IMPACT OF TAX REVENUE ON INFRASTUCTURAL DEVELOPMENT IN NIGERIA

BY

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NSU/M.Sc/ECO/0106/16/17

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TITLE PAGE

IMPACT OF TAX REVENUE ON INFRASTUCTURAL DEVELOPMENT IN NIGERIA: 1987-2019

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ACHUKWU MARK ADAH

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A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, NASARAWA STATE UNIVERSITY KEFFI, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE (M.Sc) DEGREE IN ECONOMICS,

DEPARTMENT OF ECONOMICS

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CERTIFICATION

The Dissertation, **"Impact of Tax Revenue on Infrastructural Development in Nigeria. 1987-2019,"** meets the regulations governing the award of Masters of Science (M.Sc.) Degree in Economics of the school of postgraduate studies, Nasarawa State University, Keffi, and it is approved for its contribution to knowledge.

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DEDICATION

The dissertation is dedicated to the Almighty God, Engr. John O. Achukwu, Mrs. Grace Achukwu and the entire Achukwu family.

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My first and foremost, praises and thanks goes to God Almighty for His Showers of blessings throughout my M.Sc research work. My sincere appreciation goes to My Dad, Engr. John O. Achukwu, for giving me the opportunity to undertake my Maters (M.Sc) degree Programme and also encouraging me to stay focus throughout the Programme. I am eternally grateful to Him. I am equally grateful to my Mum, Mrs. Grace Achukwu, for her support throughout the period of undertaking this research work and much more. I deeply appreciate her.

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My special thanks go to all the staff of Nasarawa State University and my friends for the keen interest and support shown to complete this dissertation successfully. Finally, I want to thank all those that supported me in this programme but cannot be mentioned here, May God bless them all.

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ABSTRACT

The study examined the effect of tax revenue on infrastructural development in Nigeria. This study used an annual time series data ranging from 1987 to 2019, obtained from the Central Bank of Nigeria (CBN) and the Federal Inland Revenue Service (FIRS) publications. The variables in the model include infrastructural development (INFD) as the dependent variable while companies income tax (CIT), petroleum profit tax (PPT), customs and excise duties (CED) were captured in the model as the explanatory variables. The study employed autoregressive distributed lag (ARDL) model to analyze the time series data. It was found that companies income tax (CIT), petroleum profit tax (PPT), customs and excise duties (CED) have a long and short run impact on infrastructural development. Finding from the study revealed that companies income tax (CIT) and petroleum profit tax (PPT) were statistically insignificant on infrastructural development while custom and excise duties (CIT) was statistically significant on infrastructural development. Finding from the ARDL regression result also shows that the coefficients of petroleum profit tax (PPT) and custom and excise duties (CIT) were negative to infrastructural development (INFD) while the coefficients of companies income tax (CIT) was positive to infrastructural development (INFD). In view of the findings, the study recommends tax policymakers such as the Federal Inland Revenue service (FIRS) and other tax regulatory bodies to strengthen their regulations on tax compliance. Government should improve its tax revenue mechanism that will impact positively on government expenditure such as infrastructural amenities provision across the country. There should also be accountability and transparency from government officials on the management of revenue derived from the various components of taxation particularly petroleum tax that directly concerns individuals in the society. Moreso, there is a need for increased citizens' awareness in terms of their tax obligation and civic responsibilities.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The increasing cost of running government coupled with dwindling revenue has led various state governments in Nigeria to formulating strategies to improve revenue base.

More so, the near collapse of the national economy has created serious financial stress for all tiers of government. Despite the numerous sources of revenue available to the various tiers of government as specified in the Nigeria 1999 constitution, since the 1970s till now, over 80% of the annual revenue of the three tiers of government comes from petroleum. However, the serious decline in the price of oil in recent years has led to a decrease in the funds available for distribution to the states. The need for state and local government to generate adequate revenue from internal sources has therefore become a matter of extreme urgency and importance. This need underscores the eagerness on the part of state and local government and even the federal government to look for new sources of revenue or to become aggressive and innovative in the mode of collecting revenue from existing sources (Onaolapo, Fasina, &Adegbeti, 2013).

For the growth and development of any nation, it is expedient that it has infrastructural facilities, it mean all activities that fall under the ambit of "Social Overhead Capital (SOC)". According to World Bank (1994) SOC include public utilities such as power, telecommunication, water supply sanitation sewerage as well as public works such as road, dams and drainage. Put differently, infrastructure may be argued to include all public services meant to serve the populace (e.g., provision of law and order, education,

healthcare transportation and telecommunication, power, drainage etc.) In Africa, evidence abounds as to the deficiency in infrastructure and this has inhibited growth and development in the continent. According to Foster and Brecenogarmedian (2010), most African countries lag behind other developed countries. In addition, the United Nation (2010) assert that 884 million people lack asses to potable water and 2.6 billion people lack access to basic sanitation service. Infrastructure is very important to a country's development prospect. The adequacy of infrastructure may determine a country's success or failure in diversifying production, coping with population growth, reducing poverty, improving welfare of citizen (Mobolaji & Wale 2012). Thus, every country strives for infrastructural development and to achieve this, they need revenue and thus engage in revenue mobilization which may be domestic or foreign. In recent times, revenue mobilization in developing countries has become imperative, Revenue mobilization and generation is a major requirement needed by countries for the actualization of sufficient finance. Nigeria was primarily an economy, whose revenue generation was based on agricultural. This was before the discovery of oil by the British in the Niger Delta in the late 1950's (Onaolapo, Fasina, &Adegbeti, 2013). Due to the instability in oil prices, globalization and forces of demand and supply of oil, the state government has been forced to seek other sources of revenue. One of these sources is taxation.

Taxation has become a vital source of revenue to the government because of its consistency. In Nigeria taxation has been in existence even before the coming of the colonial men or the British (Samuel & Tyokoso, 2014). According to Oriakhi (2013) revenue from tax contribute significantly to the state collected revenue since the creation of the state. Tax is seen as a burden which every citizen must bear to maintain his or her

government because the government has certain functions to carry out for the benefit of those it governs (Afuberoh & Okoye, 2014) one of such functions is the provisions of infrastructure. Taxes are not only imposed for revenue generation sake, but also to influence activities (Oriakhi,2013) Similarly, Ola (2005) assert that taxes serve as an instrument for correcting inflation and deflation, balance of payment deficit and redistribution of income among others.

Despite the amount of money generated by government through tax revenue, development in Nigeria still remains a dream as poverty, unemployment, low standard of living and poor infrastructural facilities still lingers at a very high rate (Nwite, 2015). Alabi and Ocholi (2010) opine that the state infrastructure in Nigeria is in shamble; similarly, the World Bank (2002) reports that Nigeria had inadequate infrastructure compared to other countries of the world. According to the survey by the World Bank, top on the list of inadequate infrastructures in Nigeria are pipe born or portable drinking water, road network, waste management and power Although in recent years, Nigeria has experienced increase in infrastructural transformation in terms of building of more schools, road, and telecommunication facilities, it is nowhere near what is required of it (Owolabi, 2015).

Virtually all government programmes delivery to people are not profit oriented, they are more of humanitarian hence it is through the tax realized from the citizens that government deploys to fund such programmes. The role of taxation is to fund government in order to protect the natural right of the citizens, through the provision of infrastructural facilities.

1.2 Statement of the Problem

Among the many problems confronting tax administration in Nigeria, it is how to ensure voluntary compliance on the part of the tax payers. Tax being a commodity nobody wants to buy; the tax man is hardly liked by tax payers who perceive him as government tax collector. The problem of a tax man is worsened by poor performance of most state governments in terms of provision of amenities for the taxpaying public. Lack of confidence and mutual distrust in government represented here by tax man, gave rise to voluntary compliance difficulties.

Tax laws in Nigeria are complex and difficult for the common tax payers to understand, and some cases are problematic even for literate officials. In addition to lack of understanding, many tax payers are unaware of the existence of certain tax. This coupled with lack of information, laziness of tax official, uncooperative tax payers and the habit of 'quick-fix' solution encourages the use of the best of judgment approach. This may be a manifestation of the poor tax education and weak fulfillment by tax authorities of their responsibilities with regards to public awareness.

Many individuals and corporate organizations have argued that tax revenue is not judiciously used in Nigeria and thereby deliberately either evaded or even avoided tax. They often argued that the level of infrastructural development does not in any way justify the tax revenue collected by the Federal Government. This situation has often led government to lose a quantum of its revenue which would have been used in infrastructural development in the state (Joint Tax Board, 2010).

This study has therefore sought to empirically review the discordant submission by appraising the impact of tax revenue on infrastructural development in Nigeria in general and thus the reason for this study.

1.3 Research Questions

Based on the problems stated, the study tends to address the following research questions;

i. What is the impact of companies' income tax on infrastructural development in Nigeria?

ii. What is the impact of petroleum profit tax on infrastructural development in Nigeria?

iii. What is the impact of customs and excise duties on infrastructural development in Nigeria?

1.4 Objectives of the Study

The broad objective of this study is to assess the impact of tax revenue on infrastructural development in Nigeria. To achieve this, other specific objectives are to;

i. Examine the impact of companies' income tax on infrastructural development in Nigeria.

ii. Examine the impact of petroleum profit tax on infrastructural development in Nigeria.

iii. Determine the impact of customs and excise duties on infrastructural development in Nigeria.

1.5 Research Hypotheses

$H0_1$: Companies' income tax has no significant impact on infrastructural development in Nigeria.

$H0_2$: Petroleum profit tax has no significant impact on infrastructural development in Nigeria.

$H0_3$: Customs and excise duties have no significant impact on infrastructural development in Nigeria.

1.6 Significance of the Study

This study is essential to policy makers to know more about the relationship between tax and infrastructural development. The findings of the study will help the government to provide the necessary human and material infrastructure to support the seamless tax collection so they can earn more income that boast taxation to enhance infrastructural development in Nigeria.

This study would serve as an extension to the earlier researches on the impact of tax revenue on infrastructural development in Nigeria which in some cases have mixed results. Lastly, the study will provide a framework on which further research on the relationship between tax revenue and infrastructural development could be carried out.

1.7 Scope of the Study

This study is confined to the impact of tax revenue on infrastructural development in Nigeria covering between the periods of 1987 to 2019 (33 years). The study is restricted to the following determinants of tax revenue; companies' income tax, petroleum profit

tax, custom and excise duties to determine its impact on Infrastructural Development in Nigeria.

1.8 Organization of the Study

This study was organized into five chapters. Chapter one serves as the introduction consisting of the background to the study, statement of the problem, research questions, objectives of the study, research hypotheses, significance of the study, scope of the study, and organization of the study.

Chapter two deals with literature review. The issues reviewed consist of conceptual review, theoretical review, empirical review and gaps in the literature.

Chapter three centered on research methodology comprising of research designs, theoretical framework, model for the study, model specification, a priori expectations, definition of variables, nature and sources of data, method of data analysis and justification of model used.

Chapter four centered on data presentation, interpretation and analysis comprising of descriptive statistics, unit root result, co-integration, error correction mechanism result, ARDL regression result, statistical test of hypotheses, post-estimation results and discussion of findings.

Finally, chapter five deals with summary, conclusion and recommendations which comprise of summary of major findings, conclusions, recommendations, limitations to the study, contribution to knowledge and suggestion for further studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Concept of Taxation

Several definitions of tax appear in the economic literature. These definitions do not really vary as the same thought runs through all of them.

Taxation is the inherent power of the state, acting through the legislature, to impose and collect revenues to support the government and its recognized objects. Simply stated, taxation is the power of the State to collect revenues for public purpose (Margaret, Charles and Kaka, 2014). According to Jhingan (2004), tax is a compulsory contribution imposed by a public authority, irrespective of the exact amount of service rendered to the tax payer in return. Cornelius, Ogar and Oka (2016) described tax as a compulsory contribution from a person to the government to defray the expenses incurred in the common interest of all, without reference to the special benefits conferred. It is a compulsory contribution imposed by government on private persons, groups and institutions within the country. Since it is a compulsory payment, a person who refuses to pay a tax is liable to punishment.

A tax is a payment made by the tax payers which is used by the government for the benefit of all citizens. The state uses the revenue collected from taxes for providing economic, social, educational, health and general administrative services which benefit all people. Tax is not levied in return for any specific or direct services rendered by the government to the payer.

It can be said that tax is a compulsory payment of money to government by individuals, groups and corporations. It can be levied on wealth income or as surcharged on prices. Or taxation can simply be seen as compulsory transfer or payment of money from private, individuals, institutions or groups to the government.

According to Gopar, Dalyop and Yusuf (2016), the objectives of taxation include: to raise revenue for the government; to encourage even development; to control and regulate the production of certain goods and services; to check the cyclical fluctuations in income and employment; to redistribute income; to check Inflationary pressures on the economy; to regulate the consumption of certain commodities; to influence the method and kind of business; to prevent the phenomenon of dumping; to protect infant industries from undue competition from foreign firms; to control monopoly and monopolistic tendencies in the economy; to allocate resources among the various sectors and agents in the economy; as well as to maintain balance in the nation's foreign accounts. These objectives are with a view to enhancing optimal performance of the economy.

The imposition and payment of taxes elicit some responses from individuals and companies, the imposition of tax engenders distortions in the production, employment, consumption, wealth distribution and other variables in the economy (Audu and Simon, 2015). These distortions which are collectively called the effects of tax could have varying implications for the economy.

2.1.2 Companies Income Tax

Dike (2014) refers to company income tax is a corporation tax. It is claimable at a rate of 30% on the profits of all registered corporate entities other than those engaged in petroleum operations. Corporate taxation is relatively straightforward in a closed

economy, but it becomes more complex when companies operate in different countries (Zucman, 2014). Although, company income tax is not the largest contributor of tax revenue in Nigeria, it is one of the major taxes collected by the federal government and it help in the provision of revenue for the development of some key sectors in Nigeria. By paying their taxes, companies get to enjoy some essential services from the government like the construction of better road networks, effective and efficient telecommunication, electricity and water supply. Government also develops human resources by establishing universities and college of technology, which ensures the efficient and effective running of their business. And so, the amounts of the tax that these companies pay should represent a key element of the contribution that they make to the economy as they operate (Adegbite, 2015).

2.1.3 Petroleum Profit Tax (PPT)

Petroleum profit tax of 50% & 85% is imposed on the profits of all corporate entities engaged in upstream petroleum operations registered in Nigeria or those that derive income from oil and gas operations in Nigeria (Dike, 2014). The Petroleum Profit Tax is regulated by the Petroleum Profit Tax Act of 2007 as amended. In 2009, petroleum profit tax attracted 85% tax rate on export and 65.75% on domestic sale of oil & gas (Ogbonna &Appah 2012). The petroleum industry is seen as the largest and main generator of GDP in Nigeria, which is the most populous in the African nations (Onaolapo, Fasina, & Adegbite, 2013). The contribution of the petroleum industry can be evaluated in terms of its share of revenue generation in the Nigerian economy.

The petroleum industry has contributed tremendously in both foreign exchange reserves and government revenues (Onyemaechi 2012). It has been established that the PPT is the

largest contributor to the tax revenue of Nigeria; therefore, it might be safe to conclude that it is also one of the main contributors to the development of infrastructural facilities in the country. Azaiki and Shagari (2007) observe that countries that are blessed sufficiently to have petroleum, can base their development on this resource. They also point to the prospective benefits of improved economic growth and the creation of jobs, increased government revenues to finance poverty alleviation, the transfer of technology, the development of infrastructure and the encouragement of related industries.

2.1.4 Value Added Tax (VAT)

Value added tax (VAT) is a consumption tax. It is levied at each stage of the consumption chain and borne by the final consumer of the product or service (Onwuchekwa, &Aruwa, 2014). Value Added Tax can be seen as the incremental value, which a producer, using labour, contributes to his raw materials of purchases before selling the processed goods or services (Okoli and Afolayan, 2015).

In Africa, VAT has been introduced in countries such as Benin- Republic, Cote d"Ivore, Kenya, Madagascar, Mauritius, Senegal, Togo, and Nigeria. In these countries, it is observed that VAT has become a major contributor to government revenue (Ajakaiye, 2000; Shalizi & Squire, 1988; Adereti, Sanni & Adesina, 2011). In Nigeria in particular, VAT was introduced in 1993; though implementation began in 1994 on a full scale (Onwuchekwa & Aruwa, 2014). It is claimable by the government at a rate of 5% of the value goods and services and therefore, the lowest worldwide despite the series of amendment to the Act (Abiola, 2014). Onoh (2013) asserts that Value added tax (VAT) is an ideal form of taxation and has contributed immensely to infrastructural development in

Nigeria. Okoli and Afolayan (2015) in their study, revealed that VAT should be the second-long term source of the total federally collected revenue in Nigeria.

2.1.5 Education Tax

The education tax decree No. 7 of 1993 stipulates the payment of 2% of assessable profits of companies registered in Nigeria as education tax, which is to be disbursed according to the ratio of 50:40:10 to higher, primary, and secondary education respectively. The share of higher education is further allocated to the universities, polytechnics, and colleges of education in the ratio 2:1:1 respectively (Ajayi and Alani, 1996). In 1995, the government established the education tax fund in which companies with more than 100 employees contribute 2% of their pretax earnings to the fund. Primary education receives 40% of these funds, secondary education receives 10%, and higher education receives 50% (Teboho, 2000). The assessment of education tax goes together with the company income tax. Defaulters are to pay 5% plus interest at commercial rate for non-compliance (Abiola & Asiweh, 2012).

Operation of the Education Tax Fund (ETF) was amended by Act No. 40 of (22nd Dec.) 1998 because of the widely recognized decline in educational standards and the deep rot in infrastructure and other facilities at all levels of the Nigerian educational system (Ugwuanyi, 2014). The ETF ensures that funds generated from education tax are utilized to improve the quality of education in Nigeria by providing funding for educational facilities and infrastructural development, promoting creative and innovative approaches to educational learning and services, stimulating, supporting and enhancing improvement activities in educational foundation areas like teacher education, teaching practice, library

development etc., and chmpioning new literacy-enhancing areas such as scientific, information and technology literacy (Ugwuanyi, 2014).

2.1.6 Infrastructural Development

Infrastructure is generally seen as those basic and essential services that should be in place for development to occur. Waziri, Ali and Nuru (2014) note that the physical structures necessary for the functioning of society can also be seen as infrastructure. Oisasoje and Ojeifo (2012) describe infrastructure as those specific elements that serve as catalyst for development, as well as improvement in welfare of citizens. Infrastructural development holistically can be seen as sustained rates of growth of income per capita. Infrastructural development in any country is the fulcrum for sustainable development and this can only be achieved through the readiness of the concerned tax remitting institution in Nigeria.

Infrastructure is generally seen as those and essential services that should be in place if development. Waziri, Ali and Nuru (2014) note that the physical structure necessary for the functioning of society can also be seen as infrastructure. Oisasoje and Ojeifo (2012) describe infrastructure as those specific elements that serve as catalyst for development, as well as improvement in welfare of citizens.

Infrastructural development holistically can be seen as sustained rate of growth of income per capital. Todaro and Smith (2011) is of the view that infrastructural development can be facilitated and accelerated by the presence of physical, social and economic infrastructure. If these facilities and services are not in place, development will be a near impossibility (Migap, 2014).

Infrastructural development is the aggregate of the facilities and social amenities which are provided to enhance the standard of living of the citizenry. The amenities could be in the form of pipe born water, good roads, good educational facilities, befitting health care centers, qualified teachers and teaching facilities provided. According to Afuberoh and Okoye (2014), the primary economic goals of developing countries are to increase the rate of economic growth and hence per capital income, which leads to a higher standard of living.

2.2 Theoretical Review

2.2.1 Diffusion Theory of Taxation

According to diffusion theory of taxation, under perfect competition, when a tax is levied, it gets automatically equitably diffused or absorbed throughout the community. Advocates of this theory, describe that when a tax is imposed on a commodity by state, it passes on to consumers automatically (Karras, 1999). Every individual bear burden of tax according to his ability to bear it. For instance, a specific tax is imposed on sew cloth. Manufacturer raises prices of commodity by the amount of tax. Consumers buy commodity according to their capacity and thus share burden of tax. In the words of Mansfield (1986) "It is true that a tax laid on any place is like a pebble falling into a lake and making circles till one circle produces and gives motion to another". This quotation explains that just as a pebble gets diffused in a lake, similarly a tax imposed on a commodity is also absorbed and its burden is felt equally among various sections of community (Musgrave and Musgrave, 1994). Advocates of this theory assume perfect competition in the market but in world of reality, it is imperfect competition which prevails. If tax gets automatically diffused through the community, then most of worries

of policymakers will be over. Government will simply impose tax and collect money from people without worrying about final resting place of a tax. In actual practice we find that taxes do not get distributed equally. Some taxes remain where they are imposed first and some are partly or wholly shifted on to the consumers. Diffusion theory of taxation has however been criticized. The diffusion theory of taxation has never gained any importance in the world of reality. It has never been seen that a tax gets automatically equitably distributed among people. It is true that in some taxes, diffusion or absorption does take place but that too is not throughout the community. Accordingly, another criticism of the theory of taxation is that there are few taxes like income tax, inheritance tax, toll tax in which there is no absorption at all.

2.2.2 Benefit Theory of Taxation

According to the Benefit theory of Taxation Propounded by Cooper (1994), 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 he should pay to the government. If, in accordance with the "benefits theory of taxation," we conceive of taxes as payments in exchange for government services, perhaps states should be obliged to confer personal tax benefits on residents who contribute to their tax coffers (Jhingan, 2004). The benefits theory would imply that a resident should be able to collect personal tax benefits to the extent that her tax payments to the source state exceed the money value of any source state government benefits she already receives, including infrastructure, regulated labor and capital markets, and so on. Although intuitively attractive, the benefits theory of taxation suffers from several major draw backs. First, it would be impossible to implement precisely due to the difficulty of determining the amount of

government benefits, including diffuse benefits such as military protection received by each resident and non-resident taxpayer. Second, the benefits theory does not accord with modern understandings of income taxation. In a purely domestic context, states generally do not condition government benefits upon recipients" payment of taxes. Indeed, taxpayers receiving the largest government benefits may be those who, due to their needy circumstances, pay the least taxes. Third, if the state maintains a certain connection between the benefits conferred and the benefits derived (Nwezeaku, 2005). It will be against the basic principle of the tax. A tax, as we know, is compulsory contribution made to the public authorities to meet the expenses of the government and the provisions of general benefit. There is no direct quid *pro quo* in the case of a tax. Fourth, most of the expenditure incurred by the state is for the general benefit of its citizens, it is not possible to estimate the benefit enjoyed by a particular individual every year. If we apply this principle in practice, then the poor will have to pay the heaviest taxes, because they benefit more from the services of the state. And if we get more from the poor by way of taxes, it is against the principle of justice.

2.2.3 Ability to Pay Theory

Ability to pay theory was propounded by Anyanfo in 1996. This theory state that citizens of a country should pay taxes to the government in accordance with their ability to pay. Rather than the benefits principle, the "ability-to-pay principle" generally dominates modern equity discussions. Under the ability to pay principle, people with higher incomes should pay more taxes than people with lower incomes. It appears very reasonable and just that taxes should be levied on the basis of the taxable capacity of an individual (Okafor, 2012; and Akwe, 2014). 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. It seems that if the taxes are levied on this principle as stated above, then justice can be achieved. But our difficulties do not end here. The fact is that when we put this theory in practice, our difficulties actually begin. The trouble arises with the definition of ability to pay. The economists are not unanimous as to what should be the exact measure of a person's ability or faculty to pay. The main viewpoints advanced in this connection are as follows:

(a) Ownership of Property

Some economists are of the opinion that ownership of the property is a very good basis of measuring one's ability to pay. This idea is out rightly rejected on the ground that if a personearns a large income but does not spend on buying any property, he will then escape taxation. On the other hand, another person earning income buys property; he will be subjected to taxation. It is therefore absurd and unjustifiable that a person, earning large income is exempted from taxes and another person with small income is taxed.

(b) Tax on the Basis of Expenditure

It is also asserted by some economists that the ability or faculty to pay tax should be judged by the expenditure which a person incurs. The greater the expenditure, the higher should be the tax and *vice* versa. The viewpoint is unsound and unfair in every respect. A person having a large family to support has to spend more than a person having a small family. If we make expenditure as the test of one's ability to pay, the former person who is already burdened with many dependents will have to' pay more taxes than the latter who has a small family. So, this is unjustifiable.

(c) Income as the Basis

Most of the economists are of the opinion that income should be the basis of measuring a man's ability to pay. It appears very just and fair that if the income of a person is greater than that of another, the former should be asked to pay more towards the support of the government than the latter. That is why in the modern tax system of the countries of the world, income has been accepted as the best test for measuring the "ability to pay" of a person.

2.3 Empirical Review

Aminu, Isah and Aliyu (2020) examined the Impact of State Government Revenues on Infrastructural Development in Bauchi State Nigeria. Secondary data was obtained from the government's Annual Financial Statements for the period 2006 to 2018. Ordinary Least Square regression was employed as the technique of analysis. The findings of the study revealed that share of allocation received from the federation account as well as debt both had a positive and significant influence in the provision of infrastructure while internally generated revenue, showed a negative and significant relationship. Other receipts comprising of contributions from Local Governments for the execution of joint projects as well as local and foreign grants and assistance received indicated a positive but insignificant relationship. The study recommends that policy makers should ensure a reasonable allocation of federation account revenues towards capital projects implementation. Efforts at the mobilization of internally generated revenue and grants should be intensified with funds realized used along with funding drawn from the Local Governments as well as proceeds of debts raised towards the provision of the infrastructural needs of the state.

Onwuka and Christian (2019) examined revenue generation as a tool for infrastructural development in Nigeria. Every government particularly the government of developing countries (including Nigeria) depends on revenue (oil and non-oil) for its economic growth and development. The objectives of this research were to determine the impact of revenue generated on infrastructural development in Nigeria and to determine the relationship between revenue generated and economic growth in Nigeria. Time series data were applied in carrying out this research work and the data were sourced from Federal Ministry of Finance, Office of the Accountant General of the Federation, Federal Republic of Nigeria Official Gazettes and the various States' Official Gazettes, Central Bank of Nigeria (CBN) and Nigeria Bureau of Statistics (NBS). Ordinary least square regression analysis was employed in this work with the use of STATA 13 economic package. The scope of the study is basically focused on Nigeria's total revenue generated; infrastructural development and economic growth from 1981 to 2018.The findings of this work reveal that revenue generated have significant effect on infrastructural development in Nigeria. Also, it was concluded that revenue generated have significant effect on economic growth in Nigeria. The study recommends that that the government should intensify efforts in its revenue drive. This intensified drive should be geared toward boosting non-oil revenue like taxation owing to the unpredictability of the oil market.

Oliver, Edeh and Chukwuani (2017) examined the effect of Federal Government of Nigeria's Tax resources on infrastructural development of Nigeria. Income from Value Added Tax (VAT), Petroleum Profit Taxes (PPT) was used as proxies for Tax revenues/resources while Infrastructural Development was applied as proxy for Infrastructural Development of Nigeria. The research adopted ex-pos-facto research

design as secondary data were used for the analysis. Data were sourced from the Central Bank of Nigeria Statistical Bulletin and the Federal Statistical Bureau. The study covered ten-year period (2006-2015). Data were analyzed using the multiple linear regression technique. The result reveals tax revenue resources (PPT, CIT and VAT) had positive and insignificant effect on Infrastructural Development in Nigeria. The study recommends that government should provide the necessary human and material infrastructures that are needed to support seamless tax collection so they can earn more income that will boost taxation to enhance infrastructural development in Nigeria.

Oliver, Edeh and Chukwani (2017) carried out a study to investigate the relevant of tax revenue resources to infrastructural development in Nigeria. The objective of the study is to examine the effect of federal government tax resources on infrastructural development in Nigeria. The study adopted ex-post-factor research design and a secondary data used for the analysis. The study covered ten years period (2006-2015). Data were analyzed using the multiple linear regression technique. The result reveals that tax revenue resources (PPT, CIT and VAT) had a positive insignificant effect on infrastructural development of Nigeria.

Anyaduba and Aronmwan (2015) carried out a study towards investigating the impact of tax revenues collected by the government on infrastructural development in Nigeria. This study restricts itself to taxes collected by the federal government of Nigeria. The longitudinal research design was used. The choice for using longitudinal research design is based on the observation of variables over a period of time (1980 to 2014). The hypotheses raised were evaluated using the Error Correction Model. Variables used in the model include; gross domestic product (GDP) as the dependent variable while the

explanatory variables are; Petroleum Profit Tax (PPT), Companies Income Tax (CIT), Value Added Tax (VAT), Education Tax (ET), Personal Income Tax (PIT), Custom and Excise Duties (CED).The findings shows that CIT and ET have significant impact on the level of infrastructural development while PPT, CED and VAT have non-significant impact. Based on these, the study recommends amidst others that the administration of taxes especially VAT should be done in a way that collection and remittance cannot be evaded so that its effect may be properly seen in the extent of infrastructural facilities and also, future researches can improve on this study by employing multi-proxy approach rather than the single proxy.

Chike (2013) assessed the effect of internal revenue generation on infrastructural development. The research methodology entailed the use of survey research design and purposive sampling method to select respondents from Lagos State Inland Revenue Office. Questionnaires and statistical data were instruments used for the study. Descriptive and inferential statistics were the statistical tool used for the analysis. The descriptive statistics involves the use of simple percentages while the inferential statistics involved the use of Spearman's Rank, which is to show the direction of relationship between variables in the study and to show the scale for the data that is interval. Two hypotheses were formulated and the Spearman's rank correlation analysis was used to test the relationship between internally generated revenue and infrastructural development. The result showed that there is a positive relationship between internally generated revenue and infrastructural development. The study also revealed the various methods of generating internal revenue, which are the enforcement of tax personnel, contribution, and creating awareness to the public. The findings of the study however

show that revenue administration agencies need to be reviewed to generate more revenue in the country. Finding from the study recommends that state government should embark on the establishment of some mini-size industries which will provide employment opportunities to the people. There should also be development and improvement in agricultural ventures like crop farming etc. the participation in agriculture will encourage the inhabitants of this local government area to improve their standard of living.

Worlu and Emeka (2012) examined the impact of tax revenue on the economic growth of Nigeria judging from its impact on infrastructural development from 1980 and 2007. The results show that tax revenue stimulates infrastructural growth through developments. That is, it highlights the channels through which tax revenue has no independent effect on growth through infrastructural development and foreign direct investment to positively respond to increase in output. However, tax revenues can only materialize it full potential on the economy if government can come up with fiscal laws and legislations and strengthen the existing ones in line with macroeconomic objectives, which will check-make tax offenders in order to minimize corruption, evasion, and tax avoidance. These will bring about improvement on the tax administration and accountability and transparency of government officials in the management of taxation revenue. Above all, these will increase the tax revenue with resultant increase in growth.

Ogbonna and Ebimobowei (2012) examined the impact of tax reforms on the economic growth of Nigeria from 1994 to 2009. The results from the various test shows that tax reforms are positively and significantly related to economic growth and that tax reforms grangers caused economic growth. On the basis of findings, the study concluded that tax reforms improve the revenue generating machine of government to undertake socially

desirable expenditure that will translate to economic growth cannot be attained with tax reform processes except obsolete tax laws and rates are reviewed in line with macroeconomic objectives, corrupt free and efficient tax administrative machinery with personnel's and accountability and transparency of government officials in the management of tax revenue.

Okafor (2012) explores the impact of income tax revenue on the growth of Nigeria as proxied by the Gross Domestic Product (GDP). The ordinary least square (OLS) regression analysis was adopted to explore the relationship between the GDP (the dependent variable) and a set federal government income tax revenue heads over the period 1981-2007. A simple hypothesis was formulated in the null which states that there is no significant relationship federally collected tax revenue and the GDP in Nigeria. The regression result indicated a very positive and significant relationship. However, actual tax revenue generated in most years fell below the level expected. The anomaly was attributed to dysfunctional in the income tax system, loop holes in tax law and inefficient tax administration. Suggestions were made as to strategies to be adopted to improve the system of tax administration to increase tax revenue generation.

Ebiringa and Emeh (2012) examined the empirical forms of tax on the economic growth in Nigeria. Secondary data were sourced within the period of 1998-2011 and model was specified and estimated using some econometric. The study showed that the determinant factor of economic growth in the country through tax, only custom and exercise duties is capable of influencing but has an inverse relationship and significant to the GDP. It is observed that economic instability were-experienced between 1986-1987 and 1993 to 1995 but evident in the stability in the economic growth from the graph in the rest of the

years of the study around bench mark vale of zero line of the GDP predicted graph based on tax generated or tax generations in Nigeria.

2.4 Gaps in the Literature

Studies have been carried out in the past by various scholars on tax revenue on infrastructural development from several nations of the world with varying emphasis made in Nigeria. From the empirical literature reviewed, one can see the existence of methodology and also time period gaps. Most of the studies reviewed used multiple regression and descriptive analysis while just little focus on ARDL model to see how linearly the determinants tax revenue has impacted on infrastructural development. Similarly, in terms of time none of the study covered the period up to year 2019. Hence this study extends the period of study to 2019 to include more current analysis to bridge the gaps on the impact of tax revenue on infrastructural development in Nigeria.

CHAPTER THREE

METHODOLOGY

3.1 Research Design

This chapter focuses on the methodology adopted in carrying out this research study. The aim is to examine the impact of tax revenue on infrastructural development in Nigeria. This work is a quantitative research which predicated on ex-post facto research design. Ex post facto design involves examining how an independent variable, present prior to the study, affects a dependent variable. In ex post facto research, the researcher takes the effect and examines the data retrospectively to establish causes, relationships or associations, and their meanings. Ex post facto design can be used to test hypothesis about cause and effect or correlational relationships that is not practical or ethical to apply a true experimental or even a quasi-experimental design. The research design uses data that are already collected, but not necessarily amassed for research purposes.

This research is essentially explanatory and it hinges on quantitative data analysis using econometric techniques. The approach involves the use of secondary data sources that was analyzed using an autoregressive distributed lag (ARDL) model. The collected data was subjected to diagnostic tests such as test of stationarity and test of cointegration, with a view to ascertaining their theoretical plausibility in relation to the modeling framework. The estimated model will also be evaluated based on appropriate econometric and statistical criteria.

3.2 Theoretical Framework

The theoretical framework for this study is built on the ability to pay theory of taxation. The choice of the theory owes much to its consistency with contemporary tax structure and its effective applicability in investigating the Nigerian tax system in relation to growth of the Nigerian economy.

3.2.1 Model for the Study

To examine the impact of tax revenue on infrastructural development in Nigeria, the study will make used of autoregressive distributed lag (ARDL) model approach as developed by Pesaran *et al* (2001) to empirically analysis the nexus between the dependent and independent variables. The logic behind the use of the approach are; first, ARDL can be applied regardless of whether the variables are stationary at level value I (0) or after first difference I (1) or combination of two mutually. Second, it can generate robust and reliable results even if the sample size is small or large. Finally, it generates long run and short run result at a time (Pesaran *et al,* 2001). This permits us to empirically answer the research questions, address the specific objectives, and to test the research hypotheses. The model for Autoregressive distributed lag model is express as follows;

$$Y= \beta_0 + \beta_1 Y_{t-1} + \ldots\ldots\ldots \beta_k Y_t\text{-}p + \alpha_0 xt + \alpha_1 xt\text{-}_1 + \alpha_2 xt_{-2} + \ldots\ldots\ldots \alpha_q xt\text{-}q + \varepsilon_t \qquad (3.1)$$

Where εt is the random disturbance term which is serially independent and assumed to be well behaved or constant.

3.3 Model Specification

To achieve the objective of this study by examining the impact of tax revenue on infrastructural development in Nigeria, the study adopt autoregressive distributed lag (ARDL) model approach as developed by Pesaran *et al* (2001) to empirically analysis the nexus between the dependent and independent variables. The dependent variable will be measure by infrastructural development (proxied as capital expenditure on infrastructures) while the independent variable known as tax revenue will be measure by different determinants such as companies' income tax (CIT), Petroleum Profit Tax (PPT), Customs and Excise Duties (CED).

Since the study intends to examine the impact of tax revenue on infrastructural development in Nigeria, the model for the variables in equation 3.1 was modified to have the following functional equation below;

$$INFD = f(CIT, PPT, CED) \qquad (3.2)$$

INFD= Infrastructural Development (Proxied capital expenditure on infrastructures)

CIT= Companies income tax

PPT=Petroleum Profit Tax

CED= Customs and Excise Duties

However, the econometric model of the equation 3.2 is specifying as:

$$\text{Log}INFD = f(CIT, PPT, CED)$$

$$\text{Log INFD} = \beta_0 + \beta_1 CIT_{t-1} + \beta_2 PPT_{t-2} + \beta_3 CED_{t-3} + \varepsilon_t \qquad (3.3)$$

Where;

$\beta_0 - \beta_3$ = Coefficients

ε_t= Error Term

Thus, the ARDL model is specified as:

$$\text{INFD}_t = \delta_0 + \pi_1 \text{INFD}_{t-1} + \pi_2 CIT_{t-1} + \pi_3 \text{PPT}_{t-1} + \pi_4 CED_{t-1} + \sum_{t=1}^{a} \sigma_i \, \Delta \text{INFD}_{t-i}$$

$$+ \sum_{t=0}^{b} \partial_i \, \Delta CIT_{t-i} + \sum_{t=0}^{c} \gamma_i \, \Delta \text{PPT}_{t-i} + \sum_{t=0}^{d} \lambda_i \, \Delta CED_{t-i} + \varepsilon_t \qquad (3.4)$$

Where;

δ_0 is the drift component; $\Delta$is the first difference operator; π_i= Long-run multipliers (for$i$= 1,2,...4); the terms with summation sings are used to model the short-run dynamic structure;$\sigma_i, \partial_i, \lambda_i, \gamma, \varpi_i$ = Short-run multipliers; a,b,c,d = Lag lengths for the short-run dynamic structure; ε_t= Error Term; and t= Time. Appropriate lag length will be selected based on the Schwartz-Bayesian Criterion (SBC). The short run multipliers here will help me to confirm the evidence of long-run relationship among the variables; this implies that any disequilibrium in the economy the system will correct itself from the short run towards reaching long-run equilibrium.

From equation (3.4) above, the first requirement is to test for Cointegration and the test procedure is based on the *F*-test statistics. As shown by Narayan and Smyth (2005), this is carried out via the exclusion of the lagged level variables in the above equation. It follows then that the test for the absence of any level relationship between time series variables entails the test of the null hypothesis: H_0: $\pi_1 = \pi_2 = \pi_3 = \pi_4 = 0$

The test is normalized on INFD as denoted by:

$$F_C(\text{CIT}, \text{PPT}, \text{CED})$$

The computed F-statistic (F_C) compared two sets of critical values provided by Pesaran, *et al* (2001). One set assumes that all variables are I (0) and the other assumes they are $I(1)$. If the computed F-statistic exceeds the upper critical value, then the null hypothesis will be rejected, if it falls below the lower critical value, then the null hypothesis cannot be rejected and if its falls within this two critical bounds, then the result is inconclusive.

Once Cointegration is established, the second stage involves the estimation of the following conditional ARDL (a, b, c, d) long-run model by estimating the following Bound test.

$$\text{INFD}_t = \delta_0 + \sum_{t=1}^{a} \sigma_i \, \text{INFD}_{t-i} + \sum_{t=0}^{b} \partial_i \, CIT_{t-i} + \sum_{t=0}^{c} \gamma_i \, \text{PIT}_{t-i} + \sum_{t=0}^{d} \lambda_i \, \Delta\text{CET}_{t-i} + \varepsilon_t \qquad (3.5)$$

The ARDL bound test for Cointegration help to achieve the long run impact between tax revenue and infrastructural development in Nigeria.

Furthermore, the Error Correction Model of the ARDL approach is specified as:

$$\Delta\text{INFD}_t = \delta_0 + \sum_{t=1}^{a} \sigma_i \, \Delta\text{INFD}_{t-i} + \sum_{t=0}^{b} \partial_i \, \Delta CIT_{t-i} + \sum_{t=0}^{c} \gamma_i \, \Delta\text{PPT}_{t-i} + \sum_{t=0}^{d} \lambda_i \, \Delta\text{CED}_{t-i} + \eta ECM_{t-1} + \varepsilon_t \qquad (3.6)$$

Where; ECM is the error correction mechanism (representing the residual of the co-integrating equation) andη represents its coefficient. The error correction coefficient shows how quickly the variables converge to equilibrium and it is theoretically expected to be statistically significant and negative. Error Correction mechanism here help to resolve the disequilibrium; among the dependent and independent variables in the research questions and objectives.

3.3.1 *A Priori* Expectation

The *a priori* expectations of tax revenue on infrastructural development are all expected to be positive and greater than zero as stated below: *A priori* expectation of $\beta_1, \beta_2, \beta_3 > 0$. In line with economic theory, it is expected that companies' income tax (CIT), Petroleum Profit Tax (PPT), Customs and Excise Duties (CED) is expected to have positive relationship with infrastructural development (INFD) (proxied capital expenditure on infrastructures).

3.4 Nature and Sources of Data

The research relied heavily on secondary data obtained from the Central Bank of Nigeria (CBN) and the Federal Inland Revenue Service (FIRS) publications. These time series data for analysis relate to tax revenue and infrastructural development in Nigeria. The annual time series data with respect to infrastructural development (INFD) (proxied capital expenditure on infrastructures) was obtained from the Statistical bulletin of the Central Bank of Nigeria (CBN) while data on companies income tax (CIT), Petroleum Profit Tax (PPT), Customs and Excise Duties (CED) were obtained from the Federal Inland Revenue Service (FIRS). The scope of the data ranged from 1987 to 2019.

3.5 Methods of Data Analysis

The analysis of the data collected for the purpose of this research will use quantitative analytical technique which involves the specification of Autoregressive distributed lag (ARDL) model. In a bid to avoid the phenomenon of spurious regression, the data will be subjected to diagnostic investigations to determine their stationarity status as well as the trend trajectory of the data. These investigations included:

i. Descriptive Statistics

Descriptive statistics are brief descriptive coefficients that summarize a given data set, which can be either a representation of the entire or a sample of a population. Descriptive statistics are broken down into measures of central tendency and measures of variability (spread). Measures of central tendency include the mean, median, and mode, while measures of variability include the standard deviation, variance, the minimum and maximum variables, and the kurtosis and skewness.

ii Unit Root Test

This is the pre Co-integration test. It is used to determine the order of integration of a variable. It explained how many times it has to be differenced or not to become stationary. Before model estimation is carried out, we will first conduct a unit root test to ascertain the underlying properties of the time series variables using Augmented Dickey-Fuller (ADF) unit root test method. The reason for the unit root test is to avoid obtaining spurious regression results arising from Non-Stationary of the time series variables (Gujarati and Porter, 2009). The equation to be estimated for the Augmented Dickey-Fuller (ADF) unit root test is stated as follows:

$$\Delta y_t = \omega + \beta + \sum_{i=1}^{m} \theta_i \Delta y_{t-i} + \mu_t \quad (3.7)$$

Where Δ is the first difference operator; y_t is a time series variable at current time (t); ω is the drift term; y_{t-1} is the one period lagged value of y_t; $\beta$is the coefficient of y_{t-1}i.e., autoregression coefficient; $\Delta y_{t-i}$is the lagged valued of the first difference of y_t; m is the maximum lag length; θ_i is the coefficients of Δy_{t-i}; and μ_t is the white noise error term.

iii. Cointegration Test

Cointegration analysis is used to estimate and test stationary linear relations, or cointegration relations, between non-stationary time series variables such as consumption and income, interest rates at different maturities, and stock prices. Autoregressive distributed lag model (ARDL) model framework has been widely applied to model cointegration system. In the modeling of cointegrated systems, the determination of the number of co integrating relations, or the cointegration rank, is the most important decision. Cointegration is said to exist between two or more non-stationary time series if they possess the same order of integration and a linear combination (weighted average) of these series is stationary (Granger and Newbold, 1974).

Below is the functional equation form for cointegration test:

$$Y_{1t} = \beta_2 Y_{2t} + \cdots + \beta_n Y_{nt} + U_t \quad (3.8)$$

Where; Y_t is the time series variable at current time (t), $\beta$is the coefficient of Y_t, U_t (0) referred to as the disequilibrium error or the cointegrating residual. In long-run equilibrium, the disequilibrium error U_t is zero and the long-run equilibrium relationship

is: $Y_{1t} = \beta_2 Y_{2t} + \cdots + \beta_n y_{nt}$ (Phillip, 1991). The Cointegration test using ARDL bound test will help to achieve the long run impact relationship among the variables.

iv. Error Correction Mechanism (ECM)

The concept of error correction mechanism refers to the adjustment process between short-run disequilibrium and a desired long run position. As Engle and Granger (1987) have shown, if two variables are co-integrated, then there exists an error correction data generating mechanism, and vice versa. Since, two variables that are co-integrated would on average; not drift apart over time, this concept provides insight into the long-run relationship between the two variables and testing for the Cointegration between two variables. With regard to testing procedures for the error correction model, once Cointegration is ascertained, then the residuals from the co integrating test, lagged one period, are used in a vector auto regression involving the appropriate differencing of the series (to ensure Stationary) forming the hypothesized relationship. Using Error Correction mechanism helps to resolve the disequilibrium among the dependent and independent variables in all my research questions and objectives.

v. Ramsey RESET Specification Test

Ramsey Regression Equation Specification Error Test (RESET) test is a general specification test for the linear regression model. More specifically, it tests whether non-linear combinations of the fitted values help explain the response variable. The intuition behind the test is that if non-linear combinations of the explanatory variables have any power in explaining the response variable, the model is mis-specified in the sense that the data generating process might be better approximated by

a polynomial or another non-linear functional form. For instance, if the null-hypotheses that all coefficients are zero are rejected. then the model suffers from misspecification.

vi. Serial Correlation Test

Serial correlation (also known as autocorrelation test) is a lagragian multiplier test used in statistics to describe the relationship between observations of the same variable over specific periods. If a variable's serial correlation is measured as zero, there is no correlation, and each of the observations is independent of one another. Conversely, if a variable's serial correlation skews toward one, the observations are serially correlated, and future observations are affected by past values. Essentially, a variable that is serially correlated has a pattern and is not random. Serial correlation occurs in time-series studies when the errors associated with a given period carry over into future periods. For example, when predicting the growth of stock dividends, an overestimate in one year will lead to overestimates in succeeding years. The important for the use of this test is for policy justification.

vii. Heteroscedasticity Test

The assumption behind Heteroscedasticity (the violation of Homoscedasticity) is central to linear regression models. Heteroscedasticity (the violation of Homoscedasticity) is present when the size of the error term differs across values of an independent variable. Homoscedasticity (variance) describes a situation in which the error term (that is, the "noise" or random disturbance in the relationship between the independent variables and the dependent variable) is the same across all values of the independent variables. The

impact of violating the assumption of Homoscedasticity is a matter of degree, increasing as Heteroscedasticity increases.

viii. Jarque- Bera Normality Test

Jarque–Bera test is a goodness-of-fit test of whether sample data have the skewness and kurtosis matching a normal distribution. The test is named after Carlos Jarque and Anil K. Bera. The test statistic is always nonnegative. If it is far from zero, it signals that the data do not have a normal distribution.

3.5.1 Estimation Technique

The specified ARDL model was used to estimate this study. The approach to estimation hinges on the results of diagnostic tests (unit root test and test of Cointegration) carried out on the time series data used for the regression analysis. Considering the fact that the ARDL model can only be estimated when all the variables in the model are stationary at different level, the ARDL model approach was used because the results from the unit root test and test of Cointegration satisfied the theoretical conditions (that all the variables are integrated of the different order and there is Cointegration) for using the ARDL. The ARDL estimation was carried out using econometric views (E-Views) 9 software package.

3.6 Justification of the Method Used

The study's choice of ARDL model is hinged on the germane reason as follows; first, ARDL can be applied regardless of whether the variables are stationary at level value I (0) or after first difference I (1) or combination of two mutually. Second, it can generate robust and reliable results even if the sample size is small or large. Finally, it generates

long run and short run result at a time (Pesaran *et al,* 2001).Furthermore, an economy variable rarely responds instantaneously to changes in predicator(s) or independent variable(s). It takes lapse of time called lag for explanatory variables to be significantly exert changes in the dependent variable.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 Data Presentation

To empirically analyze the impact of tax revenue on infrastructural development in Nigeria, model estimation was carried out using annual time series data covering the period from 1987 to 2019. See Appendix 1 for the regression data.

4.2 Data Analysis

This section presents the empirical results of the study, ranging from descriptive (summary) statistics, ADF unit root test results, ARDL-Bound Cointegration test result to the ARDL regression result (which consists of long-run and short-run regression results).

4.2.1 Descriptive Statistics Result

Table 4.1: Summary of Descriptive Statistics Result

	INFD	CIT	PPT	CED
Mean	91012.73	16331.57	91952.41	30984.19
Median	7356.300	1404.020	8706.250	4520.400
Maximum	498027.6	114771.1	683484.9	195468.6
Minimum	351.3000	130.1000	1183.500	177.7000
Std. Dev.	143006.9	28456.88	187458.6	56042.30
Skewness	1.489759	2.111651	2.319988	1.980158
Kurtosis	4.023659	6.749307	6.920531	5.656751
Jarque-Bera	13.23387	42.52477	49.19993	30.32323
Probability	0.001338	0.000000	0.000000	0.000000
Sum	2912407.	522610.3	2942477.	991494.1
Sum Sq. Dev.	6.34E+11	2.51E+10	1.09E+12	9.74E+10
Observations	32	32	32	32

Source: Computed by Author, 2021(See Appendix ii)

The summary of descriptive statistics of relevant variables of study is as reported in table 4.1 (See Appendix ii). The mean measures the average value of the series. It is obtained by adding up the values of the series in the current sample and dividing by the number of observations. Max and Min are the maximum and minimum values of the series in the

current sample. Standard deviation (Std. dev.) measures the dispersion or spread in the series. Thus, the higher (lower) the value, the higher (lower) the deviation of the series from its mean.

Skewness measures the asymmetry of the distribution of the series around its mean. A positive skewness means that the distribution has a long right tail and negative skewness implies that the distribution has a long left tail. The skewness of a normal distribution is zero. Kurtosis measures the peakedness or flatness of the distribution of the series. For kurtosis, the normal distribution is 3, but if it exceeds this value, the distribution is assumed to be peaked (leptokurtic) relative to the normal, but if it is less than 3, the distribution is flat (platykurtic) relative to the normal.

Jarque-Bera is a test statistic for normal distribution. The null hypothesis for the test is that the series is normally distributed. Note that there are three conventional levels of statistical significance in econometrics namely 1% (0.01), 5% (0.05) and 10% (0.10). Therefore, if the computed probability value for the test is greater than 5% (0.05), do not accept the null hypothesis otherwise reject it.

As can be observed from table 1 above, the mean, standard deviation as well as the skewness, kurtosis and Jarque-Bera measures of our variables of interest are given. The mean values of INFD, CIT, PPT and CED are 91012.73, 16331.57, 91952.41 and 30984.19 respectively while their respective standard deviations are 143006.9, 28456.88, 187458.6 and 56042.30. The results show that CIT had the lowest or least mean and variability (standard deviation) while PPT and INFD had the highest or largest mean and variability (standard deviation).

Lastly, the Jarque-Bera statistic values shows that INFD, CIT, PPT and CED are normally distributed since the Jarque-Bera normality test is less than 0.05 percent level of significance. This result is supported by the skewness and kurtosis statistics for the series.

4.2.2 Unit Root Test Result

Table 4.2: Augmented–Dickey Fuller (ADF) Test Result

Variables		ADF Statistics		Remark
	Critical Value	Level	First Difference	
INFD	-2.960411	-1.751658	-7.449238**	I(1)
CIT	-2.960411	-6.055651**	-2.287046	I(0)
PPT	-2.971853	-2.461151	-6.885773**	I(1)
CED	-2.960411	-5.764338**	-2.071403	I(0)

Source: Computed by Author, 2021. (See Appendix iii)

Note: ** Indicates the rejection of the null hypothesis of existence of unit root at 5% significance level. Lags are selected based on Schwarz Information Criteria (SIC).

The ADF unit root test results as reported in table 4.2 (See Appendix iii) shows that CIT and CED were stationary at level while INFD and PPT were stationary at first difference. This means that INFD and PPT have mean, variance and covariance that are not constant overtime. However, after at level, each of these time series variables tested became stationary. The implication of the unit root test results is that INFD and PPT are integrated of order one, i.e., I(1) while CIT and CED are integrated of order zero, i.e., I(0).

4.2.3 ARDL Bound Cointegration Test Result

Table 4.3: ARDL Bound Test Result for Cointegration

Test Statistic	Value	K
F-statistic	653.2326	5

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Source: Computed by Author, 2021. (See Appendix iv)

Note: The lag length was selected based on the Schwartz Information Criterion. K is the number of regressors.

The result of the ARDL bound test for the presence of long-run relationship between the variables is reported in table 4.3 above. Since this study employed annual data, the study follows the tradition of Narayan and Smyth (2005) and set the maximum lags in the ARDL model to 2 ($i_{max} = 2$). The estimated model of the ARDL-bound test is based on minimizing the Schwartz Information Criterion (SIC). The bound F-test for Cointegration test yields evidence of a long-run relationship between the concerned variables. The computed F statistic ($F_C = 653.2326$) is greater than the upper bound at 5% critical value resulting in the rejection of the null hypothesis of no long-run relationship between the examined variables. This evidence implies that a long-run relationship exists between the variables and rules out the possibility of estimated relationship being spurious.

4.2.4 Post- Estimation Result

For reliability of estimates, the study obtained series of residual and stability tests such as Ramsey RESET specification test, the serial correlation lagragian Multiplier test, the heteroscedasticity test and Jarque-Bera Normality test. This is to ascertain the appropriateness and stability of the model as well as the robustness of the results. Both the F-statistic and product of observation with the square coefficient of correlation (Obs.R^2) were obtained.

The decision rule to accept the null hypothesis for any of these diagnostics tests is that the probability-value (p-value) of each has to be greater than 5 percent level of significance. Table 4.4 thus presents post diagnostic test results;

Table 4.4: Post Diagnostic Test Results

Tests		**Outcomes**	
		Coefficients	Probability
Ramsey RESET Specification Test:	F- Stat.	0.369261	0.5584
Breusch-Godfrey Serial Correlation LM Test:	F Stat.	0.110274	0.8969
	Obs*R^2	0.751209	0.6869
Breusch-Pagan-Godfrey Heteroscedasticity Test:	F Statistic	0.494920	0.9030
	Obs* R^2	12.79389	0.7499
Jarque-Bera Normality Test Stat.		1.335778	0.512790

Source: Computed by Author, 2021 (See appendix V)

As may be recalled, ARDL is a linear regression model and therefore the underlying assumptions of classical linear regression model (CLRM) have to be verified through diagnostic checks. These assumptions are linearity (model correctly specified),

homoscedasticity, no serial correlation (no autocorrelation) and normality among others. These tests are necessary before one can draw inferences or policy implications from findings of the study.

The test for linearity is meant to ascertain whether the model is linear or that it is correctly specified. This is carried out using the Ramsey RESET test. As shown in the above table 4.4, the outcome from the Ramsey RESET test reports the F-statistic and t-statistic for testing the hypothesis that the coefficients on the power of fitted values from the regression are jointly zero, that is, the model is correctly specified or linear. This implies that the null cannot be rejected since the p-values of the F-statistic (0.5584) were found to be greater than 0.05. It shows that the estimated linear ARDL model was correctly specified.

Is there evidence of serial correlation (autocorrelation) problem in the estimated ARDL model? To answer this, the Breusch-Godfrey serial correlation LM test is applied. The null hypothesis of the test shows that there is no serial correlation in the residuals test to the specified lag order. The Breusch-Godfrey serial correlation LM is based on two statistics labelled "F-statistic" and "Obs*R-squared" statistic. From table 4.4, it can be observed that both statistics for the LM test failed to reject the hypothesis of no serial correlation up to lag order 2 since the probability values of the F- statistics (0.8969and 0.6869) are individually greater than 0.05 (i.e., 5% level of significance). The results indicate absence of serial correlation problem in the estimated ARDL model.

Again, the homoscedasticity assumption must be satisfied for the regression results to be valid. Therefore, testing for the presence of heteroscedasticity in a linear regression model is inevitable. Here, the study employed Breusch-Pagan-Godfrey heteroscedasticity

test. The null hypothesis of the test is that the variance of the error term is homoscedastic. The Breusch-Pagan-Godfrey heteroscedasticity test is also based on two statistics labeled "F-statistic" and "Obs*R-squared" statistic. A glance at table 4.4 revealed that the null hypothesis of homoscedastic variance of the error term cannot be rejected since the probability values of the F- test statistics (0.2279 and 0.9990) are individually greater than 0.05 (i.e., 5% level of significance). The study therefore rejects the null hypothesis and concludes that; there is a presence of homoscedasticity since the value fall within (0.1 to 0.9). Finally, the Jarque-Bera statistic shows that the error term is normally distributed since the result revealed that the JB probability value of (0.757942) is greater than 0.05 percent level of significance.

4.2.5 Error Correction Mechanism Result

The Error Correction Mechanism result is presented in table 4below:

Table 4.5: Estimated Short-run and Long-run Coefficients for the ARDL Model

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFD(-1))	-1.799097	0.590131	-3.048640	0.0123
D(CIT)	1.837768	1.555992	1.181091	0.2649
D(CIT(-1))	-6.493600	4.326132	-1.501018	0.1642
D(PPT)	-0.046130	0.124178	-0.371479	0.7180
D(PPT(-1))	0.729816	0.346018	2.109189	0.0611
D(CED)	-1.738028	0.719133	-2.416838	0.0363
D(CED(-1))	-2.172698	0.549637	-3.952971	0.0027
CointEq(-1)	-0.178489	0.851665	1.383747	0.1965

Cointeq = INFD - (-3.1012*CIT + 0.7155*PPT -0.5694*CED-3604.0287)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CIT	-3.101185	3.940544	-0.786994	0.4495
PPT	0.715475	0.412230	1.735621	0.1133
CED	-0.569407	1.173442	-0.485246	0.6380

C	-3604.028689	2695.311581	-1.337147	0.2108

Source: Computed by Author, 2021. (See Appendix V).

Note: The ARDL model was selected based on SIC.

From the error correction mechanism result in table 4.5, the coefficient of the loading factor (error correction term i.e., ECT) is correctly signed and statistically significant at 5% level of significance. It implies that an error correction mechanism exists so that the deviation from short run to the long-run equilibrium will have a significant impact on infrastructural development (INFD) in Nigeria. The value of -0.17 implies that 17% of the disequilibria in INFD of the previous year's shocks adjust back to the long-run equilibrium in the current period. It also implies that adjustment to long-run equilibrium of infrastructural development is moderate.

4.2.6 ARDL Regression Result

The ARDL regression results coefficients are presented below at equation 4.1

INFD=4247.308+1.837CIT-0.046PPT-1.738CED (4.1)

t*stat. (2.373) (1.181) (-0.371) (-2.416)

Prob. (0.039) (0.264) (0.718) (0.036)

R-squared	0.999812	Mean dependent var	103436.5
Adjusted R-squared	0.999492	S.D. dependent var	148991.6
S.E. of regression	3357.345	Akaike info criterion	19.33178
Sum squared resid	1.13E+08	Schwarz criterion	20.18820
Log likelihood	-252.6450	Hannan-Quinn criter.	19.59360
F-statistic	3127.266	Durbin-Watson stat	1.931840
Prob(F-statistic)	0.000000		

The results indicated that the coefficients of all the signs in the variables does not agreed in line with the *A prior* expectation stated except companies income tax (CIT). From the result above Petroleum Profit Tax (PPT) and Customs and Excise Duties (CED) have negative relationship with infrastructural development (INFD) except companies' income tax that has positive relationship with infrastructural development (INFD).

Similarly, by holding PPT and CED variables constant, one unit increase in the companies income tax (CIT) will lead to about 738.1 (1.837) units increase in infrastructural development (INFD). By holding CIT and CED, a unit decrease on petroleum profit tax (PPT) will lead to about 640.0 (0.046) units decrease on infrastructural development (INFD). Finally, holding CIT and PPT variables constant, a unit decrease in the custom and excise duties will lead to about 837.1 (1.738) units decrease in infrastructural development (INFD).

F-statistic

The F-statistic which was used to examine the overall significance of regression model revealed that the result is significant, as indicated by the value of F-statistic in equation 4.1, which is significant at the 5.0 percent level. That is, the F-statistic P-value of 0.000000is less than 0.05.

R^2 (R-square)

The R^2 (R-square) value of 0.999492revealed that tax revenue has a very good effect on infrastructural development (INFD) in Nigeria. It indicates that about 99.9 percent of the

variation in infrastructural development (INFD) was caused by tax revenue, while the remaining unaccounted variation of 0.1 percent is captured by the white noise error term.

Durbin Watson (DW) Statistic

It was used to test for the presence of autocorrelation among the error terms. The acceptable Durbin- Watson range is between 0 and 2.5. The model also indicates that there is absence of autocorrelation among the variables as indicated by Durbin Watson (DW) statistic of 1.93. This demonstrates that the estimates are unbiased and can be relied upon for economic decisions.

4.2.7 Test of Hypotheses

The three hypotheses formulated in the study were tested using probability t-statistics value. The level of significance for the study is 5% (0.05) for a two-tailed test. The decision rule is thus; if probability value is less than 0.05 (5% level of significance) the study accept H_0 and conclude and if otherwise reject the null hypothesis. Hypothesis one, two and three was tested from the ARDL regression result. That is, using the Probability t-statistics, a variable is statistically significant if the probability value is less than 0.05 (5% level of significance) and it is statistically insignificant if the probability value is greater than 0.05 (5% level of significance).

Test of Hypothesis One

$H0_1$: Companies income tax has no significant impact on infrastructural development in Nigeria. From the estimated regression in equation 4.1, it was observed that the probability value of the companies' income tax (CIT) whose value was 0.264 was found

to be greater than 0.05 percent level of significance. Since the probability value of the t-statistic for companies' income tax (CIT) was found to be greater than 0.05 percent level of significance value the study thus therefore reject the null hypothesis ($H0_1$) and conclude that companies' income tax has no significant impact on infrastructural development in Nigeria.

Test of Hypothesis Two

$H0_2$: Petroleum profit tax has no significant impact on infrastructural development in Nigeria. From the estimated regression in equation 4.1, it was observed that the probability value of the petroleum profit tax (PPT) whose value was 0.718 was found to be greater than 0.05 percent level of significance. Since the probability value of the t-statistic for petroleum profit tax (PPT) was found to be greater than 0.05 percent level of significance value the study thus therefore reject the null hypothesis (H_{02}) and conclude that petroleum profit tax has no significant impact on infrastructural development in Nigeria.

Test of Hypothesis Three

$H0_3$: Custom and excise duties have no significant impact on infrastructural development in Nigeria. From the estimated regression in equation 4.1, it was observed that the probability value of the custom and excise duties (CED) whose value was 0.036 was found to be greater than 0.05 percent level of significance. Since the probability value of the t-statistic for custom and excise duties (CED) was found to be less than 0.05 percent level of significance value the study thus therefore reject the null hypothesis (H_{03})

and conclude that custom and excise duties has no significant impact on infrastructural development in Nigeria.

4.3 Discussion of Findings

The finding from the study revealed that company income has positive and insignificant impact on infrastructural development in Nigeria. This is in agreement with Oliver, Edeh and Chukwuani (2017) whose findings showed that company income tax has positive and insignificant impact on infrastructural in Nigeria. This is as a result of lack of human and material infrastructures that are needed to support seamless tax collection so they can earn more income that will boost taxation to enhance infrastructural development in Nigeria.

The finding also showed that petroleum profit tax has positive and insignificant impact on infrastructural development in Nigeria. This is in agreement with Anyaduba and Aronmwan (2015) whose findings showed that petroleum profit tax has no significant impact on infrastructural development in Nigeria. This is as a result of high level of shocks associated with international crude oil prices.

More so, findings from the study show that customs and excise duties have significant impact on infrastructural development in Nigeria. The significant impact of customs and excise duties is an indication that collection and remittance of tax from custom and excise duties has properly been seen in the extent of infrastructural facilities by showing as a major driver of infrastructural development in Nigerian economy.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Major Findings

This study examined the impact of tax revenue on infrastructural development in Nigeria, covering the period from 1987 to 2019. The study was estimated using Autoregressive distributed lag model (ARDL). Before model estimation was performed, unit root and Cointegration tests were conducted in order to ascertain the stationarity status and long-run properties of the variables used for the study. Findings from the unit root test shows that almost all the time series considered were non-stationary at level but became stationary after first differencing. The Cointegration test result from the ARDL bound test shows that the variables are co-integrated, which implies that the time series variables considered have long-run equilibrium relationship.

Findings from this study show that companies income tax (CIT) and petroleum profit tax (PPT) were statistically insignificant on infrastructural development while custom and excise duties (CIT) was statistically significant on infrastructural development. Finding from the ARDL regression result also shows that the coefficients of petroleum profit tax (PPT) and custom and excise duties (CIT) were negative to infrastructural development (INFD) while the coefficients of companies income tax (CIT) was positive to infrastructural development (INFD). However, jointly they were statistically significant. The coefficient of determination R^2squared showed that 99.9% variation in infrastructural development was caused by variation in tax revenue. Using the Durbin-Watson statistic, it was found that there was no autocorrelation among the variables. Furthermore, the diagnostic checks on the estimated model showed that the estimated ARDL was well-specified and normally

distributed with the absence of serial or autocorrelation and Heteroscedasticity problems. This shows that empirical findings are not spurious.

5.2 Conclusion

Empirical findings, from the Autoregressive distributed lag (ARDL) model estimation results revealed that the determinants of taxation review had not significantly impacted on infrastructural development in Nigeria within the period under review. However, the various components of taxation did not exert the same level of influence on infrastructural development in Nigeria during the same period. Custom and excise duties exerted a relatively stronger influence on infrastructural development in the Nigerian economy when compared with companies' income tax and Petroleum Profit Tax. It should therefore be noted that this outcome is instructive for both policy and planning as far as the enhancement of Nigeria's taxation structures are concerned. Hence, policy measure with regards to improving tax revenues as well as taxation capacity can help increase infrastructural development in the country, thereby stimulating economic growth and development positively.

In conclusion, it is hoped that various strategies are being put in place by the government to ensure the implementation of requisite tax reforms in Nigeria with a view to enhancing the effectiveness of taxation in Nigeria as a viable source of government revenue as well as an instrument of economic stabilization, thereby ensuring the overall transformation of the Nigerian economy.

5.3 Recommendations

Based on the findings and conclusion of this study, the study recommend that tax policymakers such as the federal inland revenue service (FIRS) and other tax regulatory bodies should strengthen their regulations on tax compliance. This should be done for taxes that are direct based to curb tax evasion and avoidance by taxpayers. This is necessary since direct taxes exert more significant effect on economic development like infrastructural development in Nigeria than indirect tax. Specific recommendations include;

(i) In order to achieve maximum infrastructural development, government should improve its tax revenue mechanism that will impact positively on government expenditure such as infrastructural amenities provision across the country. An improve tax revenue will lead to increase in government expenditure. The government can therefore boost its revenue through petroleum profit tax, company income tax, customs and excise duties. The utilization of tax revenue will therefore increase provision of infrastructural amenities, increase employment generation, increase output, improve standard of living and overall economic growth in Nigeria.

(ii) There should also be accountability and transparency from government officials on the management of revenue derived from the various components of taxation particularly petroleum tax that directly concerns individuals in the society. This is with a view to ensuring optimal benefits of taxation to citizens who should be able to benefit from the payment of taxes. In addition, regulatory authorities charged with the sole responsibility of collecting tax should further be strengthened to enforce compliance by taxpayers.

Above all, the tax revenues should be properly distributed for economic development to be harnessed, especially in providing basic social amenities as well as infrastructures in Nigeria.

(iii) There is a need for increased citizens' awareness in terms of their tax obligation and civic responsibilities. It is also recommended that the tax execution agencies should forge good relationship with the professional associations involved in tax matters so as to elicit their support in reducing tax malpractices perpetrated by tax payers with the connivance and often active support of external auditors and tax consultants. The government in Nigeria should also restructure the tax system to meet the demands of the 21st century. This can be achieved through the deployment of technology and automation of basic tax processes, which will ensure that the level of corruption in the management of tax revenue is minimized.

5.4 Limitations of the Study

A research of this nature must have some limitations. This is because economic models make assumptions in order to be able to abstract from realities. This process gives room to inexactness in the representation of the true world situation.

Furthermore, the study is constrained by the lack of reliable tax data at sub-national levels in Nigeria. The paucity of data from state boards of internal revenue has restrained the researcher to the national level with specific reference to components of taxation for which the Federal Inland Revenue Service (FIRS) has jurisdiction. The study is also constrained by the limited resources in terms of money and time available for the study.

5.5 Contribution to Knowledge

This study has made profound contributions to knowledge in the area of taxation and infrastructural development in Nigeria. The study has provided empirical evidence to support the relationship between various tax determinants and infrastructural development in Nigeria. Specifically, the study has been able to establish a valid relationship between companies' income tax, petroleum profit tax, customs and excise duties on infrastructural development in Nigeria. The findings of the study also provide valid empirical evidence necessary for effective tax administration policies necessary for optimal productivity in the Nigerian economy.

5.6 Suggestions for Further Studies

To further broaden the horizon of knowledge with reference to taxation and infrastructural development in Nigeria, the following suggestions are made for further studies.

i. Impact of Tax Revenue on Capital Expenditure in Nigeria.

ii. Taxation and the Fiscal sustainability of sub-national governments (states and local government) in Nigeria.

iii. Taxation and its effect on Economic Development in Nigeria.

REFERENCES

Abiola, S., (2014). Current law and practice of value added tax in Nigeria. *British Journal of Arts and Social Sciences*, 5(2), 186- 201.

Abiola, J. & Asiweh, M. (2012). Impact of tax administration on government revenue in a developing economy- Case study of Nigeria. International Journal of Business and Social Science, 3(8), 99-113.

Abdul-Rahamoh, O.A., Taiwo, F.H. & Adejare, A.T. (2013). The Analysis of the Effect of Petroleum Profit Tax on Nigerian Economy. *Asian Journal of Humanities and Social Sciences (AJHSS)* 1(1).

Adegbite, T.A. (2015). The analysis of the effect of corporate income tax (cit) on revenue profile in Nigeria. American Journal of Economics, Finance and Management, 1(4), 312-319.

Adereti, S.A., Sanni M.R. & Adesina J.A., (2011). Value added tax and economic growth of Nigeria. *Journal of Humanities and Social Science.* 10(1), 456-471.

Adesoji A.A and Chike F.O (2013). Effect of Internal Revenue Generation on Infrastructural Development. A study of Lagos State Internal Revenue Service. *Journal of Educational and Social Research; 3 (2); 419-436.*

Afuberoh, D., & Okoye, E,. (2014) The Impact of Taxation on Revenue Generation in Nigeria: A Study of Federal Capital Territory and selected states. *International Journal of Public Administration and Management Research*, 2(2), 22-47.

Ajayi, T & Alani, R.A. (1996). A study on cost recovery in Nigerian university education: Issues of quality, access and equity. Final Report. Accra: Association of African Universities (AAU).

Akwe, J. A. (2014). Impact of non-oil tax revenue on economic growth: The Nigerian perspective. *International Journal of Finance and Accounting*, 3(5): 303-309. DOI: 10.5923/j.ijfa20140305.04

Aminu, H., Isah, S. and Aliyu A. A. (2020).Impact of State Government Revenues on Infrastructural Development in Bauchi State Nigeria. International Journal of Accounting and Taxation, 8 (1), 34-43.

Anyaduba, J.O and Aronmwan, E.J (2015). Taxes and Infrastructural Development in Nigeria. *Nigerian Journal of Banking, Finance and Entrepreneurship Management*; 1 (15): 14-28.

Anyafo, A.M.O. (1996); Public Finance in a Developing Economy the Nigeria Case, Wp 1002.

Gopar, J.K., Dalyop, L.M., and Yusuf, B.D (2016). "Impact of Petroleum Profits Tax on Economic Growth in Nigeria: A Longitudinal Study"TAX*Academy Research Journal (Tarj)*, Vol. 1 No.1 pp 139 – 150.

Jhingan, M.L. (2004). *Money, Banking, International Trade and Public Finance.7th Edition.* New Delhi: Vrinda Publication (P) Ltd.

Jhingan, M.L. (2004). *Macro-Economic Theory. 11thEdition.*, New Delhi: Vrinda Publications (P) Ltd.

Joint Tax Board (2018), New Letters a Quarterly Publications of the Joint Tax Board, Abuja.

Mansfield, E. (1986). *Principles of Macroeconomic,*5th Edition. New York: W.W. Norton & Company.

Migap, J.P., (2014). Enhancing Infrastructural Growth in Nigeria: The Sovereign Wealth Fund Strategy. International Journal of Economic Development Research and Investment, 5(2), 61-74.

Mobolaji, A. & A., (2012).Vision 20:2020 and the Challenges of Infrastructural Development in Nigeria. *Journal of sustainable Development*, 5(2), 63-76.

Musgrave, R. A. and Musgrave, P. B. (1994), *Public Finance in Theory and Practice*, Tata

Nwezeaku, N.C. (2005). *Taxation in Nigeria: Principles and Practice*. Springfield Publishers, Owerri.

Nwite, C.S. (2015). The Implication of Tax Revenue on the Economic Development of Nigeria. *Issues in Business Management and Economics*, 3(5), 74-80

Oliver, I.I, Edeh, A.C, Chukwuani V. N (2017). Relevance of Tax Revenue Resources to Infrastructural Development of Nigeria. *International Journal of Managerial Studies and Research (IJMSR), 5 (10), 74-81.*

Okafor, R. G. (2012). Tax revenue generation and Nigerian economic development. *European Journal of Business and Management, 4(19):* 49-57.

Okoli, M.N., &Afolayan, S.M. (2015). Correlation between value added tax (VAT) and national revenue in Nigeria: An ECM model. Research Journal of Finance and Accounting, 6(6), 230-238.

OnaolapoA.A, Fasina H.T &Adegbite T.A, (2013).The Analysis of the Effect of Petroleum Profit Tax on Nigerian Economy. Asian Journal of Humanities and Social Sciences 1(1), 25-36.

Onoh, L.M., (2013).The impact of value added tax on Nigerian economic growth. 1-53.

Onwuchekwa, J.C., &. Aruwa, S.A.S., (2014).Value added tax and economic growth in Nigeria. *European Journal of Accounting Auditing and Finance Research*, 2 (8), 62-69.

Onwuka, O.O and Christian, C (2019). Revenue Generation as a Tool for Infrastructural Development in Nigeria. *Journal of Accounting and Financial Management*, 5 (2); 59-72.

Onyemaechi J. O. (2012). Economic Implications of Petroleum Policies in Nigeria: An Overview. American International Journal of contemporary research, 2(5), 60-70.

Oriakhi, D.E. (2013). Facilitating Adequate Revenue Generation for Enhanced Service Delivery: the Case of Nigeria. Covenant Journal of Business and Social Sciences (CJBSS), 5(2), 52-69.

Oyedele.T. (2012). Updates on Personal Income Tax (Amendment) Act 2011. PWC Nigeria, February 2012.

Oisasoje, O.M. & Ojeifo, S.A. (2012). The Role of Public Infrastructure in Poverty Reduction in the Rural Areas of Edo State, Nigeria. *Research on Humanity and Social Sciences*, 2(7).

Samuel, S.E., & Tyokoso, G., (2014). Taxation and Revenue Generation: An Empirical Investigation of Selected States in Nigeria. *Journal of Poverty, Investment and Development*, 4, 102-114.

Teboho, M. (2000), Nigeria education sector analysis: An analytical synthesis of performance and main issues. A Publication for World Bank, 1-49.

Todaro M.P. & Smith S.C (2011). Economic Development. Addison Wesley. New York. Pp. 20-23

Shalizi, Z & Squire, L. (1988). Consumption Taxes in Sub-Africa: Building on Existing Instruments. In M. Gillis, C.S Shour and Sicat, G.P, eds, Value And Taxation in Developing Countries, Washington, D.C, The World Bank, Washington D.C.

Ugwuanyi, G.O., (2014).Taxation and tertiary education enhancement in Nigeria: An evaluation of the education tax fund (ETF) between 1999 and 2010. Journal of Economics and Sustainable Development, 5(6), 131-141.

United Nations (2010). We can end Poverty by 2015: Millennium Development Goals Fact Sheet. High-level Plenary Meeting of the General Assembly, 20-22 September. Available from:www.un.org/millennium/.../MDG FS 7 EN.pdf.

Waziri S., Ali, G.B., &Nura M., (2014). Sustainable Infrastructure Development in Nigeria: Challenges of the Construction Sector. *International Journal of Development and Sustainability*, 3(7), 1488-1495.

World Bank (1994). Infrastructure for Development: World Development Report, Executive summary Washington, D.C. Retrieved from www.world bank.org.

Zucman, G., (2014). Taxing across borders: tracking personal wealth and corporate profits. *Journal of Economic Perspectives*, 28 (4), 121–148

APPENDICES

Appendix I

Time Series Data

Year	INFD	CIT	PPT	CED
1987	6372.5	1,235.20	12,504.00	3,540.80
1988	8,340.10	1,550.80	6,814.40	5,672.00
1989	15,034.10	1,914.30	10,598.10	5,815.50
1990	24,048.60	2,997.30	26,909.00	8,640.90
1991	28,340.90	3,827.90	38,615.90	11,456.90
1992	39,763.30	5,417.20	51,476.70	16,055
1993	54,501.80	9,554.10	59,207.60	15,486.40
1994	70,918.30	12,274.80	42,802.70	18,294.60
1995	121,138.30	21,878.30	42,857.90	37,364.00
1996	212,926.30	22,000.00	76,667.00	55,00.00
1997	269,651.70	26,000.00	68,574.10	63,000.00
1998	309,015.60	33,315.30	67,986.60	57,683.00
1999	498,027.60	46,211.20	164,273.40	87,906.90
2000	239,450.90	51,147.40	525,072.90	101,523.60
2001	438,696.50	68,660.00	639,234.00	170,557.10
2002	321,378.10	89,104.00	392,207.20	181,408.20
2003	241,688.30	114,771.10	683,484.90	195,468.60
2004	351.3	130.1	1,183.50	217.2
2005	519.5	162.2	1,904.90	232.8
2006	552.4	244.9	2,038.30	177.7
2007	759.3	327	1500.6	241.4
2008	960.9	416.8	2,812.30	281.3
2009	1,152.80	568.1	1,256.50	297.5
2010	883.9	657.3	1,944.70	309.2
2011	918.5	700.5	3,976.30	438.3
2012	874.7	848.6	4,365.40	474.9
2013	1,108.40	985.5	3,719.00	433.6
2014	783.1	1,207.30	3.439.60	566.2
2015	818.4	1,029.10	1,782.40	546.2
2016	653.6	988.4	1,192.30	548
2017	1,163.20	1,206.30	1,801.40	628
2018	1185.4	1,229.34	1,835.80	639.99
2019	1212.3	1,257.24	1,877.47	654.51

Sources: (i) Central Bank of Nigeria (CBN) Statistical Bulletin.

ii) Federal Inland Revenue Service (FIRS) publications

Appendix II

Descriptive Statistics Result

	INFD	CIT	PPT	CED
Mean	91012.73	16331.57	91952.41	30984.19
Median	7356.300	1404.020	8706.250	4520.400
Maximum	498027.6	114771.1	683484.9	195468.6
Minimum	351.3000	130.1000	1183.500	177.7000
Std. Dev.	143006.9	28456.88	187458.6	56042.30
Skewness	1.489759	2.111651	2.319988	1.980158
Kurtosis	4.023659	6.749307	6.920531	5.656751
Jarque-Bera	13.23387	42.52477	49.19993	30.32323
Probability	0.001338	0.000000	0.000000	0.000000
Sum	2912407.	522610.3	2942477.	991494.1
Sum Sq. Dev.	6.34E+11	2.51E+10	1.09E+12	9.74E+10
Observations	32	32	32	32

Appendix III:

Augmented Dickey-Fuller (ADF) Unit Root Tests Results using E-Views 9 Software

ADF Unit Root Test on INFD at Level

Null Hypothesis: INFD has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.751658	0.3967
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFD)
Method: Least Squares
Date: 02/05/21 Time: 05:49
Sample (adjusted): 1988 2019
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFD(-1)	-0.186280	0.106345	-1.751658	0.0901
C	16790.11	17825.14	0.941934	0.3538

R-squared	0.092787	Mean dependent var	-161.2563
Adjusted R-squared	0.062546	S.D. dependent var	87459.42
S.E. of regression	84680.12	Akaike info criterion	25.59161
Sum squared resid	2.15E+11	Schwarz criterion	25.68322
Log likelihood	-407.4658	Hannan-Quinn criter.	25.62198
F-statistic	3.068305	Durbin-Watson stat	2.394552
Prob(F-statistic)	0.090051		

ADF Unit Root Test on INFD at First Difference

Null Hypothesis: D(INFD) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.449238	0.0000
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INFD,2)
Method: Least Squares
Date: 02/05/21 Time: 05:51
Sample (adjusted): 1989 2019
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFD(-1))	-1.313528	0.176330	-7.449238	0.0000
C	-282.3903	15421.79	-0.018311	0.9855

R-squared	0.656769	Mean dependent var	-62.60323
Adjusted R-squared	0.644933	S.D. dependent var	144098.6
S.E. of regression	85864.73	Akaike info criterion	25.62127
Sum squared resid	2.14E+11	Schwarz criterion	25.71379
Log likelihood	-395.1298	Hannan-Quinn criter.	25.65143
F-statistic	55.49115	Durbin-Watson stat	1.804122
Prob(F-statistic)	0.000000		

ADF Unit Root Test on CIT at Level

Null Hypothesis: D(CIT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.055651	0.0000
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CIT,2)
Method: Least Squares
Date: 02/05/21 Time: 05:53
Sample (adjusted): 1989 2019
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CIT(-1))	-1.116805	0.184424	-6.055651	0.0000
C	-9.491757	4044.291	-0.002347	0.9981

R-squared	0.558404	Mean dependent var	-9.280645
Adjusted R-squared	0.543177	S.D. dependent var	33315.71
S.E. of regression	22517.66	Akaike info criterion	22.94433
Sum squared resid	1.47E+10	Schwarz criterion	23.03684
Log likelihood	-353.6371	Hannan-Quinn criter.	22.97449
F-statistic	36.67091	Durbin-Watson stat	2.025463
Prob(F-statistic)	0.000001		

ADF Unit Root Test on CIT at First Difference

Null Hypothesis: CIT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.287046	0.1820
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CIT)
Method: Least Squares
Date: 02/05/21 Time: 05:52
Sample (adjusted): 1988 2019
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CIT(-1)	-0.296921	0.129827	-2.287046	0.0294
C	4849.408	4209.294	1.152072	0.2584

R-squared	0.148467	Mean dependent var	0.688750
Adjusted R-squared	0.120083	S.D. dependent var	21929.36
S.E. of regression	20570.59	Akaike info criterion	22.76157
Sum squared resid	1.27E+10	Schwarz criterion	22.85318
Log likelihood	-362.1852	Hannan-Quinn criter.	22.79194

F-statistic	5.230578	Durbin-Watson stat	1.947734
Prob(F-statistic)	0.029419		

ADF Unit Root Test on PPT at Level

Null Hypothesis: PPT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.461151	0.1347
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PPT)
Method: Least Squares
Date: 02/05/21 Time: 05:54
Sample (adjusted): 1988 2019
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PPT(-1)	-0.356435	0.144824	-2.461151	0.0203
C	34603.91	30834.51	1.122246	0.2713

R-squared	0.177855	Mean dependent var	-289.6643
Adjusted R-squared	0.148493	S.D. dependent var	162527.6
S.E. of regression	149975.8	Akaike info criterion	26.73868
Sum squared resid	6.30E+11	Schwarz criterion	26.83209
Log likelihood	-399.0801	Hannan-Quinn criter.	26.76856
F-statistic	6.057266	Durbin-Watson stat	2.251743
Prob(F-statistic)	0.020275		

ADF Unit Root Test on PPT at First Difference

Null Hypothesis: D(PPT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.885773	0.0000
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	

	10% level	-2.625121

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PPT,2)
Method: Least Squares
Date: 02/05/21 Time: 05:55
Sample (adjusted): 1989 2019
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PPT(-1))	-1.291667	0.187585	-6.885773	0.0000
C	-170.3007	31027.42	-0.005489	0.9957

R-squared	0.645843	Mean dependent var	202.6775
Adjusted R-squared	0.632222	S.D. dependent var	270726.8
S.E. of regression	164181.4	Akaike info criterion	26.92408
Sum squared resid	7.01E+11	Schwarz criterion	27.01924
Log likelihood	-374.9371	Hannan-Quinn criter.	26.95317
F-statistic	47.41387	Durbin-Watson stat	2.024752
Prob(F-statistic)	0.000000		

ADF Unit Root Test on CED at Level

Null Hypothesis: D(CED) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.764338	0.0000
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CED,2)
Method: Least Squares
Date: 02/05/21 Time: 05:56
Sample (adjusted): 1989 2019
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CED(-1))	-1.067886	0.185257	-5.764338	0.0000
C	-168.2069	7370.327	-0.022822	0.9819

R-squared	0.533969	Mean dependent var	-68.28000
Adjusted R-squared	0.517899	S.D. dependent var	59101.33
S.E. of regression	41036.13	Akaike info criterion	24.14463
Sum squared resid	4.88E+10	Schwarz criterion	24.23715
Log likelihood	-372.2418	Hannan-Quinn criter.	24.17479
F-statistic	33.22759	Durbin-Watson stat	1.989661
Prob(F-statistic)	0.000003		

ADF Unit Root Test on CED at First Difference

Null Hypothesis: CED has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.071403	0.2569
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CED)
Method: Least Squares
Date: 02/05/21 Time: 05:55
Sample (adjusted): 1988 2019
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CED(-1)	-0.251107	0.121226	-2.071403	0.0470
C	7689.454	7669.475	1.002605	0.3241

R-squared	0.125127	Mean dependent var	-90.19656
Adjusted R-squared	0.095965	S.D. dependent var	39784.16
S.E. of regression	37827.08	Akaike info criterion	23.97990
Sum squared resid	4.29E+10	Schwarz criterion	24.07151
Log likelihood	-381.6784	Hannan-Quinn criter.	24.01027
F-statistic	4.290709	Durbin-Watson stat	1.900186
Prob(F-statistic)	0.047017		

ADF Unit Root Test on EDT at Level

Null Hypothesis: EDT has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.814626	0.0686
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EDT)
Method: Least Squares
Date: 02/05/21 Time: 05:57
Sample (adjusted): 1991 2019
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EDT(-1)	-0.479979	0.170530	-2.814626	0.0096
D(EDT(-1))	0.821677	0.199748	4.113580	0.0004
D(EDT(-2))	-0.448125	0.179438	-2.497374	0.0198
D(EDT(-3))	0.378092	0.188831	2.002275	0.0567
C	589.8338	457.5997	1.288973	0.2097

R-squared	0.577832	Mean dependent var	1.761034
Adjusted R-squared	0.507470	S.D. dependent var	3122.954
S.E. of regression	2191.703	Akaike info criterion	18.37833
Sum squared resid	1.15E+08	Schwarz criterion	18.61407
Log likelihood	-261.4858	Hannan-Quinn criter.	18.45216
F-statistic	8.212344	Durbin-Watson stat	1.835187
Prob(F-statistic)	0.000254		

ADF Unit Root Test on EDT at First Level Difference

Null Hypothesis: D(EDT) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.380334	0.0000
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EDT,2)
Method: Least Squares
Date: 02/05/21 Time: 05:58
Sample (adjusted): 1990 2019
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EDT(-1))	-1.170865	0.183512	-6.380334	0.0000
D(EDT(-1),2)	0.611712	0.152243	4.017986	0.0004
C	1.967600	441.8111	0.004453	0.9965

R-squared	0.601508	Mean dependent var	0.037667
Adjusted R-squared	0.571990	S.D. dependent var	3698.881
S.E. of regression	2419.899	Akaike info criterion	18.51548
Sum squared resid	1.58E+08	Schwarz criterion	18.65560
Log likelihood	-274.7322	Hannan-Quinn criter.	18.56030
F-statistic	20.37773	Durbin-Watson stat	1.787491
Prob(F-statistic)	0.000004		

ADF Unit Root Test on VAT at Level

Null Hypothesis: VAT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.220849	0.2032
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(VAT)
Method: Least Squares
Date: 02/05/21 Time: 05:59
Sample (adjusted): 1988 2019
Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
VAT(-1)	-0.281914	0.126940	-2.220849	0.0341
C	5150.574	4938.254	1.042995	0.3053

R-squared	0.141193	Mean dependent var	31.50750
Adjusted R-squared	0.112566	S.D. dependent var	26225.27

S.E. of regression	24705.18	Akaike info criterion	23.12787
Sum squared resid	1.83E+10	Schwarz criterion	23.21948
Log likelihood	-368.0460	Hannan-Quinn criter.	23.15824
F-statistic	4.932170	Durbin-Watson stat	1.918869
Prob(F-statistic)	0.034057		

ADF Unit Root Test on VAT at First Difference

Null Hypothesis: D(VAT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.906326	0.0000
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(VAT,2)
Method: Least Squares
Date: 02/05/21 Time: 06:00
Sample (adjusted): 1989 2019
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(VAT(-1))	-1.092114	0.184906	-5.906326	0.0000
C	35.45331	4849.209	0.007311	0.9942

R-squared	0.546057	Mean dependent var	0.721613
Adjusted R-squared	0.530404	S.D. dependent var	39399.36
S.E. of regression	26999.23	Akaike info criterion	23.30735
Sum squared resid	2.11E+10	Schwarz criterion	23.39986
Log likelihood	-359.2639	Hannan-Quinn criter.	23.33750
F-statistic	34.88468	Durbin-Watson stat	2.007115
Prob(F-statistic)	0.000002		

Appendix IV:

ARDL-Bounds Cointegration Test Results using E-Views 9 Software

ARDL Bounds Test
Date: 02/05/21 Time: 06:15
Sample: 1989 2019
Included observations: 28
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	K
F-statistic	653.2326	5

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Test Equation:
Dependent Variable: D(INFD)
Method: Least Squares
Date: 02/05/21 Time: 06:15
Sample: 1989 2019
Included observations: 28

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFD(-1))	-1.799097	0.590131	-3.048640	0.0123
D(CIT)	1.837768	1.555992	1.181091	0.2649
D(CIT(-1))	-6.493600	4.326132	-1.501018	0.1642
D(PPT)	-0.046130	0.124178	-0.371479	0.7180
D(PPT(-1))	0.729816	0.346018	2.109189	0.0611
D(CED)	-1.738028	0.719133	-2.416838	0.0363
D(CED(-1))	-2.172698	0.549637	-3.952971	0.0027
C	4247.308	1789.529	2.373422	0.0390
CIT(-1)	3.654712	3.871422	0.944023	0.3674
PPT(-1)	-0.843179	0.331482	-2.543664	0.0292
CED(-1)	0.671040	1.118331	0.600037	0.5618
INFD(-1)	1.178489	0.851665	1.383747	0.1965

R-squared	0.999525	Mean dependent var	-238.3214
Adjusted R-squared	0.998717	S.D. dependent var	93713.29
S.E. of regression	3357.345	Akaike info criterion	19.33178
Sum squared resid	1.13E+08	Schwarz criterion	20.18820
Log likelihood	-252.6450	Hannan-Quinn criter.	19.59360
F-statistic	1236.855	Durbin-Watson stat	1.931840
Prob(F-statistic)	0.000000		

Appendix V:

Error Correction Mechanism Test Result using E-Views 9 Software

ARDL Cointegrating And Long Run Form
Dependent Variable: INFD
Selected Model: ARDL(2, 2, 2, 2, 2, 2)
Date: 02/05/21 Time: 06:11
Sample: 1987 2019
Included observations: 28

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFD(-1))	-1.799097	0.590131	-3.048640	0.0123
D(CIT)	1.837768	1.555992	1.181091	0.2649
D(CIT(-1))	-6.493600	4.326132	-1.501018	0.1642
D(PPT)	-0.046130	0.124178	-0.371479	0.7180
D(PPT(-1))	0.729816	0.346018	2.109189	0.0611
D(CED)	-1.738028	0.719133	-2.416838	0.0363
D(CED(-1))	-2.172698	0.549637	-3.952971	0.0027
CointEq(-1)	-0.178489	0.851665	1.383747	0.1965

Cointeq = INFD - (-3.1012*CIT + 0.7155*PPT -0.5694*CED -3604.0287)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CIT	-3.101185	3.940544	-0.786994	0.4495
PPT	0.715475	0.412230	1.735621	0.1133
CED	-0.569407	1.173442	-0.485246	0.6380
C	-3604.028689	2695.311581	-1.337147	0.2108

Appendix VI:

Post Diagnostic Test Results

Appendix VI (A):

Ramsey RESET Specification Test Result using E-Views 9 Software

Ramsey RESET Test
Equation: UNTITLED
Specification: INFD INFD(-1) INFD(-2) CIT CIT(-1) CIT(-2) PPT PPT(-1) PPT(-2) CED CED(-1) CED(-2) EDT EDT(-1) EDT(-2) VAT VAT(-1) VAT(-2) C
Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	0.607668	9	0.5584
F-statistic	0.369261	(1, 9)	0.5584

F-test summary:

	Sum of Sq.	Df	Mean Squares
Test SSR	4442422.	1	4442422.
Restricted SSR	1.13E+08	10	11271764
Unrestricted SSR	1.08E+08	9	12030580

Unrestricted Test Equation:
Dependent Variable: INFD
Method: ARDL
Date: 02/05/21 Time: 06:19
Sample: 1989 2019
Included observations: 28
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic):
Fixed regressors: C

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
INFD(-1)	0.332275	0.314534	1.056407	0.3183
INFD(-2)	1.546708	0.737703	2.096654	0.0655
CIT	1.265530	1.863032	0.679285	0.5140
CIT(-1)	-3.423915	5.240752	-0.653325	0.5299
CIT(-2)	6.734277	4.486893	1.500878	0.1676
PPT	0.059299	0.215777	0.274818	0.7897
PPT(-1)	-0.018670	0.352815	-0.052917	0.9590
PPT(-2)	-0.563923	0.449797	-1.253726	0.2415
CED	-1.507295	0.834350	-1.806549	0.1043
CED(-1)	0.001458	0.813511	0.001792	0.9986
CED(-2)	1.406663	1.382600	1.017405	0.3355
C	3800.006	1989.934	1.909614	0.0885
FITTED^2	2.55E-07	4.19E-07	0.607668	0.5584

R-squared	0.999819	Mean dependent var	103436.5
Adjusted R-squared	0.999458	S.D. dependent var	148991.6

Appendix VI:

Post Diagnostic Test Results

Appendix VI (A):

Ramsey RESET Specification Test Result using E-Views 9 Software

Ramsey RESET Test
Equation: UNTITLED
Specification: INFD INFD(-1) INFD(-2) CIT CIT(-1) CIT(-2) PPT PPT(-1) PPT(-2) CED CED(-1) CED(-2) EDT EDT(-1) EDT(-2) VAT VAT(-1) VAT(-2) C
Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	0.607668	9	0.5584
F-statistic	0.369261	(1, 9)	0.5584

F-test summary:

	Sum of Sq.	Df	Mean Squares
Test SSR	4442422.	1	4442422.
Restricted SSR	1.13E+08	10	11271764
Unrestricted SSR	1.08E+08	9	12030580

Unrestricted Test Equation:
Dependent Variable: INFD
Method: ARDL
Date: 02/05/21 Time: 06:19
Sample: 1989 2019
Included observations: 28
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic):
Fixed regressors: C

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
INFD(-1)	0.332275	0.314534	1.056407	0.3183
INFD(-2)	1.546708	0.737703	2.096654	0.0655
CIT	1.265530	1.863032	0.679285	0.5140
CIT(-1)	-3.423915	5.240752	-0.653325	0.5299
CIT(-2)	6.734277	4.486893	1.500878	0.1676
PPT	0.059299	0.215777	0.274818	0.7897
PPT(-1)	-0.018670	0.352815	-0.052917	0.9590
PPT(-2)	-0.563923	0.449797	-1.253726	0.2415
CED	-1.507295	0.834350	-1.806549	0.1043
CED(-1)	0.001458	0.813511	0.001792	0.9986
CED(-2)	1.406663	1.382600	1.017405	0.3355
C	3800.006	1989.934	1.909614	0.0885
FITTED^2	2.55E-07	4.19E-07	0.607668	0.5584
R-squared	0.999819	Mean dependent var		103436.5
Adjusted R-squared	0.999458	S.D. dependent var		148991.6

S.E. of regression	3468.513	Akaike info criterion	19.36300
Sum squared resid	1.08E+08	Schwarz criterion	20.26700
Log likelihood	-252.0820	Hannan-Quinn criter.	19.63936
F-statistic	2767.259	Durbin-Watson stat	1.792940
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Appendix VI (B):

Breusch-Godfrey Serial Correlation LM Test Result using E-Views 9 Software

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.110274	Prob. F(2,8)	0.8969
Obs*R-squared	0.751209	Prob. Chi-Square(2)	0.6869

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 02/05/21 Time: 06:17
Sample: 1989 2019
Included observations: 28
Presample and interior missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFD(-1)	-0.029122	0.399443	-0.072906	0.9437
INFD(-2)	-0.009767	0.685737	-0.014243	0.9890
CIT	-0.105857	2.008335	-0.052709	0.9593
CIT(-1)	1.032493	6.710205	0.153869	0.8815
CIT(-2)	0.289380	5.450478	0.053093	0.9590
PPT	0.026453	0.172860	0.153029	0.8822
PPT(-1)	-0.065690	0.440183	-0.149234	0.8851
PPT(-2)	-0.017119	0.448161	-0.038197	0.9705
CED	0.101593	0.907877	0.111901	0.9137
CED(-1)	-0.067305	0.937531	-0.071789	0.9445
CED(-2)	-0.147887	0.808387	-0.182942	0.8594
C	-692.3484	2555.264	-0.270950	0.7933
RESID(-1)	-0.197864	0.534166	-0.370417	0.7207
RESID(-2)	-0.257394	0.720608	-0.357189	0.7302

R-squared	0.026829	Mean dependent var	8.18E-11
Adjusted R-squared	-2.284453	S.D. dependent var	2043.215
S.E. of regression	3702.930	Akaike info criterion	19.44745
Sum squared resid	1.10E+08	Schwarz criterion	20.39902
Log likelihood	-252.2642	Hannan-Quinn criter.	19.73835
F-statistic	0.011608	Durbin-Watson stat	1.758170
Prob(F-statistic)	1.000000		

Appendix VI (C):

Breusch-Pagan-Godfrey Heteroscedasticity Test Result using E-Views 9 Software

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.494920	Prob. F(17,10)	0.9030
Obs*R-squared	12.79389	Prob. Chi-Square(17)	0.7499
Scaled explained SS	2.227160	Prob. Chi-Square(17)	1.0000

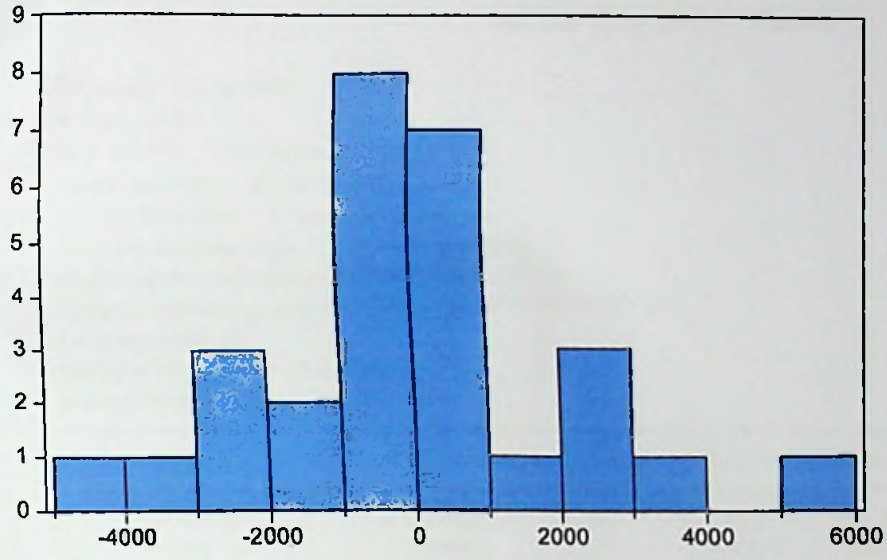
Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 02/05/21 Time: 06:18
Sample: 1989 2019
Included observations: 28

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7377631.	4371529.	1.687654	0.1224
INFD(-1)	-358.3851	720.7760	-0.497221	0.6298
INFD(-2)	-218.6995	1441.594	-0.151707	0.8824
CIT	1730.803	3801.036	0.455350	0.6586
CIT(-1)	6322.267	11392.94	0.554928	0.5911
CIT(-2)	-5994.542	10568.04	-0.567233	0.5831
PPT	61.70494	303.3479	0.203413	0.8429
PPT(-1)	-461.0556	812.5622	-0.567410	0.5829
PPT(-2)	608.5095	845.2648	0.719904	0.4881
CED	513.5913	1756.724	0.292357	0.7760
CED(-1)	-1165.793	1692.517	-0.688792	0.5066
CED(-2)	-560.0182	1342.673	-0.417092	0.6854

R-squared	0.456924	Mean dependent var	4025630.
Adjusted R-squared	-0.466304	S.D. dependent var	6772960.
S.E. of regression	8201448.	Akaike info criterion	34.93361
Sum squared resid	6.73E+14	Schwarz criterion	35.79003
Log likelihood	-471.0706	Hannan-Quinn criter.	35.19543
F-statistic	0.494920	Durbin-Watson stat	2.939240
Prob(F-statistic)	0.903036		

Appendix VI (D):

Jarque-Bera Normality Test Result using E-Views 9 Software



Series: Residuals	
Sample 1989 2019	
Observations 28	
Mean	8.18e-11
Median	-22.41812
Maximum	5496.793
Minimum	-4285.257
Std. Dev.	2043.215
Skewness	0.391367
Kurtosis	3.729575
Jarque-Bera	1.335778
Probability	0.512790

Appendix VII:

ARDL Regression Result

Dependent Variable: INFD
Method: ARDL
Date: 02/05/21 Time: 06:09
Sample (adjusted): 1989 2019
Included observations: 28 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): CIT PPT CED EDT VAT
Fixed regressors: C
Number of models evalulated: 486
Selected Model: ARDL(2, 2, 2, 2, 2, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
INFD(-1)	0.379392	0.295057	1.285827	0.2275
INFD(-2)	1.799097	0.590131	3.048640	0.0123
CIT	1.837768	1.555992	1.181091	0.2649
CIT(-1)	-4.676656	4.663816	-1.002753	0.3396
CIT(-2)	6.493600	4.326132	1.501018	0.1642
PPT	-0.046130	0.124178	-0.371479	0.7180
PPT(-1)	-0.067233	0.332630	-0.202126	0.8439
PPT(-2)	-0.729816	0.346018	-2.109189	0.0611
CED	-1.738028	0.719133	-2.416838	0.0363
CED(-1)	0.236370	0.692849	0.341157	0.7400
CED(-2)	2.172698	0.549637	3.952971	0.0027
C	4247.308	1789.529	2.373422	0.0390

R-squared	0.999812	Mean dependent var	103436.5
Adjusted R-squared	0.999492	S.D. dependent var	148991.6
S.E. of regression	3357.345	Akaike info criterion	19.33178
Sum squared resid	1.13E+08	Schwarz criterion	20.18820
Log likelihood	-252.6450	Hannan-Quinn criter.	19.59360
F-statistic	3127.266	Durbin-Watson stat	1.931840
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.