successive error terms were not correlated in the estimated model for economic growth and mining profit tax.

Stability Test (CUSUM Residual Test): The CUSUM test for stability is meant to determine the appropriateness and the stability of the model. In addition, the CUSUM test is used to show whether the model is stable and is suitable for making long run decision. The CUSUM is also reported in Panel C. For the Sierra Leone, the CUSUM test also shows that the estimated model is stable; this is because the plot of

CUSUM statistic stays within a 5% significance level portrayed by two straight lines.

4.4.3 Hypothesis three

Research Question: To what extent does customs and excise duty affect economic growth in Sierra Leone?

Interpretation: The value of F-Stat is 12.654 and it is greater than the critical values bound at upper bound (I1) of 4.26, 3.5 and 3.13 at 1 percent. This implies that the variables co-moved in the long run. Having found a long-run relationship between economic growth and customs and excise duties, the study then estimates the long-run and the short-run elasticities. The empirical results for the model, obtained through normalizing economic growth and customs and excise duties in the short and long run are reported in Table 6.

The Long-Run Dynamics: The estimated long-run coefficients (elasticities) for the UECM model are given in the tables Panel A of Tables 6. In the long run, there is evidence of a positive relationship between economic growth and customs and excise duties. This implies that increases in customs and excise duties will lead to increase in the economic growth in Sierra Leone. Furthermore, there is evidence of a long-run significant relationship between economic growth and customs and excise duties in Sierra Leone ($\beta_1 = 1.192$, $t\text{-test} = 4.719$, $p < 0.05$). This implies that customs and excise duties is a significant factor influencing changes in economic growth in Sierra Leone. Also, a 1 per cent increase in customs and excise duties will lead to 1.192 per cent increase in economic growth in Sierra Leone in the long run. Thus, the null hypothesis that there is no significant effect of customs and excise duties on economic growth in Sierra Leone was rejected and accept the alternative hypothesis that there is significant relationship that between customs and excise duties on economic growth in Sierra Leone.

Short-run Dynamics: The purpose of this section is for two reasons. First, is to examine if changes and the statistical significance experienced in the long run also exist in the short run model. Second, is to examine the degree of adjustment back to equilibrium using the error correction term. The short-run adjustment process is measured by the error correction term ECM_{t-1} and it shows how quickly variables adjust to a shock and return to equilibrium. For stability, the coefficient of ECM_{t-1} should carry the negative sign and be statistically significant.

The result shows that in the short-term customs and excise duties has a positive and significance relationship with the economic growth ($\beta_1 = 0.282$, $t\text{-test} = 3.506$, $p < 0.05$). In addition, the estimated coefficient for the ECM_{t-1} reported in Panel B of 4.6 is negative and statistically significant ($ECM = -0.088$, $t\text{-test} = -6.386$, $p < 0.05$). This implies that deviations from economic growth equilibrium path are corrected by nearly 9 per cent over the following year. In other words, the adjustment process is slow for Sierra Leone. The statistical significance of the ECM_{t-1} confirms the presence of long-run equilibrium relationship between economic growth and customs and excise duties in Sierra Leone. The R-square is 0.34; this implies that customs and excise duties explain about 34 per cent changes in economic growth, while the remaining 66 per cent were other factors affecting changes in economic growth but were not captured in the model.

Diagnostic Test:

The Linearity Test: The linearity assumption of ARDL test was estimated using **Ramsey Reset Test**, F-statistics of 0.350 and its p-value is being greater than 5 per cent chosen level of significance, thus the null hypothesis of linearity cannot be rejected. This implies that the model is correctly specified and that there is a linear relationship between the economic growth and customs and excise duties in Sierra Leone.

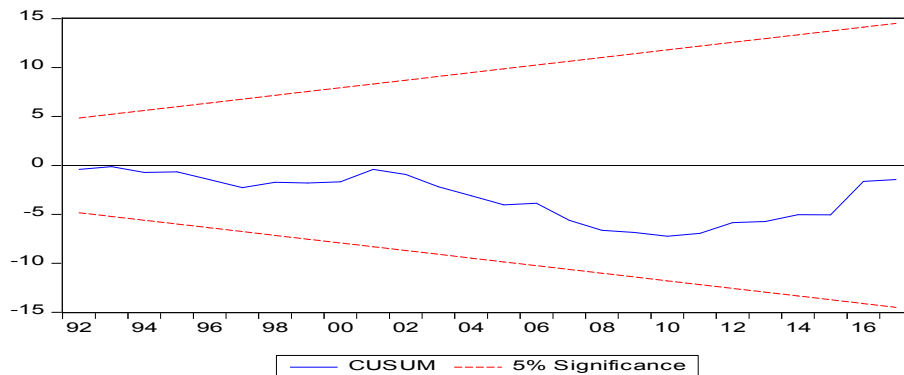
The Heteroskedasticity Test: Breusch-Pagan Test for Heteroskedasticity was conducted to test is the covariance of the estimated model error term is constant or not. The result suggests that a statistic of 0.589 is not statistically significant at 5 per cent level of significance, this implies that the null hypothesis of homoscedasticity could not be rejected; thus, there is evidence that the covariance of the error terms have a constant finite variance.

The Breusch-Godfrey Serial Correlation LM Test: The Breusch-Godfrey Serial Correlation LM Test was carried out to determine if successive error terms are correlated. The probability value of F-statistic of 0.883 is in favour of the null hypothesis that there is no serial correlation in the residuals up to the specified lag order at 5 percent significant level. Thus, the study concluded that the successive error terms were not correlated in the estimated model for economic growth and customs and excise duties.

Table 6. Full information on the effects of custom and excise duties on economic growth

Panel A: Long Run Estimates				
Dependent Variable: LGDP				
Variable	Coefficient	S.E	t-stat	Prob
C	4.641	2.638	1.760	0.090
LCED	1.192	0.253	4.719	0.000
Panel B: Short -Run Estimates				
Variable	Coefficient	S.E	t-stat	Prob
C	-0.165	0.050	-3.303	0.001
D(LCED(-1))	0.282	0.080	3.506	0.001
ECM(-1)	-0.088	0.014	-6.386	0.000
Panel C: Diagnostic Tests		Statistic	Prob.	
Bound Test		12.654	0.050	
Serial Correlation		0.125	0.883	
Heteroscedasticity		0.589	0.562	
Linearity Test		0.350	0.723	
R-square		0.344		
Stability Test		CUSUM		Stable

Notes: Table 6 reports the long-run estimates, short run estimates and the diagnostic tests for the relationship between customs and excise duties and economic growth. The dependent variable is the logarithm of gross domestic product and independent variable is the logarithm of customs and excise duties



Stability Test (CUSUM Residual Test): The CUSUM test for stability is meant to determine the appropriateness and the stability of the model. In addition, the CUSUM test is used to show whether the model is stable and is suitable for making long run decision. The CUSUM is also reported in Panel C. For the Sierra Leone, the CUSUM test also shows that the estimated model is stable; this is because the plot of CUSUM statistic stays within a 5% significance level portrayed by two straight lines.

4.4.4 Hypothesis four

Research Question: To what extent does value added tax affect economic growth in Sierra Leone?

Interpretation: The value of F-Stat is 5.630 and it is greater than the critical values bound at

upper bound (I1) of 4.26, 3.5 and 3.13 at 1 percent. This implies that the variables co-moved in the long run. Having found a long-run relationship between economic growth and value added tax, the study then estimates the long-run and the short-run elasticities. The empirical results for the model, obtained through normalizing economic growth and value added tax in the short and long run are reported in Table 7.

The Long-Run Dynamics: The estimated long-run coefficients (elasticities) for the UECM model are given in the tables Panel A of Table 7. In the long run, there is evidence of a positive relationship between economic growth and value added tax. This implies that increases in value added tax will lead to increase in the economic growth in Sierra Leone. Furthermore, there is

evidence of a long-run significant relationship between economic growth and value added tax in Sierra Leone ($\beta_1 = 0.643$, $t\text{-test} = 4.992$, $p < 0.05$). This implies that value added tax is a significant factor influencing changes in economic growth in Sierra Leone. Also, a 1 per cent increase in value added tax will lead to 0.643 per cent increase in economic growth in Sierra Leone in the long run. Thus, the null hypothesis that there is no significant effect of value added tax on economic growth in Sierra Leone was rejected and accept the alternative hypothesis that there is significant relationship that between value added tax on economic growth in Sierra Leone.

Short-run Dynamics: The purpose of this section is for two reasons. First, is to examine if changes and the statistical significance

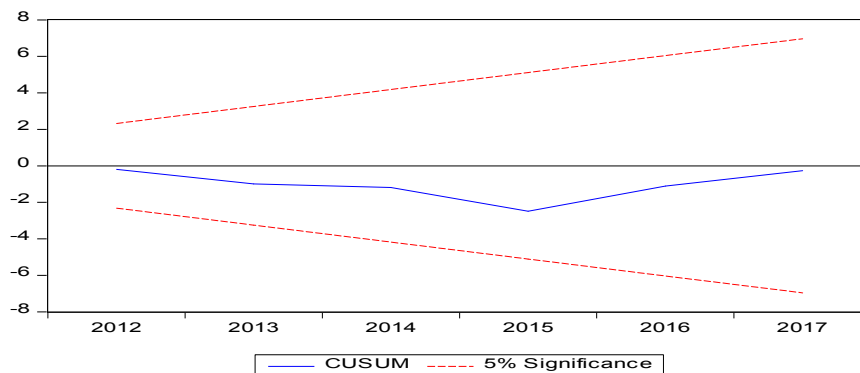
experienced in the long run also exist in the short run model. Second, is to examine the degree of adjustment back to equilibrium using the error correction term. The short-run adjustment process is measured by the error correction term ECM_{t-1} and it shows how quickly variables adjust to a shock and return to equilibrium. For stability, the coefficient of ECM_{t-1} should carry the negative sign and be statistically significant.

The result shows that in the short-term value added tax has a positive and significance relationship with the economic growth ($\beta_2 = 0.674$, $t\text{-test} = 2.580$, $p < 0.05$). In addition, the estimated coefficient for the ECM_{t-1} reported in Panel B of 4.7 is negative and statistically significant ($ECM = -0.779$, $t\text{-test} = -4.745$, $p < 0.05$). This implies that deviations from economic growth equilibrium path are corrected

Table 7. Full information on the effects of value added tax on economic growth

Panel A: Long Run Estimates				
Dependent Variable: LGDP				
Variable	Coefficient	S.E	t-stat	Prob
C	7.158	0.853	8.393	0.000
LVAT	0.643	0.129	4.992	0.003
Panel B: Short -Run Estimates				
Variable	Coefficient	S.E	t-stat	Prob
C	-0.997	0.422	-2.365	0.056
D(LVAT(-1))	0.560	0.416	1.346	0.227
D(LVAT(-2))	0.674	0.261	2.580	0.042
ECM(-1)	-0.779	0.164	-4.745	0.003
Panel C: Diagnostic Tests		Statistic	Prob.	
Bound Test		5.630	0.050	
Serial Correlation		1.290	0.369	
Heteroscedasticity		0.870	0.584	
Linearity Test		1.056	0.339	
R-square		0.723		
Stability Test		CUSUM		Stable

Notes: Table 7 reports the long-run estimates, short run estimates and the diagnostic tests for the relationship between value added tax and economic growth. The dependent variable is the logarithm of gross domestic product and independent variable is the logarithm of value added tax



by nearly 78 per cent over the following year. In other words, the adjustment process is slow for Sierra Leone. The statistical significance of the ECM_{t-1} confirms the presence of long-run equilibrium relationship between economic growth and value added tax in Sierra Leone. The R-square is 0.72; this implies that value added tax explains about 72 per cent changes in economic growth, while the remaining 28 per cent were other factors affecting changes in economic growth but were not captured in the model.

Diagnostic Test:

The Linearity Test: The linearity assumption of ARDL test was estimated using **Ramsey Reset Test**, F-statistics of 1.056 and its p-value is being greater than 5 per cent chosen level of significance, thus the null hypothesis of linearity cannot be rejected. This implies that the model is correctly specified and that there is a linear relationship between the economic growth and value added tax in Sierra Leone.

The Heteroskedasticity Test: Breusch-Pagan Test for Heteroskedasticity was conducted to test if the covariance of the estimated model error term is constant or not. The result suggests that a statistic of 0.870 is not statistically significant at 5 per cent level of significance, this implies that the null hypothesis of homoscedasticity could not be rejected; thus there is evidence that the covariance of the error terms have a constant finite variance.

The Breusch-Godfrey Serial Correlation LM Test: The Breusch-Godfrey Serial Correlation LM Test was carried out to determine if successive error terms are correlated. The probability value of F-statistic of 0.369 is in favour of the null hypothesis that there is no serial correlation in the residuals up to the specified lag order at 5 percent significant level. Thus, the study concluded that the successive error terms were not correlated in the estimated model for economic growth and value added tax.

Stability Test (CUSUM Residual Test): The CUSUM test for stability is meant to determine the appropriateness and the stability of the model. In addition, the CUSUM test is used to show whether the model is stable and is suitable for making long run decision. The CUSUM is also reported in Panel C. For the Sierra Leone, the CUSUM test also shows that the estimated

model is stable; this is because the plot of CUSUM statistic stays within a 5% significance level portrayed by two straight lines.

4.4.5 Hypothesis five

Research Question: To what extent does road tax affect economic growth in Sierra Leone?

Interpretation: The value of F-Stat is 6.087 and it is greater than the critical values bound at upper bound (I1) of 4.26, 3.5 and 3.13 at 1 percent. This implies that the variables co-moved in the long run. Having found a long-run relationship between economic growth and road tax, the study then estimate the long-run and the short-run elasticities. The empirical results for the model, obtained through normalizing economic growth and road tax in the short and long run are reported in Table 8.

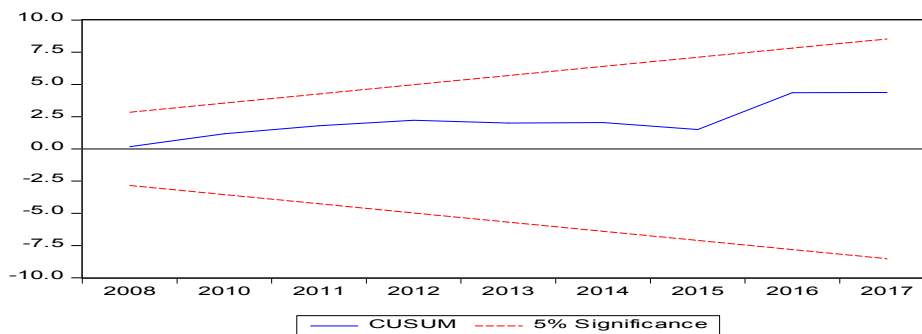
The Long-Run Dynamics: The estimated long-run coefficients (elasticities) for the UECM model are given in the tables Panel A of Tables 8. In the long run, there is evidence of a positive relationship between economic growth and road tax. This implies that increases in road tax will lead to increase in the economic growth in Sierra Leone. Furthermore, there is evidence of a long-run significant relationship between economic growth and road tax in Sierra Leone ($\beta_1 = 1.987$, t-test= 2.836, $p < 0.05$). This implies that road tax is a significant factor influencing changes in economic growth in Sierra Leone. Also, a 1 per cent increase in road tax will lead to 1.987 per cent increase in economic growth in Sierra Leone in the long run. Thus, the null hypothesis that there is no significant effect of road tax on economic growth in Sierra Leone was rejected and accept the alternative hypothesis that there is significant relationship that between road tax on economic growth in Sierra Leone.

Short-run Dynamics: The purpose of this section is for two reasons. First, is to examine if changes and the statistical significance experienced in the long run also exist in the short run model. Second, is to examine the degree of adjustment back to equilibrium using the error correction term. The short-run adjustment process is measured by the error correction term ECM_{t-1} and it shows how quickly variables adjust to a shock and return to equilibrium. For stability, the coefficient of ECM_{t-1} should carry the negative sign and be statistically significant.

Table 8. Full information on the effects of road tax on economic growth

Panel A: Long Run Estimates				
Dependent Variable: LGDP				
Variable	Coefficient	S.E	t-stat	Prob
C	-2.624	6.171	-0.425	0.681
LRT	1.987	0.700	2.836	0.020
Panel B: Short -Run Estimates				
Variable	Coefficient	S.E	t-stat	Prob
C	-0.257	0.066	-3.871	0.004
D(LRT(-1))	-0.033	0.077	-0.428	0.669
ECM(-1)	-0.234	0.072	-3.271	0.000
Panel C: Diagnostic Tests		Statistic	Prob.	
Bound Test		6.087	0.050	
Serial Correlation		1.604	0.251	
Heteroscedasticity		1.162	0.356	
Linearity Test		1.156	0.281	
R-square		0.093		
Stability Test		CUSUM	Stable	

Notes: Table 8 reports the long-run estimates, short run estimates and the diagnostic tests for the relationship between road tax and economic growth.. The dependent variable is the logarithm of gross domestic product and independent variable is the logarithm of road tax



The result shows that in the short-term road tax has a negative and insignificant relationship with the economic growth ($\beta_2 = -0.033$, $t\text{-test} = -0.428$, $p > 0.05$). In addition, the estimated coefficient for the ECM_{t-1} reported in Panel B of 4.8 is negative and statistically significant ($ECM = -0.234$, $t\text{-test} = -3.271$, $p < 0.05$). This implies that deviations from economic growth equilibrium path are corrected by nearly 23 per cent over the following year. In other words, the adjustment process is slow for Sierra Leone. The statistical significance of the ECM_{t-1} confirms the presence of long-run equilibrium relationship between economic growth and road tax in Sierra Leone. The R-square is 0.09; this implies that road tax explains about 9 per cent changes in economic growth, while the remaining 91 per cent were other factors affecting changes in economic growth but were not captured in the model.

Diagnostic Test:

The Linearity Test: The linearity assumption of ARDL test was estimated using **Ramsey Reset Test**, F-statistics of 1.156 and its p -value is being greater than 5 per cent chosen level of significance, thus the null hypothesis of linearity cannot be rejected. This implies that the model is correctly specified and that there is a linear relationship between the economic growth and road tax in Sierra Leone.

The Heteroskedasticity Test: Breusch-Pagan Test for Heteroskedasticity was conducted to test if the covariance of the estimated model error term is constant or not. The result suggests that a statistic of 1.162 is not statistically significant at 5 per cent level of significance, this implies that the null hypothesis of homoscedasticity could not be rejected; thus there is evidence that the

covariance of the error terms have a constant finite variance.

The Breusch-Godfrey Serial Correlation LM Test: The Breusch-Godfrey Serial Correlation LM Test was carried out to determine if successive error terms are correlated. The probability value of F-statistic of 0.251 is in favour of the null hypothesis that there is no serial correlation in the residuals up to the specified lag order at 5 percent significant level. Thus, the study concluded that the successive error terms were not correlated in the estimated model for economic growth and road tax.

Stability Test (CUSUM Residual Test): The CUSUM test for stability is meant to determine the appropriateness and the stability of the model. In addition, the CUSUM test is used to show whether the model is stable and is suitable for making long run decision. The CUSUM is also reported in Panel C. For the Sierra Leone, the CUSUM test also shows that the estimated model is stable; this is because the plot of CUSUM statistic stays within a 5% significance level portrayed by two straight lines.

5. CONCLUSION

The study concluded that tax revenue has significant effect on the economic growth of Sierra Leone, although Companies Income Tax (CIT), Custom Excise Duties (CED) and Road Taxes have not contributed positively to economic growth of this nation over the period of study.

Based on the findings and conclusion of this study, some suggestions were drawn:

1. The introduction of the Tax Identification Number ((TIN)) which is a registration and storage of taxpayers 'data in Sierra Leone is a welcome idea but for it to be successful it should be structured in such a way that will make all potential tax payers liable. Citizens and companies should be able to operate bank accounts only if they have TIN numbers. Government parastatals, multinationals, conglomerates and companies in the country should not engage any vendor who does not have a TIN number. This will go a long way in reducing Tax evasion.
2. The tribunal recommended by the Tax Act should be established to reduce cases of tax evasion and remittance of tax collections especially custom and excise

duties which reported a low impact on GDP. Only professionals and trustworthy hands should be responsible for tax administration.

3. All taxes should be remitted via an e-payment system or via direct payment to the various tax authorities accounts. This will enhance and support the cashless economy system introduced recently.
4. Tax Clearance Certificates and other tax documents used in government transactions should be referred back to the relevant revenue authority for authentication.
5. The government should ensure that taxes are accounted for to the public via print and electronic media. The intent of government with such tax should be communicated to the general public. In so doing, a separate body should be set up to inspect and ensure that the funds generated by government through tax at each level of government is properly used and any level of government that fails to utilise such taxes as communicated to the public should be charged to court.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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