IMPACT OF GOVERNMENT SPENDING FOR INFRASTRUCTURAL DEVELOPMENT ON ECONOMIC GROWTH IN NIGERIA

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A DISSERTATION SUBMITTED TO THE DEPARTMENT OF ECONOMICS, FACULTY OF SOCIAL SCIENCES, NNAMDI AZIKIWE UNIVERSITY, AWKA, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DOCTOR OF PHILOSOPHY (Ph.D) IN ECONOMICS.

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OCTOBER, 2019

CERTIFICATION

Having completed the requirements for courses and research for the award of doctor of philosophy (PhD) in Economics, I hereby certify that the work embodied in this project is original and has not been submitted in part or whole to this or any other institution for the award of any certificate, degree or diploma.

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APPROVAL

This is to certify that this Ph.D. dissertation titled, 'Impact of Government Spending for Infrastructural Development on Economic Growth in Nigeria', carried out by Okoli, Uju Victoria with registration number 2003117017P in partial fulfilment of the requirement for the award of Doctor of Philosophy (Ph.D) in Economics, has been read and approved by the under signed on behalf of the School of Postgraduate Studies, Nnamdi Azikiwe University, Awka.

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This work is dedicated to the evergreen memory of my dearly beloved mother, late Mrs Juliana Chizoba Onebunne whose love for education inspired me to go this far.

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ABSTRACT

No nation can grow without the development of infrastructure. This study specifically sought to examine how government spending for infrastructural development has impacted on Nigeria's economic growth during the pre Structural Adjustment Program (SAP), SAP and post SAP periods using the combination of endogenous growth model and unbalanced growth model as the theoretical framework and employing auto regressive distributed lag (ARDL) technique for the period 1970 to 2017 with data obtained from secondary sources. To determine if structural breaks exist within these periods for economic growth and aggregate spending in Nigeria and ascertain the causal link that exists between government spending on infrastructure and Nigeria's economic growth for the entire period under study. The findings show that the growth rate of government spending for infrastructure on transport, communication, health, education and utility sectors during the pre-SAP and SAP periods have positive impact on the dependent variable (GDPGR). Also, the growth rate of government spending on the communication and utility sectors during the post-SAP and the entire period have positive impact on the dependent variable (GDPGR) while the growth rate of government spending on the transport, health and education sectors have negative impact on economic growth rate. The Zivot-Andrew's test for structural stability showed that the economy witnessed the worst performance captured by negative growth rate of -12.4 in 1995 during the SAP period while the granger causality test revealed that there exists no causal link between the growth rate of the government spending for infrastructure in the sectors included in the model and economic growth rate in Nigeria. This study concludes that since government spending on the sectors included in the model negatively impacted on economic growth, Nigeria should not adhere to the theory of unbalanced growth even though it was effective in European countries because evidences from Nigeria do not support this theory. Nigeria should rather look inwards to utilise its abundant natural endowments in the petroleum and agricultural sectors so that government spending in these sectors can enable the country achieve infrastructural development which will in turn positively impact on economic growth.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Economic growth of any country according to scholars is the steady process by which the productive capacity of the economy is increased over time to bring about rising level of national output and income (Todaro & Smith, 2006; Kodongo & Ojah, 2016). Jhingan (2006) sees economic growth as an increase in output, and adequate provision of basic public infrastructure at full capacity. This has been seen as one of the driving forces of economic growth and development for countries wishing to move from a less developed economy to developed economy. Public infrastructure on the other hand are the basic physical and organizational structures and facilities like highways, water, electricity, educational and health facilities etc required to boost productivity that are owned by the government or are for public use (Jhingan, 2006). Since no nation can grow without infrastructure, the need for the provision of basic infrastructure primarily affects a nation's budget/allocation which when adequately spent helps it attain infrastructural development. Government spending which emanates from budgetary allocations therefore is the amount of funding released to each expenditure line as prioritised by the government as against its estimated revenues for a specific period of time usually one year.

Over the years, there has been consistent increase in government spending for the development of infrastructure in the country, yet, Nigeria's economy growth trajectory has been downward. This study examines Nigerian government expenditure on infrastructure between 1970 to 2017 and its impact on Nigerian economic growth. The period is critical in order to assess governments' efforts to achieve infrastructural development in the country from the pre structural adjustment program period to the period of structural adjustment program and post structural adjustment program period. The post structural adjustment program period incorporates salient economic reform programs in the country such as, petroleum special trust fund, national economic empowerment development strategy and poverty eradication programs. This examination of the contribution of government spending to the economic growth in Nigeria is based on the theory of unbalanced growth which is specific on the sectors to be invested in, in other to achieve development. These sectors include education, public health, communications, transportation and conventional public utilities like water, power, irrigation and drainage

schemes. This sectoral orientation is taken because extant literatures show that in Nigeria, there seem to be a concentration of attention on holistic economic approach that has not yielded much. That is why this study is taking a new dimension to examine the impact which government spending on selected infrastructure has on economic growth in Nigeria as a deviation from external literature that used holistic approach.

Government over the years has invested in the development of these selected sectors of the economy in order to enhance growth. From the first national development plan, more than 70 per cent of the total capital expenditure of £676.8 million was devoted to those sectors which contributed directly to economic growth (primary production; trade and industry; electricity; transport system; communications; irrigation and industrial water supplies), but due to the civil war, the expected annual average investment of £112.8 million was really never achieved (Budget Office of the Federation). The second national development plan contained policy framework and programmes for the reconstruction of the damaged areas of the country due to the civil war. It is observed from the third national development plan that the sectoral percentage distribution of the gross capital expenditure of ₦ 32.9 billion shows that the economic sector of agriculture, water supply, urban road development, sewage with 62.3 per cent of the total outlay had the largest expenditure . Also in the fourth national development plan, out of a total of ₦ 1.2 billion budgeted for capital expenditure, National Basic Health Scheme consumed the sum of ₦ 100 million, while the establishment of new hospitals gulped about ₦ 150 million.

By 1986, the government introduced the Structural Adjustment Program (SAP) with the establishment of directorate of food, roads and rural infrastructure (DFRRI). In that fiscal year, the directorate gulped the sum of ₦ 300 million, in 1987 it received ₦ 400 million while ₦ 500 million was spent on the agency in 1988 to develop rural infrastructure. By 1994, the government established the petroleum special trust fund charged with the responsibility of using the gains from increase in the prices of petroleum products to complete all government-abandoned projects and rehabilitate decaying infrastructure in the country. A total of ₦ 120 million was used to drill boreholes in some selected states, ₦ 11, 953 million was used to construct roads between 1995 and 1997, while a total of ₦ 9,588 billion was expended on education specifically, university education. National economic empowerment development strategy placed emphasis on the capital expenditure in sectors like education, health, transport

and communication. In line with this policy, the appropriated capital expenditure allocation to education stood at ₦ 74, 923,247,201 in 2007 which was a huge increment from ₦ 40, 005,096,429 in 2004. National poverty eradication program gulped the sum of ₦ 500 billion between 2012 and 2015. This amount was invested mainly in the health sector, transport and communication sectors (Central Bank of Nigeria (CBN), 2016).

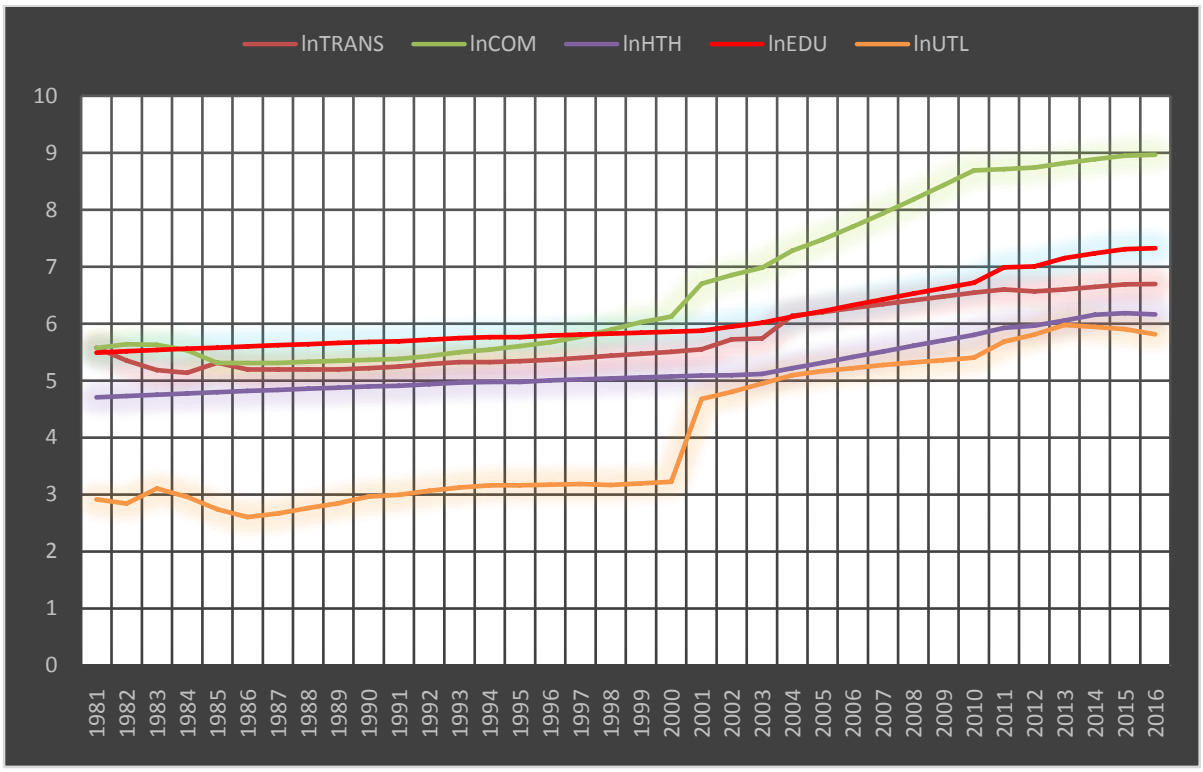

Fig 1.1: Trend of government spending on transport, communication, health, education and utilities sectors (1981-2016). Source: Researchers' Plot, using CBN Statistical Bulletin.

From Figure 1.1, government spending to sustain the available infrastructure has been on the increase as at 1981-1992 and 1994-2005. During the same period, government spending on education, health, and transport and communication infrastructure grew from 8.78 per cent, 11.1 per cent, 18.8 per cent and 38 per cent to 33.1 per cent, 44.1 per cent, 57.1 per cent and 73.2 per cent respectively. Between 2007 and 2017, the growth in government spending on education, health, construction and water infrastructure stood at 13.3 per cent and 43.96 per cent respectively (Central Bank of Nigeria (CBN), 2017). Government total capital expenditure for 2013 was ₦ 1, 786.61, ₦ 1,178. 45 in 2014, ₦ 1,346.18 in 2015 and ₦ 1, 388.39 in 2016 (Medium Term Expenditure Framework, 2014-2016). From the above background, it is evident

that over the years under consideration, there has been increased government spending for the provision of infrastructure in the country. This increased government spending did not reflect on the infrastructures on ground. This worrisome situation presented above gave rise to this research work in other to examine how and the level of growth which each of these sectors have attained based on the huge spending on them in line with economic policies and the overall growth of the Nigerian economy. As well as determine extant factors that may have impeded on the growth despite the consistency inherent in government spending.

1.2 Statement of the Problem

In Nigeria over the years, government has budgeted and spent huge amounts for the development on capital infrastructure in the country. In 2010, government budgeted ₦1,764.69 billion and spent ₦883.87 billion, budgeted ₦1,146.75 billion and spent ₦713.3 billion in 2011, budgeted ₦1,339.99 billion and spent ₦744.42 billion in 2012, budgeted ₦1,621.48 billion and spent ₦405.37 billion in 2013 and the list continues. In 2013, power sector had 80.17 per cent of budget releases, transportation sector had 50.49 per cent of budget releases, health sector had 79.37 per cent of budget releases and education sector had 65.37 per cent of budget releases (Budget Office of the Federation). Despite statistical evidence of the huge amounts that have been consistently spent for the development of public infrastructures in Nigeria, public infrastructure development in Nigeria still requires more to be desired. There is statistical evidence of the gap that exists between budgetary releases for the development of infrastructure in the country and the actual spending that is embarked on within a fiscal year. This leads to scenario in which road systems are neglected and in bad states within the country, public transport and telecommunication systems are unreliable, power generation and distribution have reduced tremendously resulting in epileptic supply and there has been dearth of equipment and infrastructure in public universities resulting in frequent strike. The infrastructural development and concomitant economic growth as a result of the huge investment seems to elude the country.

Present statistics show evidence of unstable economic growth in the country. The average growth rate in Nigeria increased from 26% to 34% between 1970 and 1979 and fell on average to -3.4per cent between 1980 and 1984 (see Figure 1.2). Between 2000 and 2004 economic growth was 11.52per cent and further declined substantially from 24.2 per cent to 8.48 per cent during the period 2000 and 2014 respectively. The Nigerian economy continues to face serious

macroeconomic challenges such that the Gross domestic product (GDP) growth rate for 2016 stood at -1.5per cent (Africa Economic Outlook, (AEO) 2016). The wide fluctuation in GDP growth rates recorded by the Nigerian economy for the period 1970- 2017 is depicted in Figure 1.2.

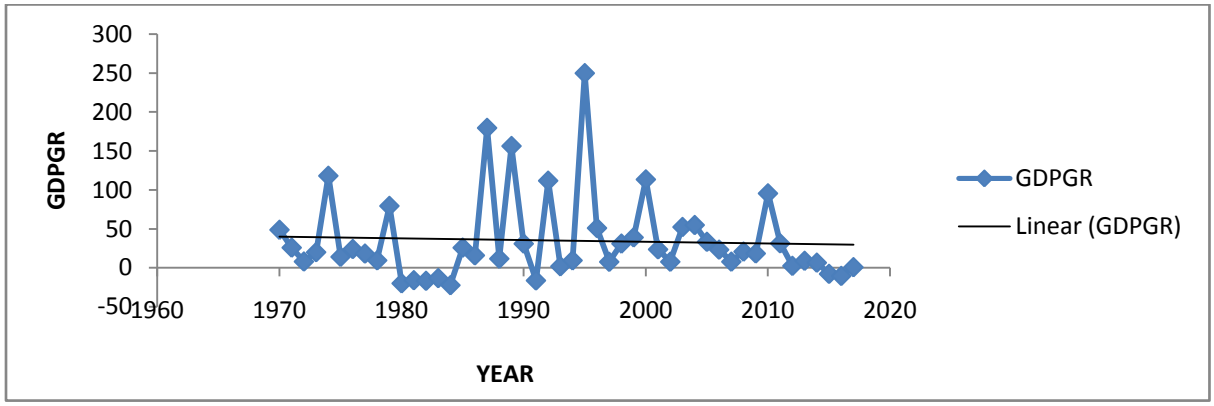

Fig 1.2: Trends of Nigeria's Economic Growth Rate (1970 - 2017)
Source: Researchers' Plot, using CBN Statistical Bulletin.

Due to the low GDP growth recorded within the period of this study, the Nigerian government took some policy measures to improve infrastructural development within the country to include the national development plans, structural adjustment program, petroleum special trust fund, national economic empowerment development strategy, poverty eradication programs etc. Yet, there exists a lacuna between what was spent for infrastructural development and the available infrastructure. Not minding that revenue inflows from taxation and other income generating activities of the government have been inconsistent yet, there appears to be consistent increase in government spending for infrastructural development in the country. This accounts for continuous borrowing to augment the budget, yet this effort seems not to reflect on the available infrastructures on ground and has not been able to address the question of bourgeoning infrastructural needs in the country. This infrastructural gap witnessed aroused the interest of this research in order to evaluate the probable causes of this negative trend and also to determine the impact government spending on infrastructure through these policies have on economic growth in Nigeria.

The problems as highlighted above have not only attracted policy measures but also literature attention. Existing empirical literature on the impact of infrastructural government spending on

economic growth have mainly focused on cross-country evidence and a production function framework to estimate the effect of government spending on infrastructure on economic growth (Bougheas, Demetriades, & Morgenroth, 1999; Kodongo & Ojah, 2016), but totally neglecting the key sectors that constitute public infrastructure. However, other empirical literature on the impact of government spending for infrastructure on economic growth focus on one element of infrastructure (e.g., telephone, roads) (Aigheyisi, & Oaikhenan, 2015; Ogunlana, Yaqub, & Alhassan, 2016; Olorunfemi, 2008) in disregard of the multidimensional nature of public infrastructure. Not minding these efforts by scholars to bridge this gap, there is still gap in empirical literature because bulk of the previous literature focused on whole sector analysis of government spending for infrastructure and economic growth. According to Hirschman (1958), for developing countries such as Nigeria to witness economic growth, there is need to choose and invest in the critical/key sectors of the economy that comprise the public infrastructure in the country, so that there will then be trickled down effects to other sectors of the economy. This idea have been neglected by previous studies (Ehizuelen, 2016; Owolabi, 2015; Siyan & Adegoriola, 2017), hence, this study adopts Hirschman's approach which was used for European countries in the Nigerian context as a robust model to incorporate and empirically examine the impact which government spending on five key selected sectors of the economy have on the Nigerian economic growth. The aim is to ascertain if the results obtained in the European context tallies with the Nigerian experience and give reasons for any differences observed especially as it relates to the variance that exists between yearly budgetary releases and the actual spending for infrastructural development within each fiscal year in the country. The investigation spans from the pre SAP period through the SAP and post SAP period till 2017 to determine if structural breaks exist within these periods for economic growth and aggregate spending in Nigeria as well as ascertain the causal link that exists between government spending on infrastructure and Nigeria's economic growth for the entire period under study. The study attempts to fill these gaps as the major point of departure from the previous literatures reviewed.

1.3 Research Questions

This study attempts to answer the following questions:

1. What impact does government spending on infrastructure have on Nigeria's economic growth during the pre SAP, SAP and post SAP periods?
2. Were there structural breaks experienced during the pre SAP, SAP and post SAP periods for economic growth and aggregate spending in Nigeria?
3. What causal link exists between government spending on infrastructures and Nigeria's economic growth for the entire period?

1.4 Objectives of the Study

The objective of the study is to:

1 Examine the impact government spending on infrastructure has on Nigeria's economic growth during the pre SAP, SAP and post SAP periods.

2 Ascertain if structural breaks exist during the pre SAP, SAP and post SAP periods for economic growth and aggregate spending in Nigeria.

3 Ascertain the causal link that exists between government spending on infrastructure and Nigeria's economic growth for the entire period.

1.5 Research Hypotheses

The following hypotheses are tested for this study:

1. H_0: Government spending on infrastructure has no significant impact on Nigeria's economic growth during the pre SAP, SAP and post SAP periods
   H_1: Government spending on infrastructure has significant impact on Nigeria's economic growth during the pre SAP, SAP and post SAP periods

2. H_0: There were no structural breaks experienced during the pre SAP, SAP and post SAP periods for economic growth and aggregate spending in Nigeria.
   H_i: There were structural breaks experienced during the pre SAP, SAP and post SAP periods for economic growth and aggregate spending in Nigeria.

3. H_0: There is no causal link between government spending on infrastructure and Nigeria's economic growth**.**
   H_i: There is causal link between government spending on infrastructure and Nigeria's economic growth**.**

1.6 Significance of the Study

The outcome of the study which gives an in depth understanding of the impact government spending to develop infrastructure in the country using various policies has on the Nigerian economic growth is beneficial to stakeholders which include the directors of government ministries, members of the national assembly, state policy makers, captains of industries, private sector and other researchers.

Directors of government ministries and members of the national assembly benefits from this study by understanding the impact huge government spending on the transport, communication, health, education and utilities sectors of the economy has on the economic growth of the country. By gaining such knowledge, they can advice the executive on how to develop the best policy mix to implement and maintain so the economy can maximise the full benefits derivable from government spending for infrastructural development in the country. From their knowledge also, they are better equipped to advice the executive on the best amount to spend for the development of infrastructure as against the huge demand for these infrastructure in the country so that the standard of living of the citizens can be improved. They also ensure that factors discussed from the result of this study that prevented the Hirschman's approach from being effective in the Nigerian context should be avoided in their legislation and activities.

State policy makers and captains of industries also benefit from this study by effectively weighing and coming up with interventions and planning that stimulate public infrastructure development as an ardent booster of economic growth at the state, manufacturing and industrial levels of the country and also avoid practices that have hindered infrastructural development in the country. They also ensure that the amount budgeted for the development of infrastructure at their state and industrial levels are judiciously spent and to avoid any form of leakage from the income stream.

The private sector from the result of this analysis appreciates the impact of government spending to develop infrastructure using various policies on the lives of the citizenry and develop renewed commitment to carry out the obligatory duties of good citizens so as to encourage and complement government activities. They also gain insight into the exact state of infrastructure in the country in line with government efforts to improve them and come up with renewed measures that enables them at their level and within their capacity to ensure that infrastructure provided by the government are not unnecessarily vandalized.

Other researchers on their own side find the results of this study and its contribution to scholarship useful as a reference material for undertaking further studies. Chief of the contribution is the finding that Nigeria should not adhere to the theory of unbalanced growth because evidences from Nigeria do not support this theory but should rather look inwards to utilise its abundant natural endowments in the petroleum and agricultural sectors so that government spending in these sectors can enable the country achieve infrastructural development which will in turn positively impact on economic growth.

1.7 Scope of and limitation to the Study

The study investigates the impact of government spending for infrastructure on Nigeria's economic growth from 1970 to 2017. The study looks at the extent to which government spending on the transport, communication, health, education and utilities sectors of the economy have influenced economic growth in Nigeria between 1970-2017. The period is critical so as to incorporate and examine government efforts to achieve infrastructural development in the country from the pre structural adjustment program period to the period of structural adjustment program and post structural adjustment program period. The post structural adjustment program period incorporates salient economic reform programs in the country such as the petroleum special trust fund, national economic empowerment development strategy and poverty eradication programs.

The major limitations are human and material resources, difficulties in securing necessary documents from relevant agencies. Another challenge that was witnessed in this study centred on finance and time constraint. Lastly, some of the secondary data used in this study were obtained from diversified sources which are also subject to error, hence absolute reliability of the data is not guaranteed. These limitations do not in any form diminish the relevance of the present study. The limitations were overcome by sourcing information from authentic and licensed bodies like Central Bank of Nigeria (CBN) statistical bulletin various issues, National Bureau of Statistics and World Development Indicators for Nigeria (WDI).

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter reviewed the literature on government spending for infrastructure and economic growth under the broad divisions namely: conceptual issues, theoretical literature, other related theoretical issues and empirical literature. Theoretical literature discussed some basic theories on government spending for infrastructure and economic growth. Empirical literature on the other hand reviewed related research findings on government spending on infrastructure.

2.1 Review of Theoretical Literature

This section reviewed the conceptual literature, basic theories and other related theoretical issues.

2.1.1 Review of Conceptual Literature

The review of conceptual literature includes the review of concepts of economic growth, infrastructure and government spending for infrastructural development as well as the conceptual framework for the study.

(1) Concept of Economic Growth

Todaro and Smith (2006) defined economic growth as a steady process by which the productive capacity of the economy is increased over time to bring about rising level of national output and income. According to Romer (1991), economic growth occurs whenever people take resources and rearrange them in ways that are more valuable. Jhingan (2006) viewed economic growth as an increase in output. He explained further that it is related to a quantitative sustained increase in the country's per capita income or output accompanied by expansion in its labour force, consumption, capital and volume of trade (Jhingan, 2008). According to Dewett (2005) the concept of economic growth is viewed as an increase in the net national product in a given period of time. He explained that economic growth is generally referred as a quantitative change in economic variables, normally persisting over successive periods. Ochejele (2007) identified the following, high rate of structural transformation, international flows of labour, goods and capital as some major characteristics of economic growth in Nigeria. Therefore economic growth has long been considered an important goal of economic policy with a substantial body of research dedicated to explaining how this goal can be achieved.

According to Fadare (2010), economic growth has been identified as an essential ingredient for sustainable development in any nation. This is because economic growth brings about a better standard of living of the people and is usually as a result of improvement in infrastructure, health, housing, education and improvement in agricultural productivity. Without doubt,

sustainable development is enhanced by economic growth. We can agree that economic growth as a concept is viewed differently by different scholars. This is attributed to the condition prevailing at the time of these scholars. This study accepts economic growth as an increase in the level of national income and output of a country.

(2) Concept of infrastructure and government spending for infrastructural development

The literature defines infrastructure in two basic ways. The broader definition distinguishes a conceptually sensible category of capital stock used by large capital-intensive natural monopolies that in individual countries may or may not be privately owned. The other approach is an expedient one used in research. It identifies infrastructure with the tangible stock owned by the public sector. The literature also notes that, as with any public good, some benefits of infrastructure such as improved security, time saving, improved health and a cleaner environment are magnitudes that are difficult to measure and thus are not included in official measures of national output. Hence, it is difficult to relate infrastructure to all of its goals (Deng, 2013; Fedderke & Garlic, 2008; Ogwumike & Ofoegbu, 2012).

Broadly, infrastructure serves two major purposes. It provides services that are part of the consumption bundle of residents and is an input into private-sector production, augmenting capital and labour. With regard to its role in augmenting output and productivity, there is conceptual agreement but researchers disagree about magnitudes involved. Infrastructure includes highways and roads, mass-transit and airport facilities, education, buildings, electricity, gas and water supply facilities and distribution systems, waste treatment facilities, correctional institutions, police, fire service and judiciary. Some infrastructure types do not possess the characteristics of public goods—non-rivalry and non-exclusionary—and thus are private and club goods. Roads constitute a mixed case of private and club goods. Core infrastructure comprises highways, water, electricity and communications facilities. Public services provided by core infrastructure components may enter directly (intermediate inputs) into private-sector production or even into aggregate production function. These components are expected to contribute most directly to private-sector output (Menyah, Nazlioglu, & Wolde-Rufael, 2014; Sachs & Dijkstra, 2004).

Aremu, (2016) posits that public infrastructure such as highways and roads, airports, communication facilities, water supply systems, electricity, waste treatment facilities and the like is believed to provide services that form a part of residents' consumption bundles and augments capital and labour as an input in the production process. Ayogu, (2007) is of the view that access to infrastructure provision promotes human development, and betters quality of life through improved productivity and sustainable economic growth. Specifically, public infrastructure provisioning may enhance trade and commerce (Mbaku, 2013; Straub, 2012) and play an important role in alleviating poverty and inequality (Ndulu, 2006; World Bank, 2006). However, some components of core infrastructure are part of social infrastructure (which counts as a final good). For instance, individuals living in squatter and slums that lack social infrastructure such as water and sewerage systems and electricity can be classified as poor cohorts regardless of movements in their indicators of income and food consumption. Therefore, as a basic consumption good, infrastructure is also a central issue in poverty alleviation strategies. Additionally, infrastructure projects generate large-scale expenditure for public works and thus increases aggregate demand. Infrastructure investments are as well sensitive to income shocks. (Ajakaiye & Ncube, 2010; Egert, Kozluk, & Sutherland, 2009)

Gramlich (1994) opined that provision of basic public infrastructure at full capacity has been seen as one of the driving forces of economic growth and development for countries wishing to move from a less developed economy to developed economy, while short supply of basic public infrastructure is a deterrent to economic growth and development. According to Warner (2014), the general idea that public infrastructure will boost economic growth is a prominent feature of government economic programs across the world. This idea originated from recommendations from the big push models in the 1940's – 1960's and formed an important aspect of the state led developmental programs through the end of the 1980's. Today international financial institutions have endorsed the idea that there is an infrastructure gap in less developed countries and closing such gaps can revive economic growth in the less developed countries (Aschauer, 1993; Sanchez-Robles, 1998).

Infrastructure development plays a fundamental part in economic growth and development. In this regard, the sectoral contribution to economic growth cannot be overemphasised. World Development Report (1994) in an attempt to establish the link between infrastructure and

economic growth shows that indeed infrastructure is a core component for economic growth to be achieved. While Estache and Garsous (2012) agree that development of infrastructure is necessary for growth, Sachs and Dijkstra (2004) asserted that the ranking of subsectors in terms of which is more important to growth is difficult due to the different levels of investment allocated to various sectors in different regions. Therefore, this study is of the position that infrastructural development is an essential ingredient for any economy to attain growth.

Governments the world over spend large proportions of their income on enhancing the growth of their economies. This could be expenditure on defence, education, servicing national debts and capital investment. Governments also spend on their own maintenance as well as aid other countries and so on. Public or government spending therefore is the expenses of the government in ensuring common good and that the economy is on course. According to Maku (2009), most nations are getting more involved in economic activities in their various countries and public expenditure has maintained an upward trend over time in virtually all the countries of the world especially in relation to infrastructure development.

Public spending could be broadly classified into recurrent expenditure and capital expenditure. The expenditures of government which occur regularly throughout the year are referred to as recurrent expenditure. They must be made regularly if the functions of government must be maintained and sustained. They include regular salaries of all employees, money spent on the running of essential services or regular maintenance of infrastructural facilities and money spent on administration (Nwaeze, 2010). Nwaeze (2010) also added that capital expenditure is the expenditures of government on the acquisition of things of permanent nature. They include all expenditure on capital projects such as buildings, construction of roads, bridges and other permanent assets.

Boom times can lead to indiscriminate public spending as can redistributive motives. Conversely, countries that face severe drop in income tend to lean on public capital expenditure programmes since the benefits of infrastructure programmes are spread over a longer term, although the costs or the effects of immediate cut backs occur with a lag. Thus cuts in spending on infrastructure are particularly expeditious for politicians attempting to manoeuvre tight budgetary corners. Given the large scale involvement of governments in infrastructure investment, it is suggested that the patterns of growth in infrastructure stocks may be explained

better by political economy rather than by economic efficiency (Ayogu, 2007; Canning, 1998; Munnell, 1992) even though much of the research in this area have looked to economic efficiency.

Foster and Brice˜no-Garmendia, (2010) and Ghosh, Garcia-Mila, and McGuire (1998), agreed that infrastructure development is critical to enhancing market accessibility and expansion especially in developing countries. Infrastructural development facilitates trade as well as creation of new markets. Many countries especially mature economies (such as the USA) realised economic take-off partly due to infrastructural induced trade (Mbekeani, 2007; Nadiri & Mamuneas, 1994; Narayan, 2005). Trade brings market players on the same table hence leading to establishment of networks, exchange of lessons from different economies and brings about competition which ensures efficient market allocations. To leverage on the benefits of effective market access, there must be a well-functioning infrastructural system including good transport network and effective communication (Seitz & Licht, 2007).

(3) Conceptual framework for the study

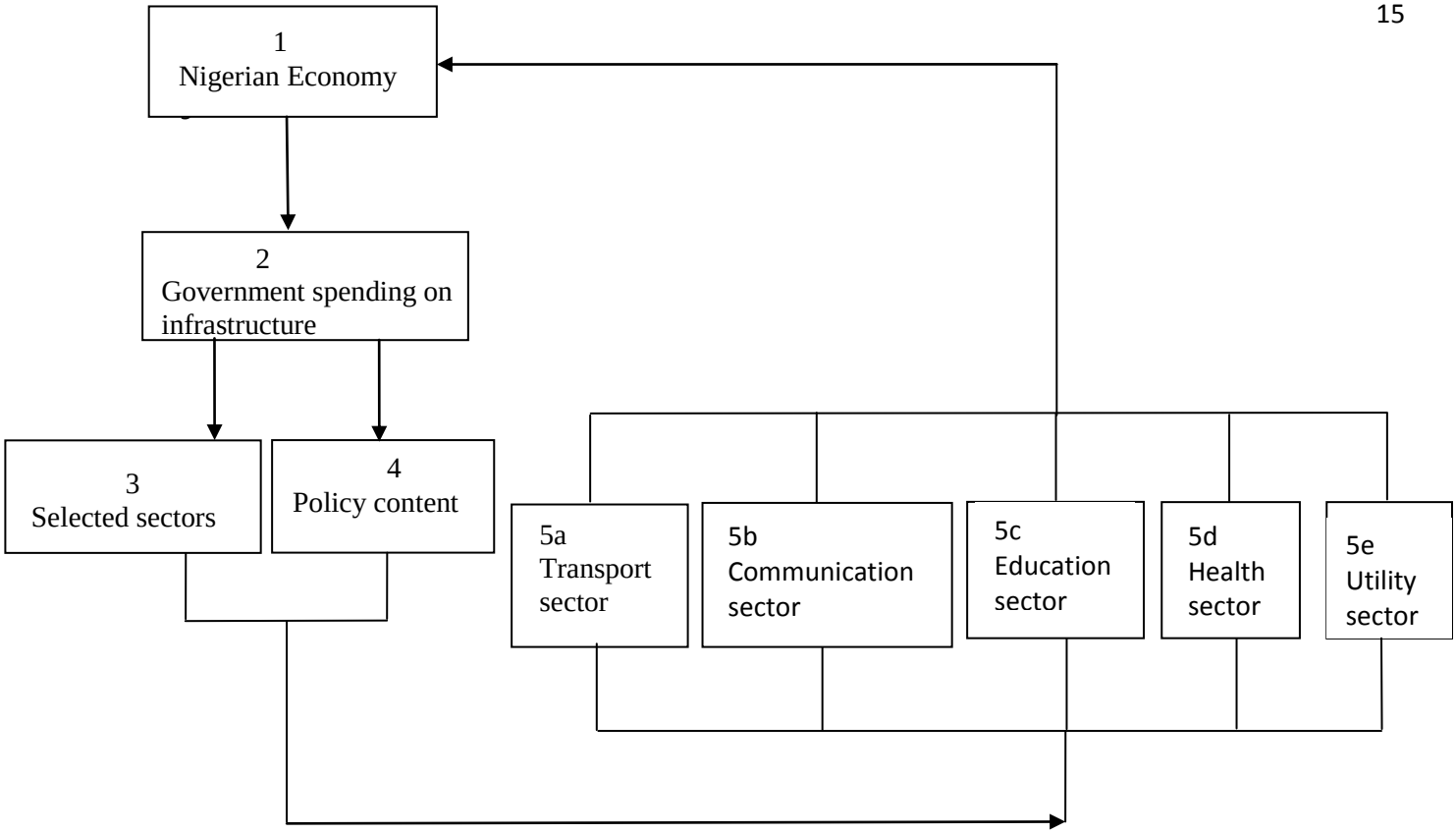

Figure 2.1: Framework for impact of government spending for infrastructure on Nigeria's economic growth. Source: Researcher's idea (2019).

The conceptual framework for this study is depicted in Fig 2.1. The movement is from box 1 in which the Nigerian economy seeks to achieve infrastructural development, to box 2, which is now the government actually spending on infrastructure in the country in other to achieve that objective. Based on the theory of unbalanced growth which is the theoretical framework of this study, the government due to insufficient capital selects the sectors to invest in. The investment by the government is in line with various policies and it is the contents of these policies that affect the selected sectors. This is shown by the movement into boxes 3 and 4 respectively. These sectors include the transport, communication, education, health and utility sectors respectively. The stimulated economic growth generated by the movement into box 5 affects the Nigerian economy. This is shown by the movement from various components of box 5 back to box 1 and the cycle continues.

2.1.2 Review of Basic Theories

In this section, the theory of balanced growth and the theory of unbalanced growth are reviewed because they emphasize government investment in infrastructure. Also The Solow neoclassical

growth model and the Romer endogenous growth theory are growth theories reviewed since the study is on economic growth.

(1)Theory of Balanced Growth

The proponent of the theory of balanced growth was Arthur Lewis (1954). He postulated that there should be simultaneous and harmonious development of different sectors of the economy by the government so that all sectors grow in unison. For this, balance is required between the demand and supply sides. The supply side lays emphasis on simultaneous development of all inter-related sectors which help in increasing the supply of goods. It includes the simultaneous and harmonious development of intermediate goods, raw materials, power, agriculture, irrigation, transportation, etc., and all industries producing consumer goods. On the other hand, the demand side relates to the provision for large employment opportunity and increasing incomes so that the demand for goods and services may rise on the part of the people. The demand side is related to supplementary industries, consumer goods industries, especially agriculture and manufacturing industries. With simultaneous setting up of all types of industries large number of people are employed, they create demand for each others' goods. In this way, all goods will be sold out.

His model is stated simply as output at time t is a function of input factors (labour, capital and technology) required in directly productive activities and social overhead capital that will facilitate simultaneous economic growth with both having some degree of homogeneity. The social overhead capital is government investment in all sectors of the economy. The strength of the theory is that if government investment is properly done, it leads to simultaneous economic growth. The weakness is that it leads to rise in costs because simultaneous establishment of a number of industries is likely to raise money and real costs of production thereby making it economically unprofitable to operate in the absence of sufficient capital equipment. When the new industries are established, the demand for the products of the existing firms will decrease and make them unprofitable. At the same time, the demand for factors of production will rise making possible for there to be a raise the prices of factors of production in all industries. The theory pre-supposes the need for balanced investment to provide a growing demand, and the existence of increasing returns.

Hirschman Criticized Lewis balanced growth model on the grounds that it cannot hold for developing countries because developing countries do not have all the capital to provide the required factor input that will lead to balanced economic growth. Hence Hirschman advocates unbalanced economic growth for developing countries. Secondly, there is no proper explanation concerning degree of homogeneity among direct productive activities and social overhead capitals. Kindleberger observes that instead of starting with new industries, the theory does not consider the possibility of cost reduction in existing industries. In some countries, labour is in abundance but capital and entrepreneurial skill are scarce. While in others, labour and capital are scarce but other resources are in abundance. This is a great hindrance to the practical application of the concept of balanced growth. According to kurihara, balanced growth is not to be desired to induce private investment but to be desired for its own sake, as far as an underdeveloped country is concerned. It therefore does not consider planning, but simultaneous investment in all sectors requires planning, direction and coordination by the government. It is therefore wrong to apply a theory applicable to a developed economy on an underdeveloped economy.

Not minding that this theory is on government spending on infrastructure to attain economic growth, it was not adopted as the theoretical framework for this research work because Nigeria as a developing nation does not have sufficient capital to invest in all sectors of the economy simultaneously and harmoniously so as to attain economic growth. The theory of balanced growth fails as a theory of development because development implies the process of change of one type of economy into another more advanced type. But the doctrine of balanced growth would involve the superimposition of an entirely new self-contained modern industrial sector upon the stagnant and equally self-contained traditional sector. The officials in underdeveloped countries lament that the necessary skills and other resources for development are lacking in the economy but the protagonists of the balanced growth doctrine assume that persons lacking in skills and entrepreneurial ability become omniscient overnight and are in a position to start a chain of new industries, thus appearing to be a contradiction in itself.

(2) Theory of Unbalanced Growth

The theory of unbalanced growth was propounded by Albert Hirschman (1958) and it is the opposite of the doctrine of balanced growth. According to the theory, investment should be made

in selected sectors rather than simultaneously in all sectors of the economy. No underdeveloped or developing country Nigeria inclusive possesses capital and other resources in such quantities as to invest simultaneously in all sectors. Therefore, investment should be made in a few selected sectors or industries for their rapid development, and the economies accruing from them can be utilized for the development of other sectors. Thus, the economy gradually moves from the path of unbalanced growth to that of balanced growth. It is his contention that deliberate unbalancing the economy, according to a pre-designed strategy, is the best way to achieve economic growth in an underdeveloped country. According to Hirschman, investments in strategically selected industries or sectors of the economy will lead to new investment opportunities and so pave the way for further economic development. He maintains that development has of course proceeded in this way, with growth being communicated from the leading sectors of the economy to the followers, from one industry to another, from one firm to another.

Hirschman maintained that development can only take place by unbalancing the economy by investing either in social overhead capital or in directly productive activities. In social overhead capital are included investments on education, public health, communications, transportation and conventional public utilities like light, water, power, irrigation and drainage schemes, etc. A large investment in social overhead capital will encourage private investment later in directly productive activities. Thus, the social overhead capital approach to economic development is to unbalance the economy so that subsequently investments in directly productive activities are stimulated. As Hirschman puts it, "investment in social overhead capital is advocated not because of its direct effect on final output, but because it permits and in fact invites directly productive activities to come into the economy", some social overhead capital investment is required as a prerequisite of directly productive activities investment. Hirschman after establishing his argument modified Lewis' balanced growth into unbalanced growth model. In Hirschman's opinion developing countries do not have all the capital to provide the required factor input that will lead to balanced economic growth. Hence Hirschman advocates unbalanced economic growth for developing countries.

Rosenstein-Rodan criticising Hirschman's theory of unbalanced growth points out that inadequate attention has been paid to the composition, direction and timing of unbalanced growth (Rosenstein-Rodan, 1943). He further points out that the theory concentrates on stimuli to

expansion and tends to neglect or minimize resistances caused by unbalanced growth. When development is the outcome of deliberate unbalancing the economy, business attitudes change due to shortages and tensions, and there is lots of opposition and hostility. Hirschman neglects this type of reaction on the part of the existing institutions in underdeveloped countries. Investment creates imbalances thereby creating pressures and tensions in the growth process which are overcome by the inducement mechanism. But pressures and tensions are bound to be serious in underdeveloped countries thereby hampering the process of development. Also there may be lots of difficulties in procuring technical personnel, raw materials, and basic facilities like power and transport and even in finding out an adequate domestic or foreign market for the products. All these inhibit growth because it is difficult to shift resources from one sector to another. Also kindleberger criticized that the unbalanced growth doctrine leads to the development of inflationary pressure within the economy. When large doses of investments are being injected into the economy at certain strategic points, income will rise which may tend to increase the demand for consumer goods relative to their supply. Shortages arise due to strains, pressures and tension. Such a situation leads to inflationary rise in the price level. It becomes difficult to control prices in underdeveloped countries, as the governments are incapable of wielding monetary and fiscal measures effectively.

Due to the fact that this theory is on government spending on infrastructure to attain economic growth, it was adopted as the theoretical framework for this research work because Nigeria as a developing nation does not have sufficient capital to invest in all sectors of the economy simultaneously and harmoniously so as to attain economic growth. There is need to invest in the sectors stipulated by the theory so that the development achieved from them will spill over to other sectors and economic growth will be attained. There is also need to state that under developed countries need not only investment decisions as stipulated by the theory but also administrative, managerial and policy decisions essential for economic growth.

(3) The Solow Neoclassical Growth Model

The Solow model in particular represented the seminal contribution to the neoclassical theory of growth and later earned Robert Solow the Noble Prize in economics. Neoclassical growth theory is an economic theory that outlines how a steady economic growth rate can be accomplished with the proper amounts of the three driving forces: labour, capital and technology. The theory states that by varying the amounts of labour and capital in the production function, an equilibrium state can be accomplished (Solow, 1956). The theory also argues that technological change has a major influence on an economy, and that economic growth cannot continue without advances in technology. Neoclassical growth theory starts by outlining the three factors necessary for a growing economy, and it champions the idea that a temporary equilibrium and growth can be achieved with the right allocation mix of the three factors. However, neoclassical growth theory makes it clear that temporary equilibrium is different from long-term equilibrium, which is achieved without any of the three factors needed for short-term growth.

The Neoclassical growth theory lays stress on capital accumulation and its related decision of saving as an important determinant of economic growth. Neoclassical growth model considered two factor production functions with capital and labour as determinants of output. Besides, it added exogenously determined factor, technology, to the production function but change in this exogenous variable will cause a shift in the production function. One popular way of incorporating the technology parameter in the production function is to assume that technology is labour augmenting and labour-augmenting technological change implies that it increases productivity of labour. The second important way of incorporating the technology factor in the production function is to assume that technological progress augments all factors (both capital and labour in our production function) and not just augmenting labour. In this way then, its contribution to the growth in total output is called Solow residual which means that total factor productivity really measures the increase in output which is not accounted for by changes in factors, capital and labour.

Unlike the fixed proportion production function of Harrod- Domar model of economic growth, neoclassical growth model uses variable proportion production function, that is, it considers unlimited possibilities of substitution between capital and labour in the production process (Domar, 1946). Also, it assumes that planned investment and saving are always equal because of immediate adjustments in price (including interest). It does not consider aggregate demand for

goods limiting economic growth unlike the Harrod-Domar growth model that does (Harrod, 1939). It is worthy to note that neoclassical growth theory focuses its attention on supply side factors such as capital and technology for determining rate of economic growth of a country. Therefore, it is called 'classical' along with 'neo' because the growth of output in this model is achieved at least in the short run through higher rate of saving and therefore higher rate of capital formation. The theory is relevant to the present study in that it stipulates factors/determinants needed to be invested in so that we can attain economic growth.

(4) The Romer Endogenous Growth Theory

This was postulated by Romer in 1991. Endogenous growth theory holds that economic growth is primarily the result of endogenous and not external forces. Endogenous growth theory holds that investment in human capital, innovation, and knowledge are significant contributors to economic growth. The theory also focuses on positive externalities and spill over effects of a knowledge-based economy which will lead to economic development. The endogenous growth theory primarily holds that the long run growth rate of an economy depends on policy measures. For example, subsidies for research and development or education increase the growth rate in some endogenous growth models by increasing the incentive for innovation.

The endogenous model gives a constant-savings rate of endogenous growth and assumes a constant, exogenous, saving rate. It models technological progress with a single parameter (usually A). It uses the assumption that the production function does not exhibit diminishing returns to scale to lead to endogenous growth. Various rationales for this assumption have been given, such as positive spill over's from capital investment to the economy as a whole or improvements in technology leading to further improvements (learning by doing). However, the endogenous growth theory is further supported with models in which agents optimally determined the consumption and saving, optimizing the resources allocation to research and development leading to technological progress. An endogenous growth theory implication is that policies that embrace openness, competition, change and innovation will promote growth. Conversely, policies that have the effect of restricting or slowing change by protecting or favouring particular existing industries or firms are likely, over time, to slow growth to the disadvantage of the community.

The theory underlies that the concept of endogenous growth often point to the differences in wealth that still exist between some industrialized and non-industrialized regions, something that exogenous growth proponents would argue evens out over time. On the other hand, one of the main failings of endogenous growth theories is the collective failure to explain conditional convergence reported in empirical literature. Another frequent critique concerns the cornerstone assumption of diminishing returns to capital. Stephen Parente contends that new growth theory has proved to be no more successful than exogenous growth theory in explaining the income divergence between the developing and developed worlds (despite usually being more complex). Paul Krugman criticized endogenous growth theory as nearly impossible to check by empirical evidence because too much of it involved making assumptions about how immeasurable things affected other immeasurable things. The theory is relevant to the present study in that it stipulates factors/determinants needed to be invested in so that we can attain economic growth.

2.1.3 Economic and Policy Content of the Study

In order to fully discuss other issues relating to government spending on infrastructure and its impact on economic growth, this section is divided into four.

(1) Government spending on selected sectors and their contribution to Nigeria's Economic Growth:

In an effort to improve the development of infrastructure in the country, the Nigerian government has over the years increased the expenditure for the provision of infrastructure on key sectors in the country. In as much as that there are other determinants of economic growth, this section is focusing on the government spending in relation to the key sectors of interest in this research work. This will be done using diagrams and tables.

In the health sector**,** government spending to the health sector for the periods 1970-1980, 1981-1989, 1990-1998, 1999-2007 and 2008-2017 increased from 1.3 per cent to 1.9 per cent, 2.5 per cent to 2.8 per cent, 1.4 per cent to 3.1 per cent, 3.0 per cent to 1.7 per cent and then fell from 13.6 per cent to 11.2 per cent respectively. This is shown in Figure 2.2

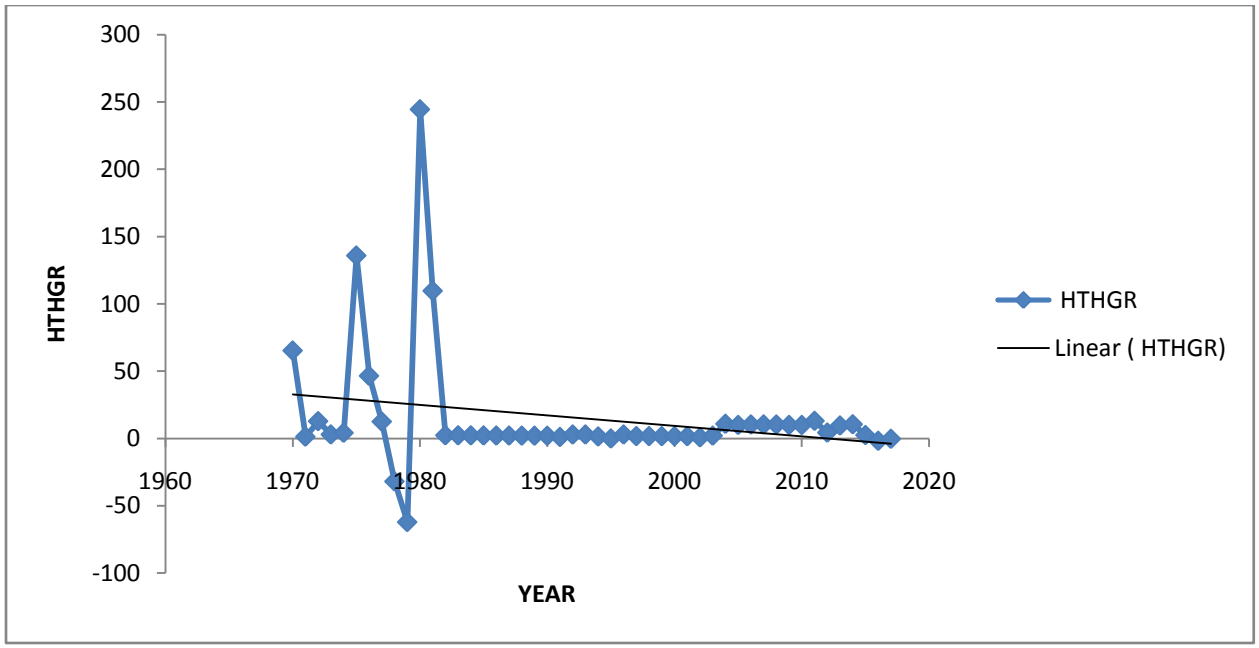

Fig 2.2: Trends of growth rates of government spending in the health sector (1970-2017)
Source: Researchers' Plot, using CBN Statistical Bulletin.

Public health expenditure as percentage of total health expenditure increased from 25.04per cent to 29.10per cent during the period 1995-1999 and 2000-2004. It reached its peak during 2005-2009 with 32.62per cent and fell to 29per cent during 2010-2017. During the same period, private health expenditure as percentage of GDP stood at 2.32per cent during 1995-1999. It increased sharply to 2.76per cent during 2005-2009 and declined to 2.61per cent during 2010-2017. Similarly, public health expenditure as percentage of government expenditure increased significantly from 8.51per cent to 17.69per cent during 1995-1999 and 2005-2009. It declined to 16.70per cent during 2010-2017. However, public health expenditure as percentage of GDP stood at 0.78per cent during 1995-1999. It increased marginally to 0.98per cent in 2000-2004, peaked at 1.33per cent during 2005-2009, and later declined to 1.06per cent during 2010-2017 respectively. Similarly, the total health expenditure as percentage of GDP increased from 3.10per cent to 4.09per cent during 1995-1999 and 2005-2009. It reduced marginally to 3.66per cent in 2010-2017. This is seen in Table 2.1.

Table 2.1: Health Expenditure in Nigeria, 1995-2017

Year	1995-1999	2000-2004	2005-2009	2010-2017
Public health exp (per cent of Total)	25.04	29.10	32.62	29.00
Private health exp (per cent of GDP)	2.32	2.40	2.76	2.61
Public health exp (per cent of Govt. Exp)	8.51	11.30	17.69	16.70
Public health exp (per cent of GDP)	0.78	0.98	1.33	1.06
Total health exp (per cent of GDP)	3.10	3.38	4.09	3.66

Source: World Health Organization Global Health Expenditure database

In the transport sector, government spending to the sector for the periods 1970-1980, 1981-1989, 1990-1998, 1999-2007 and 2008-2017 increased from 0.5 per cent to 1.32 per cent, negative 20 per cent to 0.24 per cent, 2.22 per cent to 4 per cent, 3.93 per cent to 7.18 per cent and then fell from 7.05 per cent to 0.37 per cent respectively. Transport infrastructure grew from a negative 1.84 per cent to 49.6 per cent and declined to 7.03 per cent during 2000-2017. This is shown in Figure 2.3.

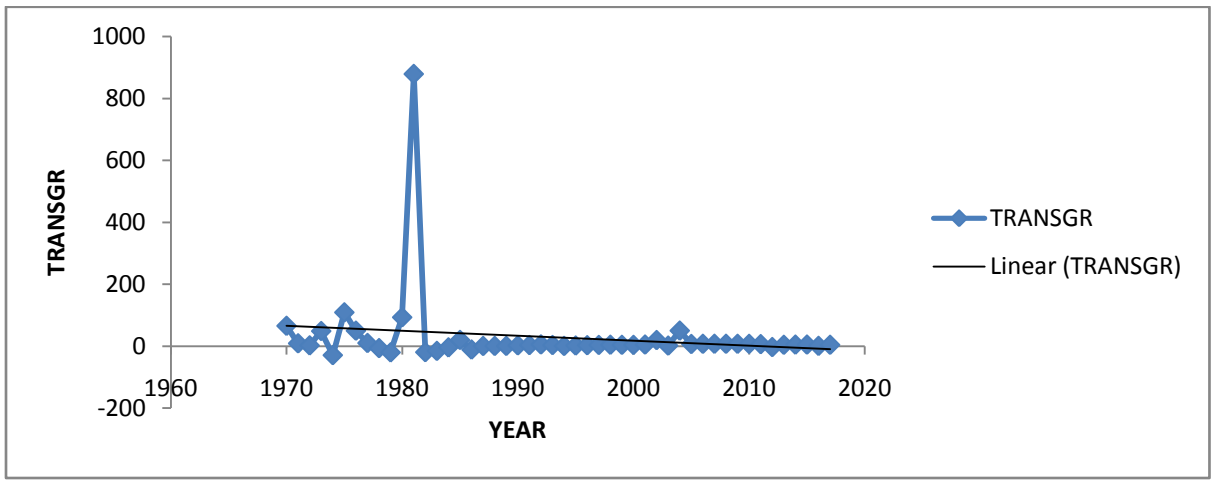

Fig 2.3: Trends of growth rates of government spending in the transport sector (1970-2017)
Source: Researchers' Plot, using CBN Statistical Bulletin.

In the same vein, the government spending to the education sector for the periods 1970-1980, 1981-1989, 1990-1998, 1999-2007 and 2008-2017 fell from 2.48 per cent to 1.81 per cent, 50 per

cent to 1.35per cent, 2.12 per cent to 1.8 per cent, increased from1.5 per cent to 10.7 per cent and then fell from 10.8 per cent to 1.3 per cent respectively. This is shown in Figure 2.4.

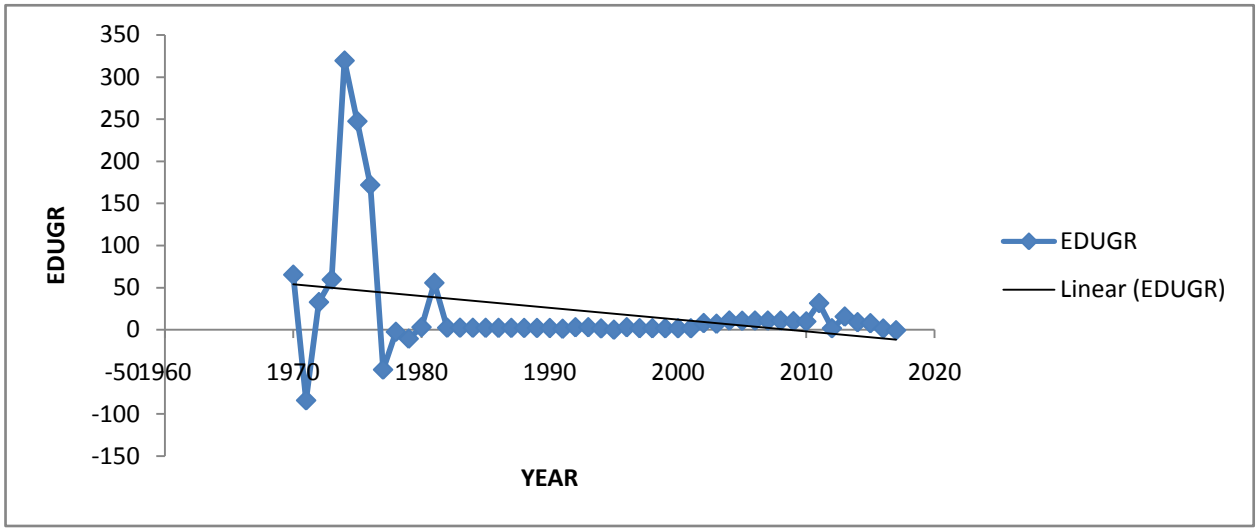

Fig 2.4: Trends of growth rates of government spending in the education sector (1970-2017)
Source: Researchers' Plot, using CBN Statistical Bulletin.

And then in the communication sector, the government spending for the periods 1970-1980, 1981-1989, 1990-1998, 1999-2007 and 2008-2017 fell from 1.9 per cent to 1.2 per cent, 6.84 per cent to 1.9 per cent, 1.92 per cent to 13.4 per cent, 14.0 per cent to 26.51 per cent and then fell from 27.6 per cent to 1.92 per cent respectively This is shown in Figure 2.5.

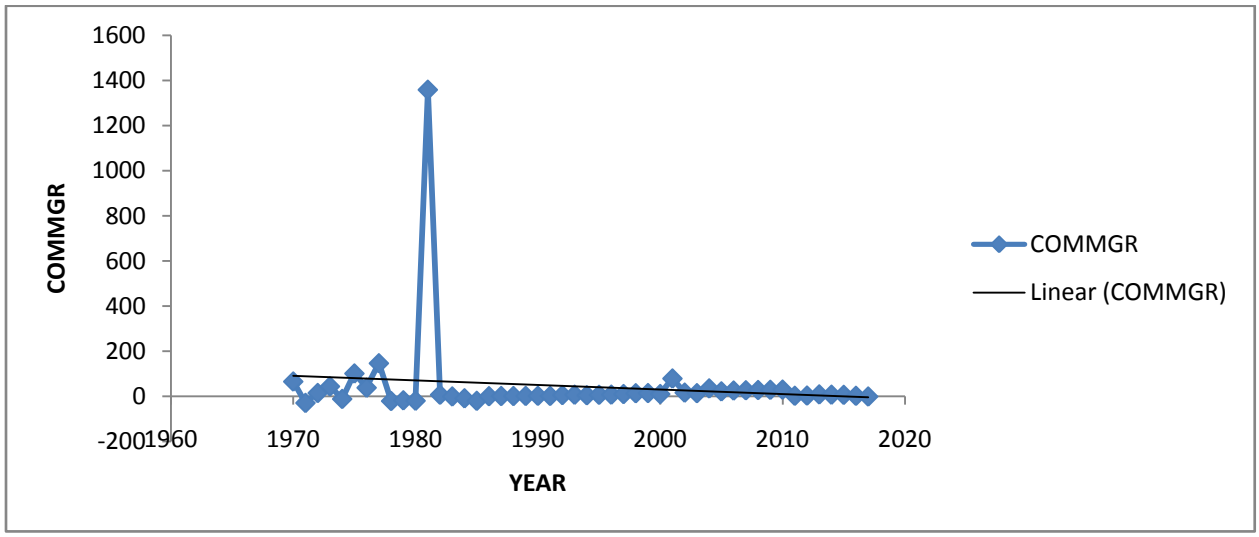

Fig 2.5: Trends of growth rates of government spending in the communication sector (1970-2017)
Source: Researchers' Plot, using CBN Statistical Bulletin.

The utility sector is made up majorly by the power sector. Evidence showed that the Nigerian power sector is characterized by low generating capacity relative to installed capacity (PHCN Report, Various issues). Electricity generation and consumption further give credence to the fact that despite government's spending on the provision of infrastructures in Nigeria, the contribution of the existing ones are far from raising the quality of growth. A large number of electricity consumers do not have access to uninterrupted supplies of electricity. There is a wide gap between the installed capacity and total electricity generated. The gap became widened during the periods 1981-2017 (PHCN Report, various issues). Consequently, power outages became so frequent and the sector operated below its estimated capacity. Low water levels at various power stations are frequently claimed to be responsible for the frequent power shortages (Babatunde & Shuaibu, 2011). This is shown in Table 2.2.

Table 2.2: Electricity Generation in line with government spending in Nigeria, 1970-2017

Year	1970-1979	1981-1989	1990-1999	2000-2009	2010-2017
Installed Capacity (mw)	1097.8	3495.3	4654.8	8244.5	12112.2
Total Generation(mw/hr)	384.4	1117.2	1736.5	3850.9	6096.6
Capacity Utilized (per cent)	35.6	32.6	37.4	45.6	50.3

Source: PHCN Report and CBN Statistical Bulletin

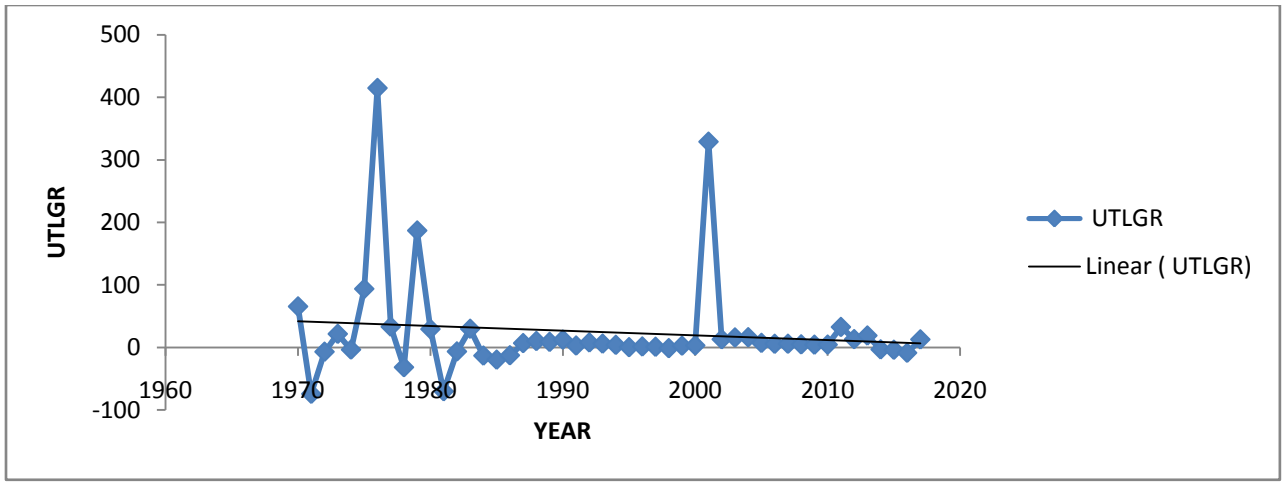

Fig 2.6: Trends of growth rates of government spending in the utility sector (1970-2017)
Source: Researchers' Plot, using CBN Statistical Bulletin.

In Figure 2.6, the government spending to the utility sector for the periods 1970-1980, 1981-1989, 1990-1998, 1999-2007 and 2008-2017 rose from negative 0.48 per cent to 1.81 per cent, 2.1 per cent to 22.4 per cent, 1.12 per cent to negative 0.8 per cent, increased from1.5 per cent to 30.7 per cent and then fell from 1.8 per cent to negative 1.3 per cent respectively.

Finally, government spending to all the sectors in line with economic growth in the country during the same period, education, health, construction and water infrastructure grew from 8.78per cent, 11.1per cent, 18.8per cent and 38per cent to 33.1per cent, 44.1per cent, 57.1per cent and 73.2per cent respectively. Between 2007 and 2017, the growth of education, health, construction and water infrastructure stood at 13.3per cent and 4.96per cent respectively. The increase in growth rate of government spending on infrastructures in Nigeria did not reflect on the infrastructures on ground. This implies that the funds allocated to the provision of infrastructural projects were channelled to less productive projects. This is shown in table 2.3.

Table 2.3: Growth of Recurrent & Capital Budget Estimate on Infrastructures in Nigeria (%)

Year	1977-1986	1987-1996	1997-2006	2007-2017
Transport & Communication	-1.84	49.2	79.6	7.03
Education	8.78	48.4	33.1	13.3
Health	11.1	38.9	44.1	13.3
Construction	18.8	27.0	57.4	4.96
Water	38.0	33.3	73.2	4.96

Source: CBN Statistical Bulletin 2017.

Table 2.3 further give credence to the fact that despite government's spending on the provision of infrastructures in Nigeria, the contribution of the existing ones are far from raising the quality of growth. The information from the table is best assessed when viewed in line with economic growth. This gives rise to Table 2.4.

Table 2.4: Contributions of Selected sectors to Growth in Nigeria, 1970-2017 (%)

Year	1970-1979	1980-1989	1990-1999	2000-2009	2010-2017
Education	1.49	0.46	0.23	0.22	0.15
Transport	3.01	4.46	2.64	2.58	1.84
Health	0.52	0.14	0.06	0.06	0.04
Electricity	0.43	0.45	0.13	0.21	0.18
Water	0.07	0.27	0.07	0.01	0.01
Communication	0.20	0.11	0.03	0.52	1.34

Source: CBN Statistical Bulletin, 2017.

Evidence from Table 2.3 and Table 2.4 above show that education, transport, health, electricity and water contributed insignificantly to growth in Nigeria when analysed in line with government expenditure on the sectors. Between 1970-1980, 1981-1989, the contribution of education, transport, health, electricity and water stood at 0.89, 1.49 per cent, 3.01 per cent, and 0.52 per cent, 0.43 per cent and 0.07 per cent respectively. This fell to 0.22 per cent, 0.89 per cent, 2.58per cent, 0.06per cent, 0.21per cent and 0.01per cent during the period 2000-2009. During period 2010-2017, the contribution of these infrastructures to growth was not sustained as it fell to 0.15per cent, 1.84per cent, 0.04per cent, 0.12per cent, 0.18per cent and 0.01per cent respectively. This indicates a gross deficit in infrastructure finance required to catalyzed growth (Aremu, 2016). The analysis above is presented in Figure 2.7.

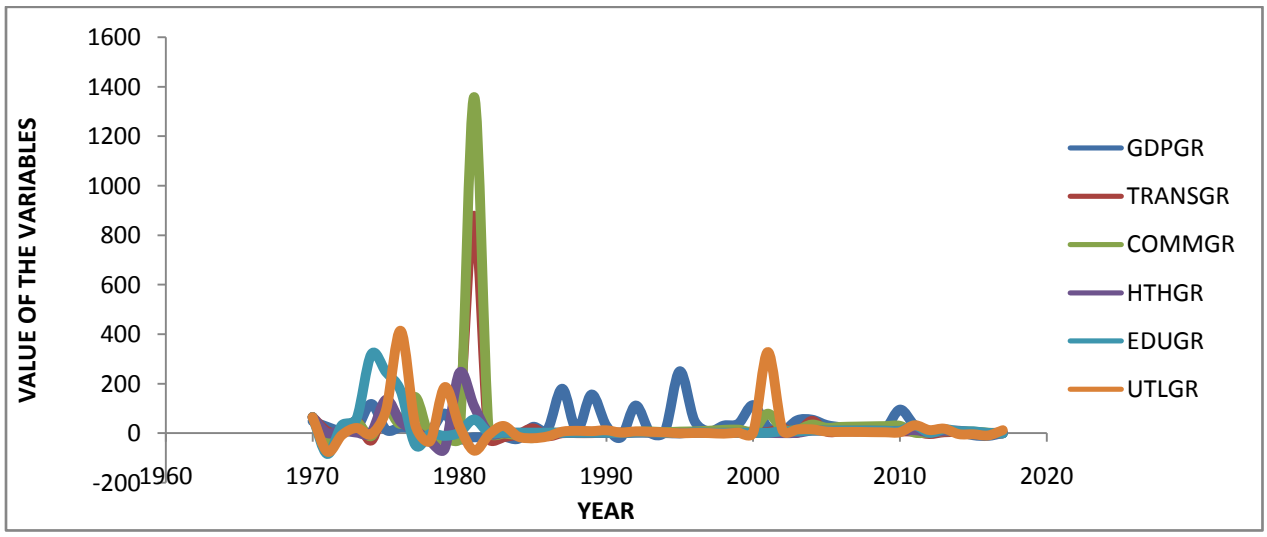

Fig 2.7: Trends of Nigeria's Economic Growth Rate in line with growth rates of government spending in the transport, communication, health, education and utilities sectors (1981-2017).
Source: Researchers' Plot, using CBN Statistical Bulletin.

In summary, Nigeria has the potential to house a large number of the world's investments, but due to poor state of infrastructure development, this potentials could not be showcased to a greater height. The deplorable state of infrastructures and poor state of repairs and maintenance are evident on electricity, roads, railways and water facilities. The reasons for the deplorable conditions of the infrastructures are: reduction in government spending on infrastructure, vandalization of existing ones, corruption, bureaucratic bottlenecks and delay, maintenance and repairs of damaged facilities. As rightly submitted by Ijaiya and Akanbi (2009) and Barro (1990), these could result into: low productivity growth, low income growth, low savings, low level of industrial development and ultimately end up as vicious cycle of poverty. Infrastructure deficit have decimated Nigeria's growth potentials and made doing business very difficult and restrictive. For Nigeria to realize its growth potentials, a fully structured and sustainable infrastructure development policy is desirable. Infrastructure development and management constitute the critical area which requires efficient developments that the society heavily relies upon and this would provide a good yardstick of measuring socio-economic development (Ret, Niels, Daniel, & Youdi, 1994).

The growth process in Nigeria can be ascertained through the quality of infrastructures supporting it. Infrastructures could be financed through domestic savings or foreign direct investment (Lynde, & Richmond, 1993; Martin & Rogers, 1995). The bulk of infrastructure financing in Nigeria comes from direct budget investment from fiscal resources, borrowing and market based financing. A large number of urban infrastructures in Nigeria were financed through direct budget expenditures from the three layers of government (Central, State and local governments). However, the dimension of finance differs due to constitutional limitations. Infrastructure development remains grossly inadequate relative to the nation's requirements due to lack of funds. Revenue inflows from taxation and other income generating activities have been quiet epileptic and inadequate to address the question of bourgeoning infrastructural needs in Nigeria. There appears to be a financing gap from direct budgetary spending on infrastructure. This gap can be filled by borrowing and market based financing. To address this challenge, the Central Bank of Nigeria established the infrastructure finance office to come up with a sustainable financing framework to stimulate long-term financing for infrastructure development (CBN, 2011; CBN, 2015).

(2) Macroeconomic Policy Basis of Government in Infrastructure towards Economic Growth in Nigeria from Post-Independence till 2017:

This section examines critically policy basis of public investment in infrastructure as the study recognizes government spending as heartbeat of economic development and a child of necessity. Hence the importance and relevance of government investment in infrastructure cannot be overemphasized as there is every need for us to unmask and explain lucidly the various macroeconomic policy basis of public investment in infrastructure towards economic growth in Nigeria from post-independence till date.

First National Development Plan (1962-1968)

The total capital expenditure profile of the first national plan amounts to £676.8 million over the six-year period. Of this sum, approximately 14 per cent was allocated to primary production and 13 per cent to trade and industry. Thus, the two sectors accorded top priority in the plan accounted for more than one quarter of the total capital expenditure over the period. Equally notable was the fact that more than 70 per cent of the total expenditure was devoted to those sectors which contributed directly to economic growth (primary production; trade and industry; electricity; transport system; communications; irrigation and industrial water supplies). Total planned fixed investment for the six years of the national plan was £1,183 million. About £90 million of this amount was to be invested in the private sector at an average of £65 million annually. The plan assumed that £793 million would be invested in projects in the public sector at an average annual investment of £132.2 million. The public sector investment will be in descending order; transport, electricity, primary production, trade and industry, education dominated as well as in terms of the allocation of funds.

In summary, the first year of the plan was essentially a period of preparation: detail costing, designing, planning of projects and similar preparatory works such as site acquisition. Public investment, which in the first year of the plan period amounted to £64.6 million, declined slightly to £63.4 million in 1963. Thereafter, it rose gradually to approximately £90.0 million in 1966. The expected annual average investment of £112.8 million was really never achieved due to the civil war.

Second National Development Plan (1970-1974)

The second National Development Plan contains policy framework and programmes for the reconstruction of the damaged areas as well as the construction and development of the rest of the country. The Plan sets out clearly the national objectives and priorities of post-war Nigeria. It also outlined the general policy measures and programmes of action which flowed from the objectives as well as the agreed national scale of priorities. The estimated net nominal investment expenditure amounted to £780 million. The Plan projection was that in the first year, aggregate expenditure will be distributed among the economic, social and administrative sectors in the proportion of 60.0 per cent, 25.9 per cent and 14.1 per cent, respectively. In broad terms, strict adherence of these proportions was important to ensure that available resources are not channelled to the less productive sectors of the economy. This also helps the federal government to emphasize the need to maximize value added to the Gross Domestic Product by establishing of heavily industries in the intermediate and capital goods sectors. This marks the first stage of the import substitution industrialization (ISI) strategy which involved the replacement of imported non – durable consumer goods and their inputs with domestic production.

Third National Development Plan (1975-1980)

The nominal total of the capital expenditure programmes of all the governments of the federation during the Third National Development Plan period was ₦ 32.9 billion. The amount embodied an element of "double counting" to the tune of ₦ 727.6 million which represented the bulk of Federal Government transfers to state governments for meeting part of their capital expenditures in the fields of agriculture, water supply, urban road development, sewage, etc. The exclusion of this inter-governmental transfer from the nominal total expenditure of ₦ 32.9 billion reduced the size of the public sector investment programmes to about ₦ 32 billion. This sum was the total estimated cost of the programmes of all the governments of the federation during the Plan period. An important feature of the Third National Development Plan was the annual phasing of capital expenditures. About 16.8 per cent of gross capital expenditure was disbursed in the first year of the Plan, 20.7 per cent in the second, 21.8 per cent in the third, 20.7 per cent in the fourth and 20.0 per cent in the fifth years.

In summary, sectoral percentage distribution of the gross capital expenditure shows that the economic sector with 62.3 per cent of the total expenditure outlay had the largest allocation followed by administration with 13.6 per cent, regional development with 12.6 per cent and social sector with 11.5 per cent. This shows that the policy was designed to significantly increase the economy's productive capacity and improve the nation's social services to meet the policy objectives set out by the government.

Fourth National Development Plan (1981-1985)

Fourth Plan recognised the role of social services in bridging the gap between urban and rural sectors but continued to receive a small share of the aggregate government public investment. The total expenditure under the federal allocation programme was ₦ 2.2 billion which amounted to about 5.5 per cent of the estimated total federal government capital investment during the plan period. A significant distinction between the fourth and third development plans in the educational sector is that federal investment in primary education was completely absent in the latter. For the health sector, a total of ₦ 1.2 billion was spent as total capital estimation of the federal government of which National Basic Health Scheme had a financial investment of ₦ 100 million, while the establishment of new hospitals gulped about ₦ 150 million. Of the total investment of ₦ 82 billion spent on the education sector in the fourth development plan, the share of public sector was ₦ 70.5 billion. This was distributed among the federal (₦ 40 billion), state and local (₦ 28 billion) governments and the Federal Capital Development Authority (₦ 2.5 billion). The balance of ₦ 11.5 billion was reserved for the private sector. In summary, the fourth development plan was a success in terms of regional development, but some public sector investment did not yield return as expected (e.g. National Electric Power Authority and Nigeria Telecommunication Corporation).

Furthermore, public investments within this period were expended to large capital and skill intensive projects, particularly heavy and intermediate industries like steel, oil refineries and fertilizer. However, besides suffering from protracted and cost increasing construction period and low capacity utilization, the Ajaokuta and Delta steel companies and the various steel mills have constituted a burden to the annual budgets due to recurrent losses and the supply of expensive industrial input into the downstream sectors (Rosenberg, 1981).

The Structural Adjustment Programme (SAP)

In 1986, government initiated SAP as a short-term plan whose major objectives centred on rural development, poverty alleviation, restructuring and diversification of the economy's productive base in order to reduce the country's dependency on the imports and oil sector. The key elements of SAP were deregulation and reduction or full withdrawal of subsidies. In line with these objectives, government established the Directorate of Food, Roads and Rural Infrastructure (DFRRI). The directorate had the responsibility of providing basic infrastructure that will facilitate the development of agriculture by increasing agricultural output and creating enabling environment for farm produce to get to final consumers. In the fiscal 1986, it received a budgetary expenditure of ₦ 300 million, in 1987 it received ₦ 400 while ₦ 500 million was allocated to the agency in 1988 to develop rural infrastructure.

The share of total public investment in economic, social and community services and administration rose to 31.1, 17.8 and 9.2 per cent respectively in 1986 compared to 11.7, 13.4 and 5.6 per cent respectively in 1985. In 1987 the total public investment fell by 25.3 per cent to ₦ 6, 372.5 million from ₦ 8, 526.8 million in 1986. In 1988 this amount rose by 30.9 per cent to ₦ 8, 340.1. This amount rose by 50.3 per cent to ₦ 15, 034.1 in 1990. This trend continued until 1991. Generally, public investment increased during the SAP era. In 1989, new industrial policy for Nigeria was launched. However, in terms of emphasis, the small and medium scale enterprise (SME) projects, contained in the 1989 industrial policy stood out. The sap induced industrial policies include interest rate deregulation, debt conversion, and privatization and commercialization policy and the new export policy incentive. Previous initiatives designed to assist small and medium scale industries in Nigeria include: Mandatory minimum credit allocation by banks to small scale enterprises (SMEs); Introduction of other specialized schemes, including the World Bank SME I and SME II loan programmes, family economic Advancement Programme (FEAP) and the Agricultural credit Guarantee Scheme Fund (ACGSF).

The Petroleum (Special) Trust Fund (PTF)

The PTF was established by Decree 25 of 1994 (and amended by Decree 1 of 1995). It was empowered to utilise the gains from increase in the prices of petroleum products to complete all government-abandoned projects and rehabilitate decaying infrastructure nationwide. The PTF

influence was felt in seven sectors of the economy, namely roads, health, education, water supply, food supply, security and agriculture. In the area of water supply, a total of ₦ 120 million was used to drill boreholes in some selected states like Katsina, Cross River, Akwa-Ibom, Kogi, Abia and Borno. Also, ₦ 11, 953.000 million was spent to construct roads between 1995 and 1997. A total of ₦ 9, 588 billion was expended on education specifically, university education, technological/technical and teacher education (World Bank, 1994). For the health sector, a total of ₦ 1.354 billion was allocated to support some key priority programmes in the health sector such as: The National Essential Drugs Programme, National AIDS Control Programme and Improvement of Physical Infrastructure and Equipment Maintenance Programme.

National Economic Empowerment Development Strategy (NEEDS)

The macroeconomic policy thrust of Nigeria outlined in the National Economic Empowerment and Development Strategy (NEEDS) document aimed at creating a stable environment for accelerated pro-poor growth. In this regard, the government's fiscal policy sought to enhance revenue collection, strengthen public financial management through effective fiscal allocation, coordination and monitoring. NEEDS reforms in improving the transport sector infrastructure was aimed at completing 3,000 kilometres network of roads and strengthening the Road Maintenance Agency, which monitored the repair and rehabilitation of some 500 roads in the country. Roads rehabilitation, maintenance and new roads were expected to increase from 3,000 in 2003 to 3,500 in 2004, 4,000 in 2006 and 4,500 in 2007.

NEEDS policies in the health sector targeted priority diseases such as malaria, tuberculosis, HIV/AIDS and reproductive health related illness. The NEEDS policy was designed to target the reduction in HIV/AIDS prevalence rate from 6.1 per cent in 2003 to 5.0 per cent in 2007. Access to safe water was supposed to increase from 64.1 per cent in 2003 to 70.0 per cent in 2007 while access to adequate sanitation was expected to increase from 53.0 per cent in 2003 to 65.0 per cent in 2007. In terms of power generation (megawatts), 4,000 were expected to be generated in 2004, 5,000 in 2005, 7,000 in 2006 and 10,000 in 2007. In the educational sector, the major policy thrust of NEEDS was targeted at increasing adult literacy rate from 57.0 per cent in 2003 to 65.0 per cent in 2007. In summary, most of these targets were not met, for instance, as at

September, 2009 the total megawatts in Nigeria was less than 6,000 as against the targeted value of 10, 000 in 2007. Adult literacy as at 2010 was less than 52 per cent while access to safe water and good sanitation did not improve.

Poverty Alleviation Programmes In Nigeria (NAPEP)

President Olusegun Obasanjo introduced a National Poverty Eradication Programme (NAPEP) in 2002. The programme was aimed at eradicating abject poverty in Nigeria. Poverty became widespread after the implementation of Structural Adjustment Programme (SAP) in Nigeria. This scheme was structured to integrate four sectoral schemes. The first was the Youth empowerment Schemes (YES), which was concerned with providing unemployed youth opportunities in skills acquisition, employment and wealth generation. To achieve this, the scheme was further subdivided into 3: Capacity Acquisition programme, Mandatory Attachment programme and Credit Delivery programme. The second was the rural infrastructural needs in the areas of sport, energy, water and communication. In rural areas Scheme was broken into four parts:

- The Rural Transport Programme,
- The Rural Energy Programme,
- The Rural Water Programme and
- The Rural Communication Programme.

The third was the Social Welfare ‘ices Scheme (SOWESS) which aimed at ensuring the provision of basic social ices including quality primary and special education, strengthening the economic power of farmers, providing primary healthcare, and so on. This scheme consisted of four broad subcategories, which were:

- Qualitative Education Programme,
- Primary Health Care Programme,
- Farmers Empowerment Programme and
- Social Services Programme.

The last was the Natural Resources Development and Conservation Scheme (NRDCS). The vision of this scheme was to bring about a participatory and sustainable development of agricultural, mineral and water resources through the following sub-divisions:

- Agricultural Resources Programme,

- Water Resources Programme,
- Solid Minerals Resources Programme and
- Environment Protection Programme.

The target of the National Poverty Eradication Programme was to completely wipe out poverty from Nigeria by the year 2010.

When NAPEP came on stream in January 2001, it was given a take-off grant of ₦ 6 billion ($42.8m). This money was used to establish NAPEP structures in 36 states, the Federal Capital Territory, Abuja and 774 local government councils. Part of the money was also used in the NAPEP employment generation intervention which translated to the training of 100,000 youths, attaching 50,000 unemployed graduates in various places of work, training of over 5000 people in tailoring and fashion design, and the establishment of rural telephone networks in 125 local government areas (Maduagwu, 2000). The establishment of 147 youth information centres across the senatorial districts, the delivery of informal micro credit ranging from ₦ l0,000 ($71) to ₦ 50,000 to 10,000 beneficiaries most of whom were women. About 140,000 youths were trained in more than 190 practical hand-on trades over a period of three months. Every trainee was paid ₦ 3,000 ($21) per month while ₦ 3,500 ($215) was paid to each of the trainer. 5,000 beneficiaries were resettled with assorted tailoring and fashion designing equipment. Also under the Mandatory Attachment Programme for unemployment graduate, 40,000 beneficiaries were attached in 2001, each of whom was paid a monthly stipend of ₦ 10,000 ($71). (Jaja, Badey & Ogoloma, 2008).

The Vision 20:2020

The capital expenditure layout under the vision 20:2020 economic plan was specifically targeted at infrastructural development that would enhance industrial growth in Nigeria. Notably is the emphasis on the capital expenditure in sectors like education, health, transport and communication. In line with this policy, the appropriated capital expenditure to education stood at ₦ 74,923,247,201 in 2010 which was a huge increment from ₦ 40,005,096,429 in 2009. This figure increased steadily in nominal terms from 2010 to 2015. For the health sector, it has been mixed achievements. Capital expenditure on key infrastructure stood at ₦ 32.2 billion in 2006 and increased to ₦ 96.9 and ₦ 97.2 billion in 2007 and 2008 respectively. This figure fell precipitously to ₦ 52.5 and ₦ 49.9 in 2009 and 2010 respectively especially in terms of

expenditure to the transport and communication sectors. Based on the vision 20:2020 policy layout, the commitment of the Federal Government to enhance the contribution of the industrial sector to national economic development was demonstrated in several policy pronouncements and actions. The Nigeria Industrial Revolution Plan (NIRP) was approved, with its formal launch scheduled for early 2014. The NIRP aims to expand the country's industrial capacity by pursuing systematic development in agro-allied industries; metals and solid minerals processing; oil and gas industries; light manufacturing; construction and services.

In line with the power sector's road map, the transfer of some of the operations to private enterprises to boost efficiency in the sector was implemented. To address challenges in the privatisation process, especially labour-related issues, the Federal Government released ₦ 72.7 billion to the Federal Ministry of Power. Of this amount, 62.0 per cent was used to offset the outstanding payments due to the PHCN workers, while the balance was utilized by power generation and distribution companies to support their operations. The acquisition of the unbundled companies from PHCN was completed with the new owners formally taking over the companies. A Canadian firm, Manitoba Hydro International was also formally given the schedule of Delegated Authority that transferred managerial control over the Transmission Company of Nigeria (TCN) to it.

The National Enterprise Development Programme (NEDEP) was launched in 2014. The NEDEP aimed to generate five (5) million direct jobs by focusing on skills acquisition, entrepreneurship training, business development services and access to finance. The programme targeted small businesses and was coordinated by the Small and Medium Enterprises Development Agency of Nigeria (SMEDAN). Similarly, the National Automotive Industry Development Plan (NAIDP) was launched in the same year. The plan, among other things, aimed to make the environment conducive for automotive companies by providing incentives to local manufacturers. The auto policy was expected to result in substantial savings from the US$6.5 billion spent annually on the importation of vehicles and car spare parts. On the back of this policy, two Indian vehicle manufacturing companies, TATA Motors and TVS Motor Company had indicated interest in establishing assembly plants in Nigeria. The drive to patronise made-in-Nigeria products received a boost in 2013.

(3) Overview of Infrastructure in Nigeria

This section studies the key legal and regulatory agencies in charge of the five key sectors (transport, communication, education, health and utility) studied in this research work and summaries by studying their performance for the period under review (1970 – 2017). These ministries, agencies and departments include:

Ministry of Education:

The Ministry of Education is an arm of the Federal Ministry that directs educational activities in Nigeria. Its functions include: formulating a national policy on education; collecting and collating data for purposes of educational planning and financing; maintaining uniform standards of education throughout the country; controlling the quality of education in the country through the supervisory role of the Inspectorate Services Department within the Ministry; harmonizing educational policies and procedures of all state of the federation through the instrumentality of the National Council on Education; effecting co-operation in education matters on an international scale and developing curricula and syllabuses at the national level in conjunction with other bodies. The parastatals include: National Universities Commission (NUC), National Board for Technical Education (NBTE), National Commission for Colleges of Education (NCCE); Universal Basic Education Commission (UBEC), Joint Admission and Matriculation Board (JAMB), West African Examination Council (WAEC), National Examination Council (NECO), National Business and Technical Examination Board (NABTEB), Federal Scholarship Board.

Ministry of Health:

The Ministry of Health is an arm of Federal Ministry concerned with the formulation and implementation of policies related to health. The ministry has several departments specializing in different aspects of health care. The Family Health department is concerned with creating awareness on Reproductive, Maternal Neonatal and Child Health, ensuring sound nutrition including infant and young child feeding and care of the elderly and adolescents. The department of Public Health coordinates formulation, implementation and evaluation of public health policies and guidelines. It undertakes health promotion, surveillance, prevention and control of disease. The department of Hospital Services supervises 53 Federal Tertiary Hospitals –

Nigeria's teaching hospitals, Orthopaedic Hospitals, Federal Medical Centres and National Eye Centres. The department processes appointment of Chief Medical Directors and Medical Directors, supervises oral health research, develops policies on nursing, coordinates training programmes for nurses and monitors the midwifery service scheme. The department of Food and Drugs Services formulated national policies, guidelines and strategies on food and drugs, and ensures ethical delivery of pharmaceutical services nationwide. The department sponsors the National Institute for Pharmaceutical Research and Development and the National Agency for Food and Drug Administration and Control, and acts as regulator through the Pharmacists Council of Nigeria, the institute of Chartered Chemists of Nigeria and the Institute of Public Analyst of Nigeria.

Ministry of Water Resources:

The Federal Ministry of Water Resources was first created in 1976 to formulate National Water Resources development policies and co-ordinate their development. The functions include to formulate National Water resources policy towards ensuring adequate water supply for agricultural, industrial, recreational, domestic and other uses; to formulate and implement a water resources master plan for the development of dams, irrigation and drainage, water supply, soil erosion and flood control as well as hydrological and hydro-geological activities; to develop and support irrigated agriculture and reduce the nation's dependence on rain-fed agriculture; promote and sustain national food security by minimizing unexpected and undesirable shortfalls in domestic food production and agro-based raw materials caused by the vagaries of weather; collect, store, analyze and disseminate hydro-meteorological and hydrological data; support, monitor and evaluate the programmes and performances of the River Basin Development Authorities (RBDA's) and National Water Resources Institute (NWRI) and promote adequate training and manpower development in the water resources sector.

Ministry of Transport:

The Federal Ministry of Transport is responsible for transportation within a country. It is administered by the Minister for Transport. Their main mission is to provide a safe, secure, efficient, affordable and seamless inter-modal transport system that is self-sustaining and pivotal to the socio-economic growth in line with global best practice. Their specific responsibilities include overseeing road safety, civil aviation, maritime transport, rail transport, developing

government transportation policy, organizing public transport and the maintenance and construction of infrastructural projects. The ministry implements its mandate through seven parastatals namely: Nigeria Ports Authority (NPA), Nigerian Maritime Administration and Safety Agency (NIMASA), Nigerian Shippers Council (NSC), Nigerian Railway Corporation (NRC), National Inland Waterways Authority (NIWA), Nigerian Institute of Transport Technology (NITT) and Maritime Academy of Nigeria (MAN). Under Aviation, we have the Nigerian Metrological Agencies (NMA), Nigeria College of Aviation Technology (NCAT), Nigerian Air Space Management Agency (NASMA), Federal Airport Authority of Nigeria (FAAN), Nigeria Civil Aviation Authority (NCAA) and Accident Investigation Bureau (AIB). The current transport sector priorities and other national commitment aim at developing a modern transport system that fully exploits the potentials of each mode, instead of the existing dependence on road transport, which accounts for nearly 95% of total traffic with all the other modes sharing the remaining 5%. Also, it ensures that transport infrastructural projects are planned, prioritized and managed to maximize economic returns and that the public enjoys new or improved transport services at affordable rate and value-for-money.

Ministry of Communications:

The Federal ministry of Communication was created to foster a knowledge based economy and information society in Nigeria. The Ministry was created to facilitate ICT as a key tool in the transformation agenda for Nigeria in the areas of job creation, economic growth and transparency of governance. Its main mission is to facilitate universal, ubiquitous and cost effective access to communications infrastructure throughout the country as well as to provide the utilization of ICT in all spheres of life to optimize the communications infrastructure – digital content creation, domestic software application and the delivery of private and public services over the internet. Their specific responsibilities include regulating telecommunications, postal services, broadcasting and print media. The ministry implements its mandate through the following parastatals namely: Advertising Practitioners Council of Nigeria (APCN), Federal Radio Corporation of Nigeria (FRCN), National Broadcasting Commission (NBC), National Film and Video Board (NFVCB), News Agency of Nigeria (NAN), Nigeria Television Authority (NTA), Nigerian Communications Commission (NCC), Nigerian Film Corporation (NFC),

Nigerian Institute of Public Relations (NIPR), Nigerian Postal Service (NIPOST), Nigerian Press Council (NPC) and Voice of Nigeria (VON).

Ministry of Power:

The Federal Ministry of Power is concerned with the formulation and implementation of policies related to energy and power. The responsibilities of this ministry includes: initiating and formulating broad policies and programmes on the development of the power sector (electricity) in general; initiating concessions in the power sector of the economy; licensing of electric generating sets of 1MW capacity and below and electrical contractors; conducting investigation on electrical accidents and to ensure safety in the electricity industry in Nigeria; conducting statutory test and certification of electric poles (concrete, wooden, steel, etc.) and other major electrical materials before they are used on the grid and networks in Nigeria; implementing renewable energy programmes (Solar, Wind, Biomass, Small Hydro etc.); coordinating activities of power sector; handling policy matters relating to research and development in the power sector; promoting the development of hydro power plants through public private partnership (PPP); participating in bilateral and multilateral relations affecting the power sector and facilitating the overall coordination of the activities of the parastatals under its supervision. The ministry implements its mandate through the following parastatals namely: Energy Commission of Nigeria (ECN), Nigerian Electricity Regulatory Commission (NERC), Power Holding Company of Nigeria (PHCN) and Rural Electrifying Agency (REA).

(4) Contribution of Selected Sectors to Economic Growth in Nigeria:

The infrastructural sector accounted for a share of 7.4 per cent to Nigerian GDP in the 1980/81 fiscal year. The share declined to 6.69 per cent in 1985 before reaching a peak of 8.92 per cent in 1988 and then declining to 4.03 per cent in the 1990s. However, since 2000 the share of infrastructure to Nigerian GDP has witnessed a significant decline as the range of their contributions falls between 1% and 3% (Nigerian Bureau of Statistics, 2016).

Table 2.5: Contributions of Selected Sectors to Economic Growth in Nigeria, 1970-2017 (%)

Year	1970-1980	1981-1989	1990-1999	2000-2009	2010-2017
Transport	3.01	4.46	2.64	2.58	1.86
Communication	0.20	0.11	0.03	0.52	1.44
Education	1.49	0.46	0.23	0.22	0.17
Health	0.52	0.14	0.06	0.06	0.05
Utilities	0.25	0.27	0.07	0.01	0.02

Source: Computed from CBN Statistical Bulletin.

Table 2.5 further give credence to the fact that despite government's spending on the provision of infrastructures in Nigeria, the contribution of the selected sectors are far from raising the quality of growth. Evidence from Table 2.5 shows that education, transport, health and utilities contributed insignificantly to growth in Nigeria. Between 1980 and 1989, the contribution of education, transport, health and utilities stood at 0.46%, 4.46%, 0.14% and 0.27% respectively. This fell to 0.22%, 2.58%, 0.06% and 0.01% during the period 2000-2009. During the period 2010-2017, the contributions of these sectors to growth was not sustained as it fell to 0.17%, 1.86%, 0.05% and 0.02% respectively. We also note that during the same period, communication infrastructure recorded improvement due to positive globalization externality. This scenario above has attracted literature attention, thus necessitating our review of empirical studies.

2.2 Empirical Literature Review

This section reviewed the literature attention given to the impact of government spending for infrastructural development on economic growth. It was thematized into two:

1 Overseas studies on impact of government spending for infrastructure on economic growth

2 Nigerian studies on impact of government spending for infrastructure on economic growth

Nigerian studies were further broken into individual sector studies and aggregate studies of government spending for infrastructure on economic growth.

2.2.1. Overseas studies on impact of infrastructural government spending on economic growth

Aschauer (1988) investigated the relationship between aggregate productivity and the flow of government spending on infrastructure in the USA between 1945 and 1987. He used a generalised Cobb Douglas function to show that movements in public investment induce similar movements in output from the private segment of the US economy. The dependent variable was output per capital in private business economy and the independent variables used were private sector labour input, private capital input, non-military public capital, private business total factor productivity and capacity utilisation rated in manufacturing. The overall findings indicate that core infrastructure which comprised of 55per cent of the cumulative non-military stock is highly significant with an elasticity of 0.24. He therefore concluded that core infrastructure bears the highest explanatory power of productivity of an economy. In contrast, this work robustly examined the impact of government spending on selected sectors' infrastructure and economic growth in Nigeria by anchoring the analysis on a combination of unbalanced growth model and endogenous growth model instead of only on production function model.

Bougheas, Demetriades, and Morgenroth (1999) analysed the relationship between public investment on infrastructure stock and increased productivity in six European countries over the period 1970 to 1990. The study applied an augmented gravity model, an approach where the dependent variable is the logarithm of exports from one country to another while the independent variables are logarithms of gross domestic product (as a proxy of market sizes), logarithms of product of public capital and distances between the capital cities. In a separate equation, the length of motorway network is included as a distinct variable to measure transport infrastructure. The results indicate that the coefficients of infrastructure variables are positive and significant while those of GDP are smaller and positive. The improvement of R^2 values when additional infrastructure variables are introduced imply that volume of exports (and thus competitiveness of an economy) is highly determined by development on infrastructure. In contrast, this work used time series analysis and based on a combination of unbalanced growth model and endogenous growth model, employed gross domestic product growth rate as the dependent variable and government spending on transport, communication, health, education and utilities sectors as the independent variable to ascertain the direction of causality between government spending on

infrastructure and economic growth in Nigeria. This study ascertained a long run relationship where they ended, but went ahead to study the short run impact.

Haughwout (2000) used descriptive analysis to study the effect of public investment in infrastructure on the growth of USA with data on federal, state and local authorities. Findings revealed that States that wish to grow should use their public capital money as part of a strategic economic development effort and direct more resources to central cities and other localities that have high concentrations of jobs and also avoid building new projects in the green fields on the edges of metro areas. This study contrasted his by concentrating on the Nigerian economy for its analysis and used the government spending on selected sectors as independent variables to empirically study the impact of government spending on these sectors on economic growth.

Kweka and Morrissey (2000) studied the relationship between sectoral public expenditure and economic growth in Tanzania. They used time series data for period between 1968 to 2011. Real gross domestic product was the dependent variable and used as a proxy of economic growth. The independent variables were Government expenditure on education, agriculture, transport and communication and the rest of the sectors. The analysis adopted Augmented Dicker-Fuller and Phillips-Perron for the stationarity tests while Johansen co-integration test and vector error correction model were used to capture short and long-run dynamics of economic growth. The result indicates that public expenditure on infrastructure played no significant role in accelerating economic growth in Tanzania for the last 44 years. The findings also show that increased investment expenditure (infrastructure investment) has a negative impact on growth but consumption expenditure has a positive impact. The expenditure on human capital investment was insignificant while aid appears to have a positive impact on growth in Tanzania. The study recommended that the Tanzania policymakers should optimize the effects of government expenditure in economic growth. This study deviated by adopting the ARDL technique and used government spending on transport, communication, health, education and utility sectors as independent variables for the period 1970 to 2017 to empirically study the impact of government spending on these sectors on economic growth in Nigeria.

Moreno, Lo´pez-Bazo, and Art´ıs (2002) presented a theoretical framework for determining the short- and long-run effects of public infrastructure spending on the economic performance of

Spanish regions using the iterative Zellner technique for seemingly unrelated regression equations imposing the equality restrictions among parameters across equations to fit the theoretical models. The study derived long-run elasticities by taking into account the adjustment of quasi-fixed inputs to their optimum levels. By considering the impact of infrastructure on private investment decisions, the study found that infrastructure exerts an indirect source of influence in the long-run through their effect on private capital, apart from the direct effect on costs in the short-run. In consonance, this work examined the short run impact of government spending on selected infrastructure on economic growth but contrasted by employing a combination of unbalanced growth model and endogenous growth model and concentrating on the Nigerian economy. This analysis is such as to take an in-depth look at this impact in line with the policies government has kept in place over the years to steer economic growth in the country.

Paul (2003) used annual data from Australia from 1968/69– 1995/96 to examine the effects of public infrastructure expenditure on cost structure and productivity in the private sector. The study utilized translog cost functions incorporating public capital infrastructure for both the private-sector and a group of seven broad industries. Public infrastructure expenditure is found to have a positive and significant impact on productivity in the private sector. Also, public capital is found to be a substitute for private capital and labour Returns to public capital are significant and vary over the sample period. In contrast, this study examined the impact of government spending for infrastructure on economic growth in Nigeria as an entity using a combination of unbalanced growth model and endogenous growth model and not limiting the study to only the private sector as they did.

Herranz-Loncán (2007) investigated the impact of public infrastructure investment on Spanish economic growth during the period 1850 to 1935 using new infrastructure data and VAR technique. The result shows a strong positive relationship between investment in infrastructure and growth but infrastructure returns were not significant in the estimation. In contrast, this work employed ARDL in its estimation to cover a more recent period (from 1970 to 2017) to examine the impact of government spending for infrastructure on the Nigerian economic growth using the transport, communication, health, education and utilities sectors as sectors selected for the study as well as the direction of causality between government spending on these selected sectors and economic growth in Nigeria.

Ghosh and Gregoriou (2008) studied the composition of government capital or current spending on infrastructure and Growth. They analyzed a panel data for fifteen developing countries for twenty eight years and used an endogenous growth framework with two public goods with differing productivities in which the optimal values of the growth rate, tax rate and expenditure shares on the two public goods are linked directly to their productivity parameters. Using GMM techniques, they found that current government spending positively impacts on growth while capital government spending on the other hand impacts negatively on growth contrary to commonly held views. They recommended that government should consider the various components on the revenue side of the budget as constraints to take into account as bias that could arise if tax revenue alone was considered. This study contrasted by not decomposing government expenditure into capital and recurrent and employing time series data to study the Nigerian economy while taking cognisance of the implications of the policy breaks experienced within the period of study.

Egert, Kozluk, and Sutherland (2009) empirically examined the relationship between public expenditure on infrastructure and economic growth in Organization of Economic Cooperation and Development (OECD) countries. The variables used includes: Gross domestic product, infrastructure investment in telecommunications, electricity sectors, railways and road network. Using the Bayesian model averaging of cross-section growth regressions, the results shows, among others a positive impact of public infrastructure investment on growth. They also show that this effect varies across countries and sectors and overtime. The result also confirms that infrastructure investment in telecommunications and the electricity sectors has a robust positive effect on long-term growth unlike railways and road network. In consonance, this study majored on key sectors of the economy as specified by the unbalanced growth model to include transport, communication, health, and education and utilities sectors but contrasted by studying the impact of government spending for infrastructure on these sectors in Nigeria than just the relationship which they dwelt on.

Zainah (2009) investigated the role of public investment on infrastructure on economic performance in Mauritius between 1970 and 2006. In analyzing the study, he made use of GDP per capita as the dependent variable and public investment on infrastructure, private capital accumulation and trade openness as the independent variables. He employed an error correction

model technique as its main econometric tool. The results show that public investment on infrastructure has significant contribution to Mauritian economic performance while private capital accumulation and openness showed indirect effects on economic performance. This study employed ARDL to cover from 1970 to 2017 using a combination of unbalanced growth model and endogenous growth model with gross domestic product growth rate as the dependent variable and deviated in the choice of the independent variables to study the impact of government spending on these sectors on the Nigerian economy.

Nketiah-Amphonsah (2009) examined aggregated and disaggregated government expenditure on infrastructure and economic growth in Ghana over the period 1970-2004. Using OLS, expenditure on education and health were proxies for human capital development, while expenditure on roads and waterways captured infrastructure development. The study's findings show that expenditures on health and infrastructure promote economic growth, while those on education had no significant impact in the short run. In addition, the political economy variables-namely the nature of governance (democracy) and political instability (years of changes in government and military dictatorship) proved significant in explaining Ghana's economic growth over the study period. The study recommended that the government should put adequate facilities in place in the country to ensure that political stability is enjoyed in the country. In consonance, this study adopted the disaggregated approach by recognising key sectors of interest (transport, communication, health, education and utilities) to take an in depth study of the impact of government spending on infrastructure but contrasted by taking cognisance of the policy measures undertaken by the Nigerian government over the years.

Kodongo and Ojah (2016) in a study titled the relationship between public spending on infrastructure and economic growth in Sub-Saharan Africa used System GMM to estimate a model of economic growth augmented by an infrastructure variable, for a panel of 45 Sub-Saharan African countries, over the period 2000–2011. They found that it is the public spending on infrastructure and increments in the access to infrastructure that influence economic growth and development in Sub-Saharan Africa. Interestingly, these significant associations, especially those of infrastructure spending, are more important for less developed economies of the region than for the relatively more developed economies, which uncommonly have better than near-zero access to infrastructure. In addition to these robust direct links between the target variables, The

study further found that infrastructure access, and quality, also relate to economic growth indirectly via export diversification (trade competitiveness), and cross-border capital flows and trade competitiveness, respectively. They recommended reversing Africa's pervasive infrastructure deficit, in ways that enable economic growth and development, must be carefully nuanced. This study deviated by employing time series analysis using ARDL for the periods of 1970 to 2017 to study the impact of government spending for infrastructure on economic growth using a combination of unbalanced growth model and endogenous growth model with gross domestic product growth rate as the dependent variable and government spending on transport, communication, health, education and utilities sectors as the independent variables. The direction of causality between the dependent and independent variables was also ascertained as a deviation from the relationship they studied.

2.2.2 Individual sector studies of impact of government spending for infrastructure on economic growth

Osotimehin, Akinkoye, and Olasanmi (2010) appraised the effects of government investment in communication infrastructure on economic growth in Nigeria. The study employed the pooled Ordinary Least Square Regression Methods. The result shows that Communication infrastructure measured by teledensity and telecommunication employment is both statistically significant and positively correlated with economic growth. The study equally concluded that the stock of communication infrastructure play roles in determining growth and productivity in Nigeria. They recommended that investment in the sector should be encouraged via private participation, stable and transparent policies. This study majored on key sectors of the Nigerian economy as specified by the unbalanced growth model to include transport, communication, health, education and utilities sectors in order to analyse the short run impact of government spending for infrastructure on economic growth unlike only the communication sector which they dwelt on.

Lawal and Abdulkadir (2012) in examining the relationship between government spending on education and economic development in Nigeria, employed time series data spanning from 1986 to 2011 in their analysis. The independent variables employed were recurrent expenditure on education, capital expenditure on education, human capital development as a proxy for labour and gross fixed capital formation as a proxy for capital. The result of the co-integration analysis shows that there exists long run relationship between recurrent expenditure on education, capital

expenditure on education, human capital development and gross fixed capital formation whereas the econometric result indicates that a one year lag of gross domestic product, current level of recurrent expenditure on education, two year lags of recurrent expenditure on education, current as well as two year lags of gross capital formation exhibit positive impact on economic growth in Nigeria. They also found that previous year capital expenditure on education and human capital development has negative and significant impact on economic growth within the period, 1986-2011. The study recommended that government should undertake more capital expenditure on the education sector so as to achieve economic growth in the country. This study majored on key sectors of the Nigerian economy as specified by the unbalanced growth model to include transport, communication, health, education and utilities sectors to analyse the short run impact of government spending for infrastructure on economic growth unlike only the education sector which they dwelt on.

Amadi and Amadi (2013) examined public spending on transport infrastructure and economic growth in Nigeria. The study employed the Ordinary Least Square (OLS) regression method to analyze the data collected. The data analyzed shows that public spending on transport infrastructure is negatively related to growth and insignificant. The study recommended that government must ensure adequate funding of transport sector. And that fiscal responsibility laws be properly implemented to ensure greater accountability and prudence in the funds allocated to transport sector as this would go a long way to boost employment, sustainable economic growth and development in Nigeria. This study majored on government spending on key sectors of the Nigerian economy as specified by the unbalanced growth model to include transport, communication, and health, education and utilities sectors unlike only the transport sector which they dwelt on. Also the direction of causality between government spending for infrastructure and economic growth in Nigeria was determined as a further deviation.

Uma, Ogbonna, and Hyacinth (2014) examined the effect of government investment in the transportation sector on economic growth in Nigeria using sub-sector output time series data (road transport, rail transport, air transport and water way) ranging from 1981-2009. The variables they used includes real gross domestic product (RGDP) as dependent variable while public expenditures on road transport, rail transport, air transport and water way were the explanatory variables. The Ordinary least square approach was employed in the data analysis.

The results reveal that only government investment in road transport impacted significantly on the real gross domestic product (RGDP). However, the joint effect of the variables on the economy was statistically significant based on the F-statistic. The study recommended that sufficient and consistent resources should be budgeted and allocated to transportation capital expenditure. Also, private domestic and foreign investors can be contracted to establish transport infrastructure and given a period of time to recoup cost of investment and profit margin. This study majored mainly on government spending on key sectors of the Nigerian economy as specified by the unbalanced growth model to include transport, communication, and health, education and utilities sectors unlike only the transportation sector which they dwelt on. The study also took the extra mile of examining the direction of causality between infrastructural government spending on selected sectors and economic growth in Nigeria.

2.2.3 Aggregate sector studies of impact of government spending for infrastructure on economic growth

Ayogu (1999) in a study on government investment on core infrastructure disaggregated by regions on growth for 1985–95 in Nigeria, adopted Cobb–Douglas production function. The study employed physical stock of core infrastructure variables, kilometres of Federal highways; per cent of population with access to potable water, power consumed and access to main telephone mainlines as variables. The study found that government investment causes no regional differences in productivity across infrastructure types but in general government investment on infrastructure is productive. Results are stronger in the aggregate that does not control for regional differences. In contrast, the combination of unbalanced growth model and endogenous growth model was adopted for this study with gross domestic product growth rate as the dependent variable and government spending on transport, communication, health, education and utilities sectors as the independent variables to analyse the short run impact of government spending on infrastructure on economic growth.

Akinbobola and Saibu (2004) used aggregate quarterly data, 1986–2000 to investigate the correlation between infrastructure development and government capital spending in Nigeria. Real per capita income, government capital expenditure, unemployment rate and ranking on human development index were independent variables employed using VAR. Findings reveals that spending on infrastructure development lead to more job opportunities, higher level of

income per capita and a reduction in poverty and thus, an improvement in the human development index. This study adopted the aggregated approach by recognising key sectors of interest (transport, communication, health, education and utilities) to take an in depth study of the impact of government spending for infrastructure while taking cognisance of the implications of the policy breaks experienced within the period of study.

Olorunfemi (2008) examined the direction and the strength of the relationship between infrastructural development and national output in Nigeria using time series data from 1981 to 2005. The study used Vector Autoregressive (VAR) model and Granger causality relating national output to telecommunication, electricity, education and transport infrastructural services. Results show that the present transport and electricity service in Nigeria did not cause growth to occur in the country. It was also revealed in the study that telecommunication and education had contributed to the growth in the nation. The paper recommended that a centrally coordinated, internally consistent and a holistic approach that would encompass uniform standard, a maintenance culture and a linkage between the various sectors of the economy toward the development of infrastructure development is important to the development of the country. In consonance, this study examined the direction of causality between government spending for infrastructure and economic growth in Nigeria for the period 1970 to 2017 but deviated by using a combination of unbalanced growth model and endogenous growth model to study the impact of government spending on the selected sectors on economic growth.

Enimola (2010) analyzed theoretically and empirically the influence of government infrastructure investment on economic growth in Nigeria from 1980–2006. In trying to achieve the objectives, the variables used includes: real GDP, gross fixed capital formation, total expenditure on health and education, energy consumption and expenditure on transport and communication. The study employed the use of vector error correction technique (VECM). The variables were found to be stationary at order 1, and there exists a long-run equilibrium relationship between the dependent and the explanatory variables. The study found that total government expenditure on health and education, transport and communication show a steadily declining rate on the long run growth as shown by the result of the variance decomposition and impulse response functions. The study recommended that the government should intensify their efforts in mobilizing more resources towards the provision and improvement of basic

infrastructure. In consonance, this study employed time series analysis for the periods of 1970 to 2017 but deviated by using ARDL technique to ascertain if there exists causal link between government spending on the sectors selected for our analysis (transport, communication, health, education and utilities) as well as their short run impact on the economic growth of Nigeria.

Narudeen and Usman (2010) examined the effect of government expenditure on infrastructure and economic growth in Nigeria. Ordinary Least Square technique was employed in the analysis with government expenditure on agriculture, education, health and transport as independent variables. The result obtained, indicates that government total recurrent and capital expenditure had insignificant effects on economic growth and the impact of expenditure on education was negative. However, expenditure on transport and communication, and health had positive effects on growth. The R- square suggests that the explanatory variable explain 62 percent of the variation in economic growth, while the F- statistics shows that all the variables included in the model were statistically significant in explaining increase in the gross domestic product. The study recommended that the government of Nigeria should help in the pursuance of an increased level of economic activities in the country so as to attain economic growth. In consonance, this study examined the impact of government spending on transport, communication, health, education and utilities sectors as stipulated by the unbalanced growth model on economic growth and deviated by excluding the agriculture sector they used.

Akinlabi, Kehinde, and Jegede (2011) examined the impact of public investment in infrastructures on poverty alleviation and economic development in Nigeria. Using co-integration and Granger causality test for the period 1981 to 2006, they found public infrastructure Granger causes GDP, but fiscal deficit does not Granger cause GDP. They recommended that more efforts should be made by the Nigerian government to increase and improve the level of infrastructural development in the country. In consonance, this study examined the direction of causality between government spending for infrastructure on the sectors selected for our analysis (transport, communication, health, education and utilities) but deviated by studying their short run impact on the economic growth of Nigeria.

Babatunde, Salius, and Oseni (2012) attempted to investigate the impact of government investment on infrastructure and economic growth in Nigeria using a multivariate model of simultaneous equation during 1970 to 2010. The study utilized three-stage least squares

technique to capture the transmission channels through which government investment on infrastructure impacted on growth. Variables considered include, market size, public investment and private sector investment. The study submitted that government investment on infrastructure directly impacted on the overall output and indirectly stimulates growth of other sectors. In contrast, this study employed ARDL to cover from 1970 to 2017 using a combination of unbalanced growth model and endogenous growth model with gross domestic product growth rate as the dependent variable and government spending on transport, communication, health, education and utilities sectors as the independent variables to take an in depth study of the impact of government spending for infrastructure on the Nigerian economy.

Fasoranti (2012) examined the effects of aggregated government expenditures on infrastructure on the growth of the Nigerian economy. He made use real GDP as the dependent variable while government expenditures in education, health services, environment and housing, transport and communication, water resources, agriculture, security and inflation rate as the independent variables. The co-integration result showed a long run relationship between the growth of the economy and government expenditures in education, environment and housing, health services, water resources, inflation rate, agriculture, security, transport and communication. Government should encourage more investments in the development of infrastructure in the economy since they increase economic growth. In consonance, this study used gross domestic product growth rate as the dependent variable and government spending on transport, communication, health, education and utilities sectors as the independent variables but deviated by employing ARDL on a combination of unbalanced growth model and endogenous growth model to take an in depth study of the impact of government spending for infrastructure during the SAP period on the Nigerian economy. Also the direction of causality between the dependent and independent variables was determined.

Ohwofasa, Obeh and Atuma (2012) examined the impact of public sectoral expenditure on economic growth in Nigeria for the period 1981-2013. The study employed the ARDL econometric model with expenditure on administration, debt servicing, economic and social sectors as independent variables. The results show that while the impact of government expenditure on debt servicing were positive on economic growth in the long run and short run,

expenditure on economic and social sectors have negative impact on economic growth. The CUSUM and CUSUMSQ tests employed show the model is stable as neither of them cross the 5% boundary. The study recommended that government should increase expenditure on economic and social sectors while debts or debt servicing should be reduced. Also, corruption so prevalent in the public sector must be minimised if cannot be eradicated. In consonance, this study employed the ARDL econometric technique in its analysis but deviated by selecting key sectors of the Nigerian economy (transport, communication, health, education and utilities sectors), to study the impact of government spending on them while taking cognisance of the policy measures undertaken by the Nigerian government over the years.

Ekpung (2014) examined the trends of public expenditure on infrastructure, and economic growth in Nigeria between 1970 and 2010. He used GDP as the dependent variable while public expenditures on transport and telecommunication, housing and environment, water supply, road construction and electricity supply were used as the explanatory variables. He used the vector error correction technique of analysis in analyzing the data. The study finds that public expenditure on transport/telecommunication, water supply, housing/environment, road construction and electricity supply is very low especially in the short-run and long-run. Also, equilibrium is static and showed weak adjustment. The resulted expenditure on public investment has not yielded expected results, and this has shown in the dilapidated nature of public infrastructures in Nigeria during the period reviewed. They recommended that government should take measures to accelerate economic development in the country. In consonance, this study incorporated key sectors of the economy for the periods of 1970 to 2017 to examine the impact of government spending for infrastructure on economic growth but deviated by employing ARDL technique. Also the direction of causality between growth rate of government spending for infrastructure and economic growth in Nigeria was determined as a further deviation.

Nedozi, Obasanmi, and Ighata (2014) analyzed government investment in infrastructural development and economic growth in Nigeria using simultaneous analysis. Two models were specified and analyzed using the OLS method along with variables such as gross domestic product, exchange rate, labour force, inflation rate and contribution of infrastructure to GDP. Findings from the study show that government investment in infrastructural development

constitutes a critical part of growth process in Nigeria. In contrast, this study employed ARDL technique by incorporating a combination of unbalanced growth model and endogenous growth model on key sectoral variables and not on control variables which they employed while taking cognisance of the policy measures undertaken by the Nigerian government within the study period.

Owolabi (2015) through the use of Ordinary Least Squares and Granger Causality econometric techniques investigated on government infrastructural development and economic growth nexus in Nigeria. The infrastructural development was proxied by Gross Fixed Capital Formation (GFCF) while economic growth was proxied by Gross Domestic Product (GDP). The period under review is from 1983 to 2013 and the data for this study was obtained from the World Bank's Africa Development Indicators. The empirical results from this study reveal that infrastructural development has a positive and statistically significant impact on Nigeria's economic growth. The Granger Causality test connotes that there is no mutual causality between both variables in Nigeria in the period under review. In consonance, this study has the same outcome for the granger causality test carried out.

Ehizuelen (2016) examined the dynamic linkages between government infrastructural development and economic growth in Nigeria. Economic development in Nigeria can be facilitated and accelerated by the presence of infrastructure. The study employed Ordinary Least Squares along with variables such gross domestic product, exchange rate, inflation rate, labour force and contribution of infrastructure. Results show that government investment in infrastructure is an integral part of Nigeria economic growth. Undermining it (government investment in infrastructure) is undermining the growth and development of Nigerian economy. The study has showed that infrastructure is an intermediate goods and service for the real sector and a finished goods and service for consumers. So, if the real sector which is the engine of growth is to propel Nigerian growth and development, infrastructure should be given qualitative and adequate attention. This study employed ARDL incorporating gross domestic product growth rate as the dependent variable and government spending on transport, communication, health, education and utilities sectors as the independent variables to ascertain the direction of causality between the dependent and independent variables. Key sectoral variables other than control variables were employed in this study.

Ogunlana, Yaqub, and Alhassan (2016) analyzed the effect of public and private investment on infrastructures and its impact on economic growth in Nigeria during the period 1970 to 2014 using the Engel-Granger (1987) co integration and Error correction mechanism (ECM). Empirical results show that public investment in infrastructure components exert positive contribution on economic growth in Nigeria. Domestic investment on infrastructure and total labour force correlated with economic growth negatively. The study recommended that government need to design an economic policy that would raise the quality of infrastructures and at the same time make provisions for human capital development for sustained growth. In contrast, this study restricted its scope to the short run impact of public spending for infrastructure on economic growth in Nigeria and also ascertained the direction of causality between them without involving private investment on infrastructure.

Babatunde (2017) investigated government spending on infrastructure and economic growth in Nigeria. He employed both primary and secondary data in the analysis to cover 1980 to 2015. The secondary data was analysed using co- integration tests and vector error correction model with Gross Domestic Products as the dependent variable and government annual spending on transport, communication, education, health care, agriculture and natural resources infrastructure were the independent variables For the primary data, a sample of 242 respondents was utilised for the study using descriptive statistics. Findings from the study indicate that government spending on transport and communication, education and health infrastructure has significant effects on economic growth while government spending on agriculture and natural resources infrastructure had negative effect on economic growth in Nigeria. The study recommended that government should contribute as much as the private sector in spending on agriculture and natural resources infrastructure so as to attain economic growth in Nigeria. In contrast, this study employed only secondary data in its analysis to analyse the impact of government spending on key sectors of the Nigerian economy like transport, communication, and health, education and utilities sectors as against the agriculture and natural resource sectors they included.

Iheanacho (2017) examined the long and short run relationship between public expenditure on infrastructure and economic growth in Nigeria for the period 1986-2014, using Johansen cointegration and error correction approach on a Cobb Douglas production function framework. The independent variables were recurrent expenditure, capital expenditure, aggregate

government expenditure, gross capital formation ratio and one control variable non-oil price while gross domestic product was the dependent variable. The result shows that both a negative and significant long run relationship and positive short run relationship exists between recurrent expenditure on infrastructure and economic growth in Nigeria while capital expenditure has negative and significant long run effect on economic growth in Nigeria. The study recommends that there should be effective utilization of public funds by policyholders on rightful projects rather than spending them on enormous projects that will not translate into meaningful growth of the economy. In contrast, this study did not decompose government expenditure into capital and recurrent expenditure but the decomposition of government expenditure was according to key sectors of the economy so as to fully analyse the impact government spending on each sector has on Nigerian economic growth. Also the study period extended from 1970 to 2017.

Siyan and Adegoriola (2017) investigated the government infrastructural development and Nigerian economic growth nexus using data from 1981 to 2014. Real Gross Domestic Product (RGDP) was used as the dependent variable while expenditure for infrastructural development on road and communication, private investment, degree of openness and education were the independent variables. The data was tested for stationarity followed by co-integration, and vector error correction technique (VECM) was employed for the analysis. From the results, there is long run relationship between government investment in infrastructure development and Nigerian economic growth. VECM have the expected negative sign, and is between the accepted regions of less than unity. It also shows a low speed adjustment towards equilibrium. Specifically, government investment in infrastructural development on road and communication show a positive relationship with the Nigerian economic growth for the period under review, while private investment, degree of openness and education produced negative relationship with economic growth. It was therefore recommended that, the government should beef up their commitment on improving infrastructure, develop the manufacturing sector to properly harness the advantages of openness of the economy, improve and monitor budgetary allocation to education to increase human capital development that is capable of utilizing available infrastructure and resources for the attainment of economic growth. Also private sector should be encouraged with series of incentives to increase their participation in infrastructural investment activities which will lead to economic growth. In contrast, this study employed ARDL

econometric technique using gross domestic product growth rate as the dependent variable and government spending on transport, communication, health, education and utilities sectors as the independent variables to study not just the impact of government on them but also the direction of causality between the dependent and independent variables.

Usman, Agbede and Bako (2017) examined the relationship between government expenditure on infrastructure and economic growth in Nigeria using a co-integration and error correction model for the period 1970-2010. The independent variables used in the analysis were recurrent expenditure and capital expenditure while real gross domestic product was the dependent variable. The ADF unit root test indicated that all variables included in the model were integrated of order one. The results from the long-run analysis revealed that both recurrent expenditure and capital expenditure on infrastructure have positive and significant relationship with economic growth, whereas on the short-run, economic growth has a positive and significant relationship with recurrent expenditure and negative significant relationship with capital expenditure. The Granger Causality test shows a unidirectional causality running from economic growth to capital expenditure and recurrent expenditure to economic growth, while bi-directional causality runs from capital expenditure to recurrent expenditure. The study recommends that the government should allocate appropriate proportion of the national budget to capital expenditure so as to to stimulate economic growth. In contrast, this study did not decompose government expenditure into capital and recurrent expenditure but the decomposition of government expenditure was according to key sectors of the economy so as to fully analyse the impact government spending on each sector has on Nigerian economic growth. Also the ADF unit root test showed that all variables included in the model were not integrated of order one and there is no causal link between the variables included in this study and economic growth in Nigeria.

Table 2.6: Summary of Empirical Literature Reviewed

1 Overseas studies on impact of infrastructural government spending on economic growth

Author(s)/Year	Location	Topic or Nature of Study	Variables of the Model	Method of Analysis	Findings	Remark
Aschauer (1988)	USA	Relationship between aggregate productivity and the flow of government spending on infrastructure	Output per capital, labour input, private capital input, non-military public capital.	OLS	Government spending on core infrastructure which comprised of 55per cent of the cumulative non-military stock is highly significant with an elasticity of 0.24.	Did not employ core sectors as independent variables in the analysis.
Bougheas, Demetriades, and Morgenroth (1999)	Six European countries	Relationship between public investment on infrastructure stock and increased productivity	Public capital, exports Gross domestic product and distances between the capital cities	OLS	The results indicate that the coefficients of infrastructure variables are positive and significant while those of GDP are smaller and positive.	Carried out cross country analysis.
Haughwout (2000)	USA	The effect of public investment in infrastructure on the growth	Data on federal, state and local authorities.	Descriptive analysis	This study found that the wish to use public capital money as part of a strategic economic development effort will direct more resources to central cities.	Carried out whole economy descriptive analysis instead of sectoral analysis that affects infrastructural development directly.
Kweka and Morrissey (2000)	Tanzania	The relationship between sectoral public expenditure and economic growth	Real gross domestic product, government expenditure on education, agriculture, transport and communication and the rest of the sectors	Johansen co-integration test and vector error correction model	The study found that increased investment expenditure has a negative impact on growth but consumption expenditure has a positive impact.	Did not adhere to the specifications of the unbalanced growth model on the sectors to be studied.
Moreno, Lo´pez-Bazo, and Art´ıs (2002)	Spain	Effects of public infrastructure spending on the economic performance of Spanish regions	Private capital and private investment.	Seemingly Unrelated Regression (SUR)	The study found that infrastructure exerts an indirect influence on private capital.	Carried out whole economy analysis instead of sectoral analysis.
Paul (2003)	Australia	Effects of public infrastructure expenditure on cost structure and productivity in the private sector.	Public capital infrastructure for both the private-sector and a group of seven broad industries.	Translog cost functions	Public infrastructure expenditure is found to have a positive and significant impact on productivity in the private sector	Limited the analysis to only the private sector.
Herranz-Loncán (2007)	Spain	Impact of public infrastructure investment on economic growth	New infrastructure	VAR technique.	The study showed a strong positive relationship between investment in infrastructure and growth but infrastructure returns were not significant in the estimation.	Did not employ core sectors as independent variables in the analysis. Was not specific in the sectors studied.

Table 2.6: Summary of Empirical Literature Reviewed Continued

A Overseas studies on impact of infrastructural government spending on economic growth

Author(s)/Year	Location	Topic or Nature of Study	Variables of the Model	Method of Analysis	Findings	Remark
Ghosh and Gregoriou (2008)	Fifteen developing countries	The composition of government capital or current spending on infrastructure and Growth.	Two public goods, their growth rate, tax rate and expenditure shares.	GMM	They found that current government spending positively impacts on growth while capital government spending on the other hand impacts negatively on growth	Carried out cross country analysis.
Egert, Kozluk, and Sutherland (2009)	OECD countries	The relationship between public expenditure on infrastructure and economic growth	GDP, infrastructure investment on telecommunication, electricity sectors, railways and road network.	Bayesian model averaging of cross-section growth regressions	Results showed there is a positive impact of public infrastructure investment on growth.	Carried out cross country analysis.
Zainah (2009)	Mauritius	Role of public investment on infrastructure on economic performance	GDP per capita, public investment on infrastructure, private capital accumulation and trade openness.	Vector error correction technique	Public investment on infrastructure have significant contribution to Mauritian economic performance while private capital accumulation showed indirect effects on economic performance.	Used GDP per capita as the dependent variable which does not show the distribution of wealth in the economy studied.
Nketiah-Amphonsah (2009)	Ghana	Aggregated and disaggregated government expenditure on infrastructure and economic growth	Expenditure on education and health as proxies for human capital development, while expenditure on roads and waterways as proxies for infrastructure development.	OLS	The findings show that expenditures on health and infrastructure promote economic growth, while those on education had no significant impact in the short run.	The model used was not as robust as a combination of the unbalanced growth model and the endogenous growth model.
Kodongo and Ojah (2016)	Sub-Saharan Africa	The relationship between public spending on infrastructure and economic growth	Export, trade and capital flows	GMM	Results found that public spending on infrastructure and increments in the access to infrastructure that influence economic growth and development	Carried out whole economy analysis instead of sectoral analysis.

Table 2.6: Summary of Empirical Literature Reviewed Continued

2. Individual sector studies of impact of government spending for infrastructure on economic growth

Author(s)/ Year	Location	Topic or Nature of Study	Variables of the Model	Method of Analysis	Findings	Remark
Osotimehin, Akinkoye, and Olasanmi (2010)	Nigeria	The effects of government investment in communication infrastructure on economic growth	GDP, teledensity and telecommunication employment.	Pooled ordinary least square regression technique	Government investment on Communication infrastructure is statistically significant and positively correlated with economic growth.	Studied only few aspects of infrastructure.
Lawal and Abdulkadir (2012)	Nigeria	relationship between government spending on education and economic development	GDP, recurrent expenditure on education, capital expenditure on education, human capital development and gross fixed capital formation	OLS	They found that a lag of capital expenditure on education and human capital development has negative and significant impact on economic growth	Studied only few aspects of infrastructure.
Amadi and Amadi (2013)	Nigeria	Public spending on transport infrastructure and economic growth	RGDP, Public spending on transport infrastructure.	Ordinary Least Square regression technique	Public spending on transport infrastructure is negative and insignificant in its relation to growth.	Studied only an aspect of infrastructure.
Uma, Ogbonna, and Hyacinth (2014)	Nigeria	The effect of government investment in the transportation sector on economic growth	Real gross domestic product (RGDP), road transport, rail transport, air transport and water way.	Ordinary least square technique	The study shows that only government investment in road transport impacted significantly on the real gross domestic product (RGDP). However, the joint effect of the variables on the economy was statistically significant based on the F-statistic	Studied only an aspect of infrastructure.

Table 2.6: Summary of Empirical Literature Reviewed Continued

3 Aggregate Nigerian studies on impact of infrastructural government spending on economic growth

Author(s)/ Year	Location	Topic or Nature of Study	Variables of the Model	Method of Analysis	Findings	Remark
Ayogu (1999)	Nigeria	Government investment on core infrastructure on growth	kilometres of Federal highways; per cent of population with access to potable water, power consumed and access to main telephone mainlines	Cobb-Douglas production function.	Government investment causes no regional differences in productivity across infrastructure types.	The model used was not as robust as a combination of the unbalanced growth model and the endogenous growth model.
Akinbobola and Saibu (2004)	Nigeria	The correlation between infrastructure development and government capital spending	Real per capita income, government capital expenditure, unemployment rate and ranking on human development index	VAR	Findings revealed that spending on infrastructure development lead to more job opportunities, higher level of income per capita and a reduction in poverty	Did not employ core sectors as independent variables in the analysis.
Olorunfemi (2008)	Nigeria	The direction and the strength of the relationship between infrastructural development and national output in Nigeria	Manufacturing output, telecommunication, electricity, education and transport infrastructural services	VAR and Granger causality	Results showed that the present transport and electricity service in Nigeria did not cause growth to occur in the country.	Studied only relationship instead of impact government spending has to achieve infrastructural development.
Enimola (2010)	Nigeria	The influence of government infrastructure investment on economic growth	RGDP, gross fixed capital formation, total expenditure on health and education, energy consumption and expenditure on transport and communication.	Vector error correction technique, variance decompositio n and impulse response functions	Total government expenditure on health and education, transport and communication show a steadily declining rate on the long run growth.	Did not analyse the government investment in line with government policies set to achieve economic growth
Narudeen and Usman (2010)	Nigeria	Effect of government expenditure on infrastructure and economic growth	GDP, government expenditure on agriculture, education, health and transport.	OLS	They found that government total recurrent and capital expenditure had insignificant effects on economic growth and the impact of expenditure on education was negative. Also, expenditure on transport and communication, and health had positive effects on growth.	Did not analyse the government investment in line with government policies set to achieve economic growth
Akinlabi, Kehinde, and Jegede (2011)	Nigeria	The impact of public investment in infrastructures on poverty alleviation and economic development	GDP, public infrastructure, fiscal deficit.	Co-integration and Granger causality test	Results showed that public infrastructure Granger cause GDP, but fiscal deficit does not Granger cause GDP.	Carried out whole economy analysis instead of sectoral analysis.

Table 2.6: Summary of Empirical Literature Reviewed Continued

3. Aggregate Nigerian studies on impact of infrastructural government spending on economic growth

Author(s)/Year	Location	Topic or Nature of Study	Variables of the Model	Method of Analysis	Findings	Remark
Babatunde, Salius, and Oseni (2012)	Nigeria	The impact of government investment on infrastructure and economic growth	Market size, public investment and private sector investment	Three-Stage Least Squares	The study submitted that government investment on infrastructure directly impacted on the overall output and indirectly stimulates growth of other sectors.	Carried out whole economy analysis instead of sectoral analysis.
Fasoranti (2012)	Nigeria	Effects of aggregated government expenditures on infrastructure on the growth of the economy.	RGDP, government expenditures in education, health services, environment and housing, transport and communication, water resources, agriculture, security and inflation rate.	Co-integration technique	There is a positive long run relationship between the growth of the economy and government expenditures in education, environment and housing, health services, water resources, inflation rate, agriculture, security, transport and communication.	Did not analyse the government investment in line with government policies set to achieve economic growth
Ohwofasa, Obeh, and Atuma (2012)	Nigeria	The impact of public sectoral expenditure on economic growth	RGDP, expenditure on administration, debt servicing, economic and social sectors	ARDL	The results show that while the impact of government expenditure on debt servicing were positive on economic growth in the long run and short run, expenditure on economic and social sectors have negative impact on economic growth.	Did not analyse the government investment in line with government policies set to achieve economic growth
Ekpung (2014)	Nigeria	The trends of public expenditure on infrastructure, and economic growth in Nigeria	GDP, public expenditure on transport and telecommunication, housing and environment, water supply, road construction and electricity supply.	Vector error correction technique	Public expenditure on transport/telecommunication, water supply, housing/environment, road construction and electricity supply is very low especially in the short-run and long-run; equilibrium is static and showed weak adjustment.	Did not analyse the government investment in line with government policies set to achieve economic growth
Nedozi, Obasanmi, and Ighata (2014)	Nigeria	Government investment in infrastructural development and economic growth	GDP, exchange rate, and contribution of infrastructure to GDP	OLS	Findings from the study show that government investment infrastructure constitute a critical part of growth process	Employed control variable as independent variable instead of core sectors.

Table 2.6: Summary of Empirical Literature Reviewed Continued

3. Aggregate Nigerian studies on impact of infrastructural government spending on economic growth

Author(s)/Year	Location	Topic or Nature of Study	Variables of the Model	Method of Analysis	Findings	Remark
Owolabi (2015)	Nigeria	Government infrastructural development and economic growth nexus	Gross domestic product, gross fixed capital formation	Ordinary least square technique and Granger causality technique	Government infrastructural development has a positive and statistically significant impact on Nigeria's economic growth.	Studied only nexus instead of impact government spending to achieve infrastructural development.
Ehizuelen (2016)	Nigeria	Dynamic linkages between government infrastructural development and economic growth	Gross domestic product, exchange rate, inflation rate, labour force and contribution of infrastructure.	Ordinary Least Squares	Results show that government investment in infrastructure is an integral part of Nigeria economic growth.	Employed control variables as independent variables instead of core sectors.
Ogunlana, Yaqub, and Alhassan (2016)	Nigeria	Effect of public and private investment on infrastructures and its impact on economic growth	Domestic investment, and total labour force	Cointegration and Error correction mechanism	Empirical results showed that public investment in infrastructure components exert positive contribution on economic growth.	Carried out whole economy analysis instead of sectoral analysis.
Babatunde (2017)	Nigeria	Government spending on infrastructure and economic growth	Gross Domestic Products as the dependent variable and government annual spending on transport, communication, education, health care, agriculture and natural resources	Descriptive statistics for primary data and Ordinary least square technique for secondary data.	Findings from the study indicate that government spending on transport and communication, education and health infrastructure has significant effects on economic growth while government spending on agriculture and natural resources infrastructure had negative effect on economic growth in Nigeria.	The model used was not as robust as a combination of the unbalanced growth model and the endogenous growth model.
Iheanacho (2017)	Nigeria	The long and short run relationship between public expenditure on infrastructure and economic growth	Gross domestic product, recurrent expenditure, capital expenditure, aggregate government expenditure, gross capital formation ratio and non-oil price	Johansen cointegration and error correction approach	The result shows that both a negative and significant long run relationship and positive short run relationship exists between recurrent expenditure on infrastructure and economic growth in Nigeria while capital expenditure has negative and significant long run effect on economic growth in Nigeria.	The model used was not as robust as a combination of the unbalanced growth model and the endogenous growth model.

Table 2.6: Summary of Empirical Literature Reviewed Continued

3. Aggregate Nigerian studies on impact of infrastructural government spending on economic growth

Author(s)/Year	Location	Topic or Nature of Study	Variables of the Model	Method of Analysis	Findings	Remark
Siyan and Adegoriola (2017)	Nigeria	The government infrastructural development and economic growth nexus	RGDP, Infrastructural development on road and communication, private investment, degree of openness and education.	Co-integration and Vector error correction technique.	Government investment in Infrastructural development of road and communication show a positive relationship with the Nigerian economic growth for the period under review, while private investment, degree of openness and education produced negative relationship with economic growth.	Studied only nexus nstead of impact government spending to achieve infrastructural development.
Usman, Agbede and Bako (2017)	Nigeria	The relationship between government expenditure on infrasrtucture and economic growth	Real gross domestic product, recurrent expenditure and capital expenditure	Ordinary least square technique and Granger causality technique	The results from the long-run analysis revealed that both recurrent expenditure and capital expenditure on infrastructure have positive and significant relationship with economic growth, whereas on the short-run, economic growth has a positive and significant relationship with recurrent expenditure and negative significant relationship with capital expenditure. The Granger Causality test shows a unidirectional causality running from economic growth to capital expenditure and recurrent expenditure to economic growth, while bi-directional causality runs from capital expenditure to recurrent expenditure.	Studied only relationship instead of impact government spending has to achieve infrastructural development.

Source: Researchers' Compilation, 2019.

2.3 Summary of Literature Reviewed

During the course of this research work efforts were made to review theoretical literatures developed by scholars that link government spending on infrastructure and economic growth which is the issue we are investigating. While the balanced growth theory reviewed holds the

view that there should be simultaneous and harmonious development of different sectors of the economy so that all sectors grow in unison, the theory of unbalanced growth which is the theoretical underpinning of this research work, is the opposite. According to this theory, investment should be made in selected sectors rather than simultaneously in all sectors of the economy because no underdeveloped or developing country possesses capital and other resources in such quantities as to invest simultaneously in all sectors. Solow Neoclassical growth theory and the Romer Endogenous growth theory were also reviewed. The theories are relevant to the present study in that they stipulate factors/determinants needed to be invested in so that our economy attains growth. All the economic growth theories reviewed operates at a very high level of abstraction and therefore, cannot be fully applied to guide industrialization, technological advancement or anticorruption programmes in the LDCs.

The empirical literature attention given by scholars to understanding the Impact/relationship existing between government spending/investment in infrastructure and economic growth in various economies were reviewed and grouped into four based on the interest and motivation of the researchers.

Aschauer (1988), Bougheas et al (1999), Kweka and Morrissey (2000), Egert et al (2009), Kodongo and Ojah (2016), Akinbobola and Saibu (2004), Ekpung (2014), Lawal and Abdulkadir (2012), Iheanacho (2017), Usman et al (2017), all studied the relationship between government spending/investment in infrastructure and economic growth. Aschauer (1988), conducted his research on USA, Bougheas et al (1999), carried out their research on Six European countries, Egert et al (2009) worked on Organization of Economic Cooperation and Development (OECD) countries, Kweka and Morrissey (2000) worked on Tanzania, Kodongo and Ojah (2016) studied the sub Saharan Africa while the rest based their analysis on Nigeria. Not minding the variances in the country of interest, only Kweka and Morrissey (2000), Ekpung (2014), Lawal and Abdulkadir (2012), Iheanacho (2017) and Usman et al (2017) found that there is a negative relationship existing between government spending on infrastructure and economic growth while others found a positive relationship existing between them.

Haughwout (2000), Moreno et al (2002), Paul (2003), Herranz-Loncán (2007), Ghosh and Gregoriou (2008), Zainah (2009), Nketiah-Amphonsah (2009), Ayogu (1999), Enimola (2010),

Narudeen and Usman (2010), Babatunde et al (2012), Fasoranti (2012), Ohwofasa et al (2012), Nedozi et al (2014), Ogunlana et al (2016), Osotimehin et al (2010), Amadi and Amadi (2013), Uma et al (2014), Babatunde (2017), all studied the impact/effect of government spending/ investment in infrastructure and economic growth. Ghosh and Gregoriou (2008) carried out their research on Fifteen developing countries, Haughwout (2000) did his on USA, Moreno et al (2002) and Herranz-Loncán (2007) conducted their research on Spain, Paul (2003) did his on Australia, Zainah (2009) worked on Mauritius, Nketiah-Amphonsah (2009) studied Ghana while the rest of the researchers carried their out their respective researches on Nigeria. Not minding the differences in their countries of interest, Moreno et al (2002) found that public spending on infrastructure has an indirect impact on economic growth while Enimola (2010), Amadi and Amadi (2013), Uma et al (2014), Ayogu (1999)**,** Babatunde (2017), found that public spending on infrastructure has a negative impact on economic growth but the rest of the researchers found that there exists a positive impact of public spending on infrastructure on economic growth.

Another group of interest includes Owolabi (2015), Siyan and Adegoriola (2017), Ehizuelen (2016), who studied the nexus between government investment in infrastructure and economic growth in Nigeria, all found a positive nexus existing between public spending/investment in infrastructure and economic growth in Nigeria.

Lastly, Olorunfemi (2008), Akinlabi et al (2011), Owolabi (2015) and Usman et al (2017) extended their analysis to cover the direction of causality between public infrastructure and economic growth in Nigeria. Olorunfemi (2008) found that investments in telecommunication and education cause economic growth whereas investment in transport and electricity do not cause economic growth. Akinlabi et al (2011) and Owolabi (2015) found that public investment in infrastructure cause economic growth where as Usman et al (2017) found a unidirectional causality running from economic growth to capital expenditure and recurrent expenditure to economic growth, while bi-directional causality runs from capital expenditure to recurrent expenditure. These conflicting findings motivated the inclusion of the third objective of this research work so as to ascertain exactly the direction of causality between government spending on infrastructure and economic growth in Nigeria.

Not minding the group the various researchers fell into, the key techniques employed in the researches includes Ordinary Least Square technique, GMM, VAR Seemingly Unrelated Regression model, Descriptive analysis, Translog cost functions, Vector error correction technique, Three-Stage Least Squares. The key variables that reflected in most of the studies includes GDP per capita and RGDP as the dependent variable whereas government expenditures on sectors(like education, transportation, telecommunication, agriculture etc), contribution of infrastructure to GDP, exchange rate, inflation rate, gross fixed capital formation were mainly used as the independent variables.

2.4 Justification for the Study

Unlike Ayogu (1999), Moreno, et al (2002), Paul (2003), Herranz-Loncán (2007), Zainah (2009), Enimola (2010), Babatunde et al (2012), Fasoranti (2012), Ekpung (2014), Nedozi et al (2014), Ogunlana et al (2016), Siyan and Adegoriola (2017), Kodongo and Ojah, (2016), Haughwout (2000), Moreno et al (2002), Ghosh and Gregoriou (2008), Nketiah-Amphonsah (2009), Narudeen and Usman (2010), Ohwofasa et al (2012), Osotimehin et al (2010), Amadi and Amadi (2013), Uma et al (2014), who studied the impact of government spending for infrastructure on growth focusing mainly on the production function framework, this study employed a combination of the unbalanced growth theory framework in the Nigerian context by selecting active sectors of the economy which includes health, education, transport, communication and utilities sectors and the endogenous growth theory to study the impact of government spending for infrastructure on economic growth in Nigeria. The essence of the unbalanced growth theory is that Nigeria as a developing economy should invest in these stipulated five sectors due to inadequate resources so that there will then be trickled down effects to other sectors of the economy in order to attain economic growth. The superiority of the combined model therefore is to include other determinants of economic growth with the specifications of the sectors to be invested in, thereby developing a robust model that can sufficiently capture economic growth.

This approach departed from previous literature such as Osotimehin et al (2010), Amadi and Amadi (2013), Uma, Ogbonna, and Hyacinth (2014), Lawal and Abdulkadir (2012), who focused on one element of infrastructure (e.g., education, roads) in disregard of the

multidimensional nature of public infrastructure. This study adopted a multidimensional framework by examining the impact of government spending on five key sectors of the economy which ensured that a greater aspect of the economy is studied as against studying just an aspect government spending on infrastructure.

Akinbobola and Saibu (2004), Fasoranti (2012), Nedozi, Obasanmi, and Ighata (2014), Ehizuelen (2016) employed control variables like inflation rate, exchange rate, unemployment rate as their independent variables in their analysis. Control variables exert effect on the dependent variable thereby affecting the outcome of an analysis. This study therefore concerned itself with economic growth of Nigeria which is the main problem it set out to examine, by employing growth determinants and key sectoral variables as independent variables in order to capture the impact government spending has on economic growth.

Generally, this study deviated further by empirically analyzing government expenditure in line with previous government policies set out to achieve infrastructural development within the country and their impact on the overall economic growth of Nigeria from the pre SAP period through the SAP and post SAP period to 2017.This examination was extended to top oil producing European countries and a comparism made between the impact government spending on the key sectors chosen for the analysis has on their economic growth and what is obtainable in Nigeria. This distinction was achieved by converting the government spending on sectors of interest to growth rates and examining their impact on the overall economic growth of the countries studied. The issue of government spending for infrastructure has lasted for decades from the development plans to 2017 and beyond. In the face of these spending, Nigerian economy has witnessed fluctuating growth rates, hence, there is need to examine the impact of growth rate of government spending for infrastructure on economic growth rate in Nigeria. These fluctuations witnessed in Nigerian economic growth also made it necessary that the causal link existing between government spending for infrastructure and economic growth be examined, hence necessitating the need for the study.

CHAPTER THREE

RESEARCH METHODS

The purpose of this chapter was to provide adequate and appropriate methods for this study. However, the basic objective of the methods employed in this study attempts to answer the research questions stated and hypotheses postulated. This chapter covered theoretical framework, model specification, estimation technique and procedure as well as nature and source of data used.

3.1. Theoretical Framework

The theory on which this research work was framed on is a combination of the endogenous growth model and unbalanced growth theory. Endogenous growth theory holds that economic growth is primarily the result of endogenous and not external forces. It holds that investment in human capital, innovation, and knowledge are significant contributors to economic growth. The theory also focuses on positive externalities and spill over effects of a knowledge-based economy which will lead to economic development and it primarily holds that the long run growth rate of an economy depends on policy measures. It models technological progress with a single parameter (usually A) and makes the assumption that the production function does not exhibit diminishing returns to scale to lead to endogenous growth. If the same level of capital and labour is used, we have the aggregate production function:

$$Y = f(K, L, A) \qquad (3.1)$$

Where K is capital, L is labour and A is Technological progress

On the other hand, the unbalanced growth theory postulates that investment should be made in selected sectors rather than simultaneously in all sectors of the economy. Most underdeveloped or developing countries do not possess capital and other resources in such quantities as to invest simultaneously in all sectors. Therefore, investment should be made in a few selected sectors or industries for their rapid development, and the economies accruing from them can be utilized for the development of other sectors. Thus, the economy gradually moves from the path of unbalanced growth to that of balanced growth. The concept of unbalanced growth has been popularized by Hirschman. It is his contention that deliberate unbalancing the economy,

according to a pre-designed strategy, is the best way to achieve economic growth in an underdeveloped country like Nigeria. According to Hirschman, investments in strategically selected industries or sectors of the economy will lead to new investment opportunities and so pave the way for further economic development. Hirschman maintained that development can only take place by unbalancing the economy through investing either in social overhead capital (SOC) or in directly productive activities (DPA). Social Overhead Capital has been defined as comprising those basic services without which primary, secondary and tertiary productive activities cannot function. SOC includes government investments in education, public health, communications, transportation and conventional public utilities like light, water, power, irrigation and drainage schemes, etc.

Hirschman unbalanced growth model is specified as;

$$Q_{(t)} - \psi\lambda_{(t)} = \psi\theta_{(t)} \quad (3.2)$$

$$Y_{(t)} = \psi\theta_{(t)} \quad (3.3)$$

Where $Y_{(t)}$ = output from social overhead capital (SOC). $\psi\theta_{(t)}$ = social overhead capital (SOC) at time t given input requirements. The above stated model majors on core sectoral variables and hence was employed to satisfy the objectives of this study. This combination motivated our study's focus on impact of government spending for infrastructure on economic growth in Nigeria.

3.2. Model Specification

Having looked at the theoretical underpinnings of the impact of government spending for infrastructure on economic growth from a combination of the endogenous growth model and unbalanced growth theory, the task in this section is to construct a model relating the various key variables identified as factors within the context of impact of governments' infrastructural development activities and economic growth. For this purpose the model adopted for this study is represented below:

$$Y = f(K, L, A) \quad (3.4)$$

Where:

K = Capital

L = Labour

$A \rightarrow Y_{(t)} = \psi\theta_{(t)}$

Where $Y_{(t)}$ = output from social overhead capital (SOC). $\psi\theta_{(t)}$ = social overhead capital (SOC) at time t given input requirements. Equation 3.5 can be restated as

GDP = f (K, L, SOC) (3.6)

Where SOC was further decomposed into government spending on sectors such as transport, communication, health, education, and utilities. The model adapted for this study is predicated on the endogenous growth framework of Barro (1990) and modified to include the unbalanced growth model is thus:

GDP = f (GFC, HDI, TRANS, COMM, HTH, EDU, UTL) (3.7)

The mathematical and econometrical form of the model with the variables converted to growth rates is given as follows:

$$GDPGR = \beta_0 + \beta_1 GFCGR + \beta_2 HDIGR + \beta_3 TRANSGR + \beta_4 COMMGR + \beta_5 HTHGR + \beta_6 EDUGR + \beta_7 UTLGR + \mu \quad (3.8)$$

Where:
GDPGR = gross domestic product growth rate as measure of economic growth;

GFCGR = gross fixed capital growth rate as measure of capital;

HDIGR = human development index growth rate as measure of human capital (labour);

TRANSGR = growth rate of government spending on Transportation sector;

COMMGR = growth rate of government spending on Communication sector;

HTHGR = growth rate of government spending on Health sector;

EDUGR = growth rate of government spending on Education sector;

UTLGR = growth rate of government spending on Utility sector;

β_0 to β_7 are the parameters being estimated and μ other variables not explicitly included in the model

3.3 Definition of Variables / Justification for the model.
This sub-section was divided into three units for clearer explanation.

a. Description of the Variables

Description of the variables involved describing the theoretical relationship that exists between the dependent variable and the explanatory variables of the models. The model employed eight variables respectively, namely economic growth, capital, labour, government spending on the transport, communication, health, education and conventional utility sectors.

Capital was measured by gross fixed capital. Ideally, capital stock is built-up by the accumulation of capital regularly done. Therefore economists have for a long time used the estimate of capital formation as well as capital stock in their analysis of the results of productive activity. Estimate of the gross stock of capital assets and capital formation are frequently used in determining the magnitude of and changes in productive capacity. The meaning of capital formation is that society does not apply the whole of its current productive activity to the needs and desires of immediate consumption, but directs a part of it to the making of capital goods such as: building and other structure, plant and equipment, transport facilities, tools and instruments, machines, and all the various forms of real capital that can so greatly increase the efficacy of productive effort. The term is sometimes used to cover human as well as material capital, which include investment in skills, education and health.

Human capital (Labour) was measured by human development index as reported in the United Nations Development Program (UNDP). UNDP's human development index is composed of life expectancy, national income, and average and expected years of schooling (UNDP, 2005).

Public infrastructure was measured by Social overhead capital includes government spending on education, public health, communications, transportation and conventional public utilities like light, water, power, irrigation and drainage schemes, etc. Economic theory as well as empirical experience confirm that the significant differences in the level of economic development and

rates of economic growth among countries or in the same countries over time are, to a great extent, interrelated with the differences that exist in the level and composition of the public infrastructure. According to Hirschman, a large investment in Social Overhead Capital will encourage private investment later in direct productive activities. Social Overhead Capital investments indirectly subsidise agriculture, industry or commerce by cheapening various inputs which they use or by reducing their costs. Unless Social Overhead Capital investments provide cheap or improved services, private investments in direct productive activities will not be encouraged. Thus, the Social Overhead Capital approach to economic development is to unbalance the economy so that subsequently investments in direct productive activities are stimulated.

b. Justification of the Variables in the Model

To capture capital, the study utilized gross fixed capital. This measure was adopted in the present study because countries with faster growing output may spend more on infrastructure while infrastructure provision may also positively mediate the relationship between aggregate input and output, and hence foster output growth.

Human capital is important because it enables a country's pool of labour resources to acquire hard skills (e.g., ability to operate machines) and soft skills (e.g., for teamwork and effective communication) which can potentially improve the productivity of capital (Kodongo & Ojah, 2016).

Specifically, the β_3 coefficient in our model (TRANS) was adopted because an increased government investment in the transportation sector in the country increases the economy's earnings through improved facilitation of the exchange of goods and services within the country and this will in turn boost the economic growth of the country. Improved transport facilities also aid international trade thereby enabling the country to earn increased foreign exchange and attain surplus balance of payment status. The β_4 coefficient (COMM) was adopted because an increased government investment in the communication sector in the country also increases the economy's earnings through improved facilitation of information as it relates to the exchange of goods and services within and outside the country and this will as well boost the economic growth of the country. The β_5 coefficient (HTH) was adopted because an increased investment

by the government in the health sector results in improved health care for the citizens. A healthy nation they say is a wealthy nation because the healthy workforce will be able to produce more. This increase in productivity increases the economic growth of the country. The β_6 coefficient (EDU) was adopted because increased government investment in the educational sector results in improved manpower development and specialization within the citizens. This results also in increased productivity and yield for our economy. The β_7 coefficient (UTL) which according to Hirschman, conventional utilities includes power, water resources etc, was adopted because an increase in power supply in the country, results in a multiplier effect on the productive capacity of the country which in turn increases economic growth. This scenario is also true for improved availability of water resources.

3.2.3. Economic a-priori Expectation

This refers to the supposed relationship between and or among the dependent or independent variables of the model as determined by the postulations of economic theory. The result or parameter estimates of the model were interpreted on the basis of the supposed signs of the parameters as established by economic theory. Put differently, the parameter estimates of the model were checked to find out whether they conform to the postulations of economic theory or not.

Table 3.1: Summary of the a-priori expectation for the first objective

Regressand	Relationship	Regressors
GDPGR	+	GFCGR
GDPGR	+	HDIGR
GDPGR	+	TRANSGR
GDPGR	+	COMMGR
GDPGR	+	EDUGR
GDPGR	+	HTHGR
GDPGR	+	UTLGR

If estimates of the parameters of the model turn up with magnitudes and signs not in conformity with economic theory, they are analysed to ascertain if there is a good reason to believe that in that particular instance, economic theory does not hold.

3.4 Estimation Technique and Procedure

In order to empirically analyse the objectives of this study, the following procedures were adopted.

First, the study examined the time series properties of the variables included in the model. Thus, the variables were investigated for their stochastic properties using the unit roots test. The traditional test used was Augmented Dickey-Fuller (ADF) test. ADF has the advantage of being dynamic by recognising lag values, employs parameters in its analysis and using large sample data. The test is used to test for consistency and where conflicts exist, to decide on the most appropriate option (see Hamilton, 1994). However, different techniques were used to achieve the specific objectives. These techniques are described in detail below:

Objective one: Examine the impact government spending on infrastructures has on Nigerian economic growth during the pre- SAP, SAP and post SAP periods.

To achieve this specific objective, the Autoregressive Distributed Lag (ARDL) bounds testing approach to co-integration proposed by Pesaran, Shin and Smith (2001) was employed. The test was broken down to examine the periods enumerated and then employed for the whole period of study.

This technique has a number of advantages over Johansen co-integration techniques.

First, whereas the Johansen techniques require large data sample, a luxury that most developing economies do not have, the ARDL model is the most useful method of determining the existence of cointegration in small samples (Dewett, 2005).

The second advantage of ARDL approach is that while other cointegration techniques require all of the regressors to be of the same order, the ARDL approach can be applied when the variables in the regression are a mixture of I(I) and I(0). This implies that the ARDL approach avoids the pre-testing problem associated with standard cointegration, which requires that the variables be already classified into I(I) (Pesaran et al, 2001).

Thirdly, the ARDL approach to cointegration is superior to Johansen approach because it avoids the problem of too many choices that are to be made in Johansen method. These include the treatment of deterministic elements, the order of VAR and the optimal lag length to be used.

Finally, in the ARDL approach variables could have different lag length, whereas in the Johansen method this is not permissible.

The ARDL approach requires two steps. In the first step, the existence of any long run relationship among the variables of interest is determined by using the F-test or bound testing approach. The second stage requires the estimation of the long run relationship between dependent and explanatory variables and to determine their values, thereafter the short run elasticity of the variables with the error correction representation of the ARDL model. The purpose of applying the ECM version of the ARDL is to determine the speed of adjustment to equilibrium.

Following Pesaran et al (2001), the Error Correction Model (ECM) of the unrestricted Autoregressive Distributed Lag (ARDL) equation based on equation 3.8 was specified as follows:

$$\Delta GDPGR_{it} = \beta_0 + \beta_1 GFCGR_{it} + \beta_2 HDIGR_{it} + \beta_3 TRANSGR_{it} + \beta_4 COMMGR_{it} + \beta_5 HTHGR_{it} + \beta_6 EDUGR_{it} = \beta_7 UTLGR_{it} = \sum_{i=1}^{k} a1\Delta GDPGRit - i + \sum_{i=1}^{k} a2\Delta GFCGRit - i + \sum_{i=1}^{k} a3\Delta HDGRIit - i + \sum_{i=1}^{k} a4\Delta TRANSGRit - i + \sum_{i=1}^{k} a5\Delta COMMGRit - i + \sum_{i=1}^{k} a6\Delta HTHGRit - i + \sum_{i=1}^{k} a7\Delta EDUGRit - i + \sum_{i=1}^{k} a8\Delta UTLGRit - i\mu_{it} \quad 3.9$$

Where μ_t was the error term

The first part of the write hand side of equation 3.9 with parameter β_1 to β_5 represents the long-run parameters of the models and the second part with parameters Δ_1 to Δ_8 represents the short-run dynamics of the models respectively

The lag length or order of the variables was selected using Akaike Information Criteria (AIC). The AIC is often preferred as it gives the heaviest penalties for loss of degree of freedom (Ogwumike and Ofoegbu, 2012). AIC also imposes a larger penalty for additional coefficients.

To test for the cointegration relationship using the ARDL approach based on the F-statistic or Wald statistic, the study stated null hypotheses of no cointegration against the alternative hypothesis of cointegration among the variables in the model and considered thus: acceptance or rejection of the hypothesis was based on comparison between the calculated F-statistic and the F-

statistic tabulated by Pesaran et al (2001) and Johansen and Juselius, (1990). The tabulated F-statistic has both upper and lower bounds critical values and if the calculated F-statistic is higher than the upper bounds, the null hypothesis is rejected and the alternative hypothesis is accepted that there is cointegration relationship between the variables. But if the calculated F-statistic is lower than the lower bound critical value, the null hypothesis is accepted and the alternative hypothesis is rejected, meaning that there is no cointegration relationship between the variables. However, the test is inconclusive if the calculated F-statistic lies between the lower and upper bound critical values. Once a cointegration relationship was established among the variables, the study proceede to examine the short-run effects using ECT equation given as follows:

$$\Delta GDPGR_{it} = \sum_{i=1}^{k} a1\Delta GFCit-i + \sum_{i=1}^{k} a2\Delta HDIit-i + \sum_{i=1}^{k} a3\Delta TRANSit-i + \sum_{i=1}^{k} a4\Delta COMMit-i + \sum_{i=1}^{k} a5\Delta HTHit-i + \sum_{i=1}^{k} a6\Delta EDUit-i + \sum_{i=1}^{k} a7\Delta UTLit-i\,\lambda ecmit-i + \mu_{it} \quad 3.10$$

Where ecm_{t-1} is the short-run dynamic error correction factor, λ is the coefficient of ecm_{t-1} that measures the speed of adjustment in the short-run into the long-run and μ_t is the white noise error term.

If the coefficient of ecm_{t-1} was negative we then conclude that there exist short-run relationship between the independent variables and dependent variable. As a result, the study analysis relied on short run results because of the advantages short-run results have over long-run results. Short-run results have the following advantages over long-run results (a) short run results give multiplier effect of the independent variables on the dependent variable (b) short-run is a convenient model that corrects disequilibrium in short-run into long-run (c) Short-run results resolves the problem of spurious regression by taking into account the lag of error correction model (ECM) which eliminates trends from the model (d) ECM fits into both general and specific approach to econometric model the error term in short-run result is a stationary variable (Akpanta, 2013). Again, analysis of this study relied also on lag approach with minimum Akaike information criterion. This criterion is more appropriate if the variables are fractionally integrated that is combination of 1(1) and 1(0) (Akpanta, 2013). Model with minimum Akaike information criterion is assumed to be data admissible, exhibit parameter constancy, exhibit data coherency and encompassing (Gujarati, 2004). Data admissibility means that predictions made from the model must be logically possible. Exhibition of parameter constancy implies that the

value of parameters is stable, exhibition of data coherency means that the residuals estimated from the model must be stationary. By encompassing it means that the model should encompass or include all the rival models in the sense that it is capable of explaining their results (Gujarati. 2004).

Objective two: Ascertain if structural breaks exist during the pre SAP, SAP and post SAP periods for economic growth and aggregate spending in Nigeria.

In order to fully analyse the second objective, Zivot-Andrews test for presence of structural breaks was employed. It was done in such a manner that economic growth proxied by growth rate of gross domestic product was tested to ascertain if it experienced structural breaks during the pre SAP, SAP and post SAP periods. The government spending on the key sectors selected for the analysis were aggregated and was tested to ascertain if it experienced structural breaks during the pre SAP, SAP and post SAP periods. This aimed at ascertaining if structure breaks existed within the periods under study and the most prominent break analysed.

Considering the null hypothesis that the data follow a process with a break, against a trend stationary with break alternative, within this basic framework there are a variety of specifications for the null and alternative hypotheses, depending on the assumptions about the break dynamics, trend behaviour, and whether the break date is known or determined endogenously.

Assuming there is an indicator function that takes the value 1 if the argument is true and 0 otherwise. Then the following variables are defined in terms of a specified break date,

An intercept break variable

$$DUt(T_b) = 1(t \geq T_b) \quad (3.11)$$

that takes the value 0 for all dates prior to the break, and 1 thereafter.

A trend break variable

$$DUt(T_b) = 1(t \geq T_b).\ (t - T_b + 1) \quad (3.12)$$

that takes the value 0 for all dates prior to the break, and is a break date re-based trend for all subsequent dates.

A one-time break dummy variable

$$D_t(T_b) = 1\ (t = T_b) \quad (3.13)$$

which takes the value of 1 only on the break date and 0 otherwise.

Objective three: Ascertain the causal link that exists between government spending on infrastructure and Nigerian economic growth for the entire period.

This study also adopted Granger causality technique of analysis in order to ascertain the direction of causality between government spending on infrastructures and Nigeria's economic growth. This was done to analyse the third objectives of the study. The empirical causality results of this study were calculated within a simple or pair wise Granger-Causality test in order to test whether each of the independent variables Granger Cause economic growth in Nigeria and vice versa (Rexford, 2012). This is within the scope of the dependent variable and each of the independent variables and is unlike some studies that carried out causality test between the dependent variable and the independent variables as well as among the independent variables (Omotor, 2008; Uwakaeme, 2015). The causality equations herein are specified in two equations as;

$$(GDPGR)_t = \lambda + \sum_{i=1}^{m} \beta i (GDPGR)_{t-I} + \sum_{j=i}^{n} Tj\ (\alpha)_{t-1} + \mu_t \quad 3.14$$

$$(\alpha)_t = \psi + \sum_{i=1}^{p} \theta i (\alpha)_{t-I} + \sum_{j=i}^{q} \sigma j\ (GDPGR)_{t-1} + \varepsilon_t \quad 3.15$$

α is representing all the independent variables while βi, Tj, θi and σj are estimable coefficients of the variables in equations 3.11 and 3.12. Based on the estimated coefficients for the equations (3.8) and (3.9) four different hypotheses and decision rules about the relationship between GDPGR and α are formulated thus:

1) Unidirectional Granger-causality from α to GDPGR. In this case α increase the prediction of the GDPGR but not vice versa. Thus

$$\sum_{j=i}^{n} Tj \neq 0 \text{ and } \sum_{j=i}^{q} \sigma j = 0 \quad 3.16$$

H_0: there exists no unidirectional causality from α to GDPGR.

H_1: there exists unidirectional causality from α to GDPGR.

Decision rule: Reject H_0 if Probability F-value is less than or equal to 0.05 and accept H_0 if Probability F-value is greater than 0.05.

2) Unidirectional Granger-causality from GDPGR to α. In this case the GDPGR increases the prediction of the α but not vice versa. Thus

$$\sum_{j=i}^{n} Tj = 0 \text{ and } \sum_{j=i}^{q} \sigma j \neq 0 \quad 3.17$$

H_0: there exists no unidirectional causality from GDPGR to α.

H_1: there exists unidirectional causality from GDPGR to α.

Decision rule: Reject H_0 if Probability F-value is less than or equal to 0.05 and accept H_0 if Probability F-value is greater than 0.05

3) Bidirectional causality. In this case GDPGR increases the prediction of the α and vice versa.

Hence, $\sum_{j=i}^{n} Tj \neq 0$ and $\sum_{j=i}^{q} \sigma j \neq 0$ 3.18

H_0: there exists no bidirectional causality between GDPGR and α.

H_1: there exists bidirectional causality between GDPGR and α.

Decision rule: Reject H_0 if Probability F-value is less than or equal to 0.05 and accept H_0 if Probability F-value is greater than 0.05.

4. Independence between GDPGR and α. In this case there is no Granger causality in any direction, thus, $\sum_{j=i}^{n} Tj = 0$ and $\sum_{j=i}^{q} \sigma j = 0$ 3.19

H_0: there exists no causality in any direction between GDPGR and α.

H_1: there exist both unidirectional and bidirectional causality between GDPGR and α.

Decision rule: Reject H_0 if Probability F-value is less than or equal to 0.05 and accept H_0 if Probability F-value is greater than 0.05.

Obtaining any of the results above makes it possible to detect the causal relationship between each independent variable and RGDP.

3.5 Evaluation of Estimates

Evaluation of the estimates consists of deciding whether the estimated coefficients were theoretically meaningful and statistically satisfactory. For this study there is need for all results to satisfy both economic, statistical criteria (First order test) and econometric criteria (Second order test) and an explanation of any variance observed is given.

3.5.1. Economic A-Priori Expectation

This refers to the supposed relationship between and or among the dependent or independent variables of the model as determined by the postulations of economic theory. The result or parameter estimates of the three models set up to examine the three objectives were interpreted on the basis of the supposed signs of the parameters as established by economic theory. Put differently, the parameter estimates of the models were checked to find out whether they conformed to the postulations of economic theory or not.

3.5.2. Evaluation Based on Statistical Criteria: First Order Test

The Co-efficient of determinations (R^2): The coefficient of determination (R^2) was used to explain the total variation in the dependent variable caused by variation in the explanatory variables included in the model. The square of the coefficient of determination R^2 or the measure of goodness of fit was used to judge the explanatory power of the explanatory variables on the dependent variables. The R^2 denotes the percentage of variations in the dependent variable accounted for by the variations in the independent variables. Thus, the higher the R^2, the more the models are able to explain the changes in the dependent variables respectively. Hence, the better the regression based on ECM technique, and this is why the R^2 is called the co-efficient of determination as it shows the amount of variation in the dependent variable explained by explanatory variables.

However, if R^2 equals one, it implies that there is 100% explanation of the variation in the dependent variable by the independent variable and this indicates a perfect fit of regression line. While where R^2 equals zero. It indicates that the explanatory variables could not explain any of the changes in the dependent variable. Therefore, the higher and closer the R^2 is to 1, the better the models fits the data. Note, the above explanation goes for the adjusted R^2.

The F-Test: This was used to test the overall significance of the regression models employed, that is, it was used to investigate whether the entire model was statistically significant. This means that the F-statistics was used to test whether or not, there is a significant impact between the dependent and the independent variables. In the regression equation, if calculated F is greater than the table F table value, then there is a significant impact between the dependent and the independent variables in the regression equation. While if the calculated F is smaller or less than the table F, there is no significant impact between the dependent and the independent variable.

The T-Test: This test was used to check whether the variables included in the models were significant or not in determining their effect on the dependent variable. Each element of the parameter followed the T-distribution with n-k degree of freedom.

3.5.3. Econometric criteria: Second Order Test

These are set by the theory of econometrics and were aimed at investigating whether the assumption of the econometric method employed were satisfied or not in any particular case. They determine the reliability of statistic criteria and also establish whether the estimates have desirable properties of unbiasedness, and consistency. It also tests validity of non-auto correlation disturbances. Here the Durbin-Watson (D-W) statistic, Heteroscedasticity test and multicollinearity test were used.

Test for Autocorrelation: This is a problem which is usually associated with any time series data. This study employed Durbin-Watson (D-W) technique for autocorrelation test. According to Gujarati (2004) Durbin-Watson has optional asymptotic properties and is more efficient for all sample sizes. The D-W value was used to ascertain whether or not there exists the presence of autocorrelation.

Autocorrelation hypothesis:

$H_{0:}\ u_i = 0$ (the error terms are not autocorrelated with a first order scheme)

$H_{0:}\ u_i \neq 0$ (the error terms are autocorrelated with a first order scheme)

Decision rule

If $0 < d < d_L$, reject H_0 of no positive autocorrelation

If $4 \leq d \leq d_u$, take no decision on H_0 of no positive autocorrelation.

If $4\text{-}d_L < d < 4$, Reject H_0 of no negative autocorrelation

If $4\text{-}d_u \leq d\ (4\text{-}d_L)$, take no decision on H_0

If $du < d < 4\text{-}d$, do not reject H_0 of no autocorrelation, positive or negative.

Heteroskedasticity test

Classical least square (CLS) has a crucial assumption that residuals are homoscedastic. Violation of this assumption leads to standard errors and t-values that are biased. Such bias leads to wrong as well as faulty conclusions regarding the statistical significance of the ECM estimates. This was used to test for the violation of the assumption of constant variance of the error terms i.e. unequal variance. Therefore in confirming that the residuals possessed a homoscedastic residual variance (constant residual variance), we employed the white's general heteroskedasticity test to check for the presence of heteroskedasticity in the entire period model employed.

This study employed White heteroskedasticity test in order to ascertain whether the error term of the regression model were homoskedastic and/or has a constant variance.

Hypothesis:

$H_{0:}$ U's = 0 (the error terms are homoskedastic)

$H_{1:}$ U's ≠ 0 (the error terms are heteroskedastic)

The decision rule is that if Prob. (f-stat) < 0.05; accept heteroskedasticity and if Prob. (f-stat) > 0.05; accept no heteroskedasticity if stated otherwise.

Muticollinearity test: Muticollinearity test was used to dictate the presence of perfect or exact linear relationship among some or all explanatory variables of a regression model. Multicolinearity is inherent in most economic relationships and can be dictated using the correlation matrix. Once the pair wise correlation coefficient between two or more explanatory variables are in excess of 0.8, we then conclude that there is presence of multicollinearity between the variables signifying that there is an exact influence among the explanatory variables on the dependent variable.

3.5.4. Post Estimation Tests

Normality Test

The normality test adopted was the Jarque-Bera (JB) test of normality. This test was used in order to ascertain if the error term corresponding to the different observation was normally distributed and also to compute the skewness and kurtosis measures of the OLS residuals and it followed the chi-square distribution.

Decision Rule: Reject H_0 if $\chi^2_{cal} > \chi^2_{tab}{}^{(0.05)}$ (2 df), and accept H_0 if otherwise.

Test for Adequacy of the Model:

This test was conducted to test whether the model was well specified. In this test, the Ramsey Reset test was adopted. Specification biases are said to arise from inability of the researcher to formulate the model as precisely as possible because the underlying theory is weak or sometimes due to inability to obtain the correct model as in Gujarati, Porter and Gunasekar (2012). This test follows the f distribution and the formular is as follows;

$$F \frac{(Rnew - Rold)/number\ of\ new\ regressors}{(1 - Rnew)l(n - number\ of\ parameters\ in\ the\ new\ model}$$

Decision rule: reject the null hypothesis if Fcal > Ftab (k-1,n-k) df ; accept otherwise.

3.6 Test of Research Hypotheses and Decision Rules

The hypothesis was tested at 5 per cent level of significance. The condition is that the null hypothesis should be rejected if the probability at which the t-value is significant is less than the chosen level of significance, otherwise, the alternative hypothesis should be accepted.

1. If the probability (Sig) > 0.05, we should accept the null hypothesis and reject the alternative hypothesis.
2. If the probability (Sig) < 0.05, we should accept the alternative hypothesis and reject the null hypothesis.

3.7 Nature and Sources of Data

The study depended on secondary data that were obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin various issues, National Bureau of Statistics and World Development Indicators for Nigeria (WDI). It covered the period from 1970 to 2017.

CHAPTER FOUR

RESULT PRESENTATION, ANALYSIS, AND DISCUSSION OF RESULTS

Having seen the estimation techniques and procedure, this chapter empirically examined the impact of government spending for infrastructural development on economic growth in Nigeria over the period of 1970 to 2017 using the aid of autoregressive distributed lag (ARDL) technique on a time series data collected from secondary sources. There is the presentation and analysis of data used, interpretation of the result and discussion of the findings from the analysis conducted.

4.1 Result Presentation and Analyses

In analyzing the data, we first ran the unit root test to determine the stationarity of the variables included in the model, the ARDL technique to estimate the impact of government spending for infrastructural development on economic growth in Nigeria. The result from two top oil producing European countries was presented and later analysed so as to fully examine the Hirschman's theory in the Nigerian context. Again, the Zivot-Andrew's test for presence of structural break was run to ascertain if structural breaks exist within these periods for economic growth and aggregate spending in Nigeria. Finally the granger causality test was run to ascertain the direction of causality between government spending for infrastructure on selected sectors and economic growth in Nigeria. These were done to analyse the objectives of the study.

4.1.1 Unit Root Test

Due to the fact that time series data always have the problem of stationarity, it is always advisable to run a unit root test on time series data in order not to produce a spurious regression result. The unit root test is a test of stationarity (or non-stationarity) of variables that has become widely popular over the past several years. In order to determine the stationarity properties of the variables used in the study, the Augmented Dickey-Fuller (ADF) test was performed.

The ADF test was done with the following hypothesis:

Null hypothesis (H_0): Variable contains unit root and hence is non-stationary.
Alternative hypothesis (H_1): Variable does not contain unit root and hence is stationary.

The decision rule is that: If the calculated ADF test statistic is greater than the test statistic values, reject the null hypothesis of non-stationarity and accept the alternative of stationarity, otherwise accept the null hypothesis of non- stationarity.

The unit root test conducted for this study was done in four stages. The first stage conducted the stationarity test on the pre- SAP period, the second stage conducted stationarity test on the SAP period, the third stage conducted the stationarity test on the post- SAP period where as the fourth stage conducted the stationarity test on the entire period of study. The unit root test results which indicate the order of integration of each of the variables were presented in Table 4.1 to Table 4.4.

Table 4.1: Unit root test results for pre SAP period

Variable	ADF Statistic values	Test Critical values @ 5%	Order of Integration
GDPGR	-3.420429	-3.081002	I (0)
GFCGR	-5.413725	-3.791172	I (0)
HDIGR	-3.620408	-3.098896	I (1)
TRANSGR	-3.461284	-1.966270	I (0)
COMMGR	-4.013553	-3.081002	I (0)
HTHGR	-3.569309	-3.075302	I (0)
EDUGR	-5.102572	-3.828975	I (0)
UTLGR	-5.501198	-3.828975	I (1)

Source: Researchers' compilation (2019).

Following the results of Table 4.1, it can be seen that all the variables in the model except the growth rate of human development index and growth rate of government spending on the utility sector passed the ADF test at first difference and integrated of the same order I(1). This means that while GDPGR, growth rate of gross fixed capital, growth rates of government spending on transportation sector, communication sector, health sector and education sector passed the stationarity test at level, only the growth rate of human development index and growth rate of government spending on utility sector were stationarized at first difference. Thus, the null hypothesis of no stationarity was rejected for all the variables in favour of the alternative hypotheses that there is stationarity for all the variables used in the study. We therefore

concluded that the variables included in the model (GDPGR, GFCGR, HDIGR, TRANSGR, COMMGR, HTHGR, EDUGR and UTLGR) were stationary at both level and first difference during the pre- SAP period.

Table 4.2: Unit root test results for SAP period

Variable	ADF Statistic values	Test Critical values @ 5%	Order of Integration
GDPGR	-4.873302	-3.119910	I (0)
GFCGR	-7.414294	-3.933364	I (1)
HDIGR	-4.606565	-3.933364	I (1)
TRANSGR	-7.699193	-3.144920	I (1)
COMMGR	-2.609122	-1.974028	I (1)
HTHGR	-4.106165	-3.212696	I (1)
EDUGR	-4.106393	-3.212696	I (1)
UTLGR	-4.862513	-3.395302	I (1)

Source: Researchers' compilation (2019).

Following the results of Table 4.2, it can be seen that all the variables in the model except GDPGR sector passed the ADF test at first difference and integrated of the order I(1). This means that while growth rate of gross fixed capital, growth rate of human development index, growth rates of government spending on transportation sector, communication sector, health sector, education sector and utility sector passed the stationarity test at first difference, only GDPGR was stationarized at level. Thus, the null hypothesis of no stationarity was rejected for all the variables in favour of the alternative hypotheses that there is stationarity for all the variables used in the study. We therefore concluded that the variables included in the model (GDPGR, GFCGR, HDIGR, TRANSGR, COMMGR, HTHGR, EDUGR and UTLGR) were stationary at both level and first difference during the SAP period.

Table 4.3: Unit root test results for post- SAP period

Variable	ADF Statistic values	Test Critical values @ 5%	Order of Integration
GDPGR	-4.673301	-3.219910	I (0)
GFCGR	-4.929860	-3.040391	I (0)
HDIGR	-4.628139	-3.065585	I (0)
TRANSGR	-4.511487	-3.040391	I (0)
COMMGR	-6.681050	-3.710482	I (0)
HTHGR	-4.552619	-3.052169	I (0)
EDUGR	-8.735791	-3.052169	I (0)
UTLGR	-4.229031	-3.040391	I (1)

Source: Researchers' compilation (2019).

Following the results of Table 4.3, it can be seen that all the variables in the model except growth rate of government spending on utility sector passed the ADF test at level and integrated of the order I(0). This means that while GDPGR, growth rate of gross fixed capital, growth rate of human development index, growth rates of government spending on transportation sector, communication sector, health sector, and education sector passed the stationarity test at level, only UTLGR was stationarized at first difference. Thus, the null hypothesis of no stationarity was rejected for all the variables in favour of the alternative hypotheses that there is stationarity for all the variables used in the study. We therefore concluded that the variables included in the model (GDPGR, GFCGR, HDIGR, TRANSGR, COMMGR, HTHGR, EDUGR and UTLGR) were stationary at both level and first difference during the post- SAP period.

Table 4.4: Unit root test results for the entire period

Variable	ADF Statistic values	Test Critical values @ 5%	Order of Integration
GDPGR	-6.945333	-2.925169	I (0)
GFCGR	-6.761319	-2.925169	I (0)
HDIGR	-3.623757	-2.931404	I (1)
TRANSGR	-6.465626	-2.925169	I (0)
COMMGR	-7.060629	-2.925169	I (0)
HTHGR	-9.792461	-3.536601	I (1)
EDUGR	-8.631049	-2.936942	I (1)
UTLGR	-6.229138	-2.925169	I (0)

Source: Researchers' compilation (2019).

Following the results of Table 4.4, it can be seen that growth rate of human development index, growth rates of government spending on health sector and education sector passed the ADF test at first difference and integrated of the order I(1). This means that while GDPGR, growth rate of gross fixed capital, growth rates of government spending on transportation sector, communication sector and utility sector passed the stationarity test at level, the growth rate of human development index, growth rates of government spending on health sector and education sector were stationarized at first difference. Thus, the null hypothesis of no stationarity was rejected for all the variables in favour of the alternative hypotheses that there is stationarity for all the variables used in the study. We therefore concluded that the variables included in the model (GDPGR, GFCGR, HDIGR, TRANSGR, COMMGR, HTHGR, EDUGR and UTLGR) were stationary at both level and first difference during the entire period.

Since all the variables were not stationary at the same order of integration but stationary at level I(0) and first difference I(1) in the four periods, the condition for Johansen co-integration was not met necessitating the proceeding to ARDL co-integration for the periods under study.

4.1.2 Autoregressive Distributed Lag (ARDL) Bound Test Result

This bound test enables us to test for long run dynamic relationship among the variables in ARDL modelling approach.

Wald Test Result Analysis:

Following Pesaran and Pesaran (1997) procedure, we estimated ARDL with Wald test (F-statistics) to test for joint (overall) significance of the co-efficient of all the variables in the model.

Table 4.5: Critical Lower and Upper Bound Values for the periods

Significance	Lower Bound I(0)	Upper Bound I(1)
10%	2.03	3.13
5%	2.32	3.50
2.5%	2.60	3.84
1%	2.96	4.26

Source: E-views 9 computation

The decision rule is that if the computed F-statistics exceeds the upper bound value I(1), then the null hypothesis is rejected which indicates that there is co-integration. Otherwise, if computed F-statistics falls below the lower bound value I(0), the null hypothesis of no co-integration is accepted. If the computed result falls between the lower and upper bound values, the test is inconclusive.

Table 4.6: Wald Bounds Test of Presence of Co-integration in ARDL for the periods

Equation: ARDL Bounds Test		
Test Statistic	Value	K
F-statistic for pre- SAP period	7.039273	7
F-statistic for SAP period	12.36043	7
F-statistic for post- SAP period	8.376552	7
F-statistic for the entire period	5.683170	7

Source: E-views 9 computation

The table 4.6 reveals that F-statistics for pre-SAP period was 7.039273 and exceeds the upper bound values at 1 per cent, 2.5 per cent, 5 per cent and 10 per cent critical value. Also the F-statistics for the SAP, post- SAP and entire periods were 12.36043, 8.376552 and 5.683170 respectively and all exceed the upper bound values at 1 per cent, 2.5 per cent, 5 per cent and 10 per cent critical value. This implies that there is evidence of co-integration and the presence of sustained long run relationship among the variables in the model. The investigation would therefore be based on short-run analysis of ARDL to determine the dynamic relationships.

Table 4.7: Short-Run Dynamic Analysis for pre- SAP period

Dependent variable: LOGGDPGR

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	105.58408	36.42368	2.895131	0.4348
LOG((GDPGR(-1))	21.648009	2.908612	7.443479	0.0004
LOG(GFCGR)	9.686066	1.678235	5.800278	0.0231
DLOG(HDI,1)	11.440001	2.934449	-3.900243	0.0000
LOG(TRANSGR)	11.225555	2.463486	4.555102	0.0006
LOG(COMMGR)	13.999752	2.269477	-6.065496	0.0009
LOG(HTHGR)	2.587632	1.479019	1.765575	0.0757
LOG(EDUGR)	3.099085	1.129467	-2.678548	0.0531
DLOG((UTLGR,1))	5.348965	1.117715	-4.760009	0.0051
ECMPRSAP(-1)	-15.298074	2.240103	-6.773939	0.0013
R-squared	0.680172			
Adjusted R-squared	0.539441			
F-statistic	6.945191			
Prob. (F-statistic)	0.009437			
Durbin-Watson stat	1.792935			

E-views 9 computations

From the above short run analysis in Table 4.7, we observed that the constant term is given as 105.58408 which indicates that if all the independent variables are held constant, GDPGR increased on average by 106 per cent during the pre- SAP period. The variable is also insignificant as its probability value is greater than 0.05 (0.4348).

The coefficient of GDPGR $_{-1}$ (21.648009) has a positive impact on economic growth which shows that a per cent increase in the growth rate of past GDP growth rate leads to an increase in expected economic growth by 21.6 per cent on average. This agrees with the a-priori expectation as no nation can witness economic growth in the current period without its previous economic performance. This variable is also significant which means that the role of previous economic

performance (the lagged value) should not be ignored in promoting economic growth in the economy.

The coefficient of capital (9.686066) has a positive impact on GDPGR of the country during the pre- SAP period. This simply means that a per cent increase in the growth rate of capital accumulation in the economy leads to an increase in growth of the economy by 9.7 per cent. This supports the a-priori expectations that capital accumulation in an economy is a necessary determinant of economic growth and development. The variable is also significant as its probability value is given as 0.0231, further stressing the importance of capital accumulation in the economy.

The coefficient of labour (11.440001) has a positive impact on GDPGR of the country during the pre- SAP period. This simply means that a per cent increase in the growth rate of human development in the economy leads to an increase in growth of the economy to about 11.4 per cent. This goes against the a-priori expectation that human capital in an economy is a necessary determinant of economic growth. The variable is also significant as its probability value is less than 0.05 (0.0000), further stressing that available human resources in the country has been fully utilized as supposed.

The coefficient of government spending on the transport sector (11.225555) has a positive impact on GDPGR of the country during the pre- SAP period. This simply means that a per cent increase in the growth rate of government spending on the transport sector in the economy leads to an increase in growth of the economy to about 11.2 per cent. This supports the a priori expectations. The fact remains that transport infrastructure needs cut across sectors and is central to economic growth and development. This variable is also significant as its probability value is 0.0006 meaning that the role of government spending on the transport sector was well acknowledged in promoting economic growth during the period.

We also observed that government spending on the communication sector COMM has a positive impact on economic growth in Nigeria. Precisely, a per cent increase in the growth rate of government spending in COMM leads to 14 per cent increase in economic growth in Nigeria during the pre- SAP period. This is understandable since the importance of communication was not as sophisticated as it is in recent times. This variable supports the a priori predicted sign of

positive and is significant at 5 per cent significance level with a probability value of 0.0009. This means that government spending on the communication sector significantly increased economic growth in Nigeria during the period.

The coefficient of government spending on the health sector HTH is 2.587632. This implies that a per cent increase in the growth rate of government spending in HTH variable results in a 2.59 per cent increase in Nigeria's GDPGR. This is in line with the a priori expectations. This variable is also found to be statistically insignificant at 0.05 per cent levels of significance judging from the slightly high probability value estimate of 0.0757. The implication of this finding is that during the pre- SAP period, the government spending in Nigeria's health sector has not brought about the proposed growth in the economy which it has the potentials not minding government investment on it.

The estimated coefficient of government spending on the education sector EDU is found to be 3.099085. Thus, a direct relationship with GDPGR is established during the pre- SAP period. This is consistent with the a-priori expectation because providing education services to people is one of the major ways of improving the quality of human capital and no country has achieved sustained economic development without substantial investment in education. The variable is also significant at 0.05 per cent levels of significance with a probability of 0.0531. The implication of this is that the education sector is a vital ingredient to the economic growth of the Nigerian economy even in the short run.

The government spending on the utility sector (UTL) coefficient bears a positive sign. With the value of the coefficient as 5.348965 means that a per cent increase in growth rate of government spending on the utility sector leads to about 5.35 per cent increase in GDPGR on average. This is in line with the a-priori expectation but was significant at 5 per cent significance level which was confirmed by the probability value of 0.0051. This means that there is a positive significant impact of utility sector on economic growth in the short run during the pre-SAP period and it is attributable to poor emphasis laid on the water resource sector in the country at the period when compared to the scenario in recent times.

Of particular interest is the ECM. The coefficient of error correction mechanism (ECM) is negative -15.298074 and significant at 0.05 per cent critical level as evident by the low

probability value of 0.0013. This shows that about 153 per cent speed of adjustment is needed to correct the disequilibrium in Nigeria's GDPGR in the previous year in the current year. The significance of the ECM is an indication and a confirmation of the existence of a long-run equilibrium relationship between the value of GDPGR and all the explanatory variables in the model. This is indicated in the Wald Bounds test and also reveals that the variables are co-integrated.

Table 4.8: Short-Run Dynamic Analysis for the SAP period

Dependent variable: LOGGDPGR

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.153336	1.095399	-2.878710	0.0109
LOG((GDPGR(-1))	34.98542	14.40838	-2.428130	0.0273
DLOG(GFCGR,1)	6.883919	1.726110	4.043657	0.0578
DLOG(HDI,1)	7.108116	2.829056	2.542791	0.0217
DLOG(TRANSGR,1)	4.331397	1.939571	-2.268479	0.0375
DLOG(COMMGR,1)	2.587111	1.154181	2.241512	0.0395
DLOG(HTHGR,1)	0.445643	0.311501	1.407275	0.1785
DLOG(EDUGR,1)	4.358202	1.401561	3.181997	0.0444
LOG(UTLGR)	7.822980	2.383023	-3.305837	0.0537
ECMSAP(-1)	-2.811994	1.176183	-2.390779	0.0295
R-squared	0.844323			
Adjusted R-squared	0.529186			
F-statistic	5.033840			
Prob. (F-statistic)	0.000092			
Durbin-Watson stat	1.944470			

E-views 9 computations

From the above short run analysis in Table 4.8, we observed that the constant term is given as 3.153336 which indicates that if all the independent variables are held constant, GDPGR increased on average by 3.15 per cent during the SAP period. The variable is also significant as its probability value is less than 0.05 (0.0109).

The coefficient of GDPGR $_{-1}$ (34.98542) has a positive impact on economic growth which shows that a per cent increase in the growth rate of past GDP growth rate leads to an increase in expected economic growth by 34.9 per cent on average. This agrees with the a-priori expectation as no nation can witness economic growth in the current period without its previous economic performance. This variable is also significant which means that the role of previous economic

performance (the lagged value) should not be ignored in promoting economic growth in the economy.

The coefficient of capital (6.883919) has a positive impact on GDPGR of the country during the SAP period. This simply means that a per cent increase in the growth rate of capital accumulation in the economy leads to an increase in growth of the economy by 6.9 per cent. This supports the a-priori expectations that capital accumulation in an economy is a necessary determinant of economic growth and development. The variable is also significant as its probability value is given as 0.0578, further stressing the importance of capital accumulation in the economy.

The coefficient of labour (7.108116) has a positive impact on GDPGR of the country during the SAP period. This simply means that a per cent increase in the growth rate of human development in the economy leads to an increase in growth of the economy to about 7.11 per cent. This goes against the a-priori expectation that human capital in an economy is a necessary determinant of economic growth. The variable is also significant as its probability value is less than 0.05 (0.0217), further stressing that available human resources in the country has been fully utilized as supposed.

The coefficient of government spending on the transport sector (4.331397) has a positive impact on GDPGR of the country during the SAP period. This simply means that a per cent increase in the growth rate of government spending on the transport sector in the economy leads to an increase in growth of the economy to about 4.3 per cent. This supports the a priori expectations. The fact remains that transport infrastructure needs cut across sectors and is central to economic growth and development. This variable is also significant as its probability value is 0.0375 meaning that the role of government spending on the transport sector was well acknowledged in promoting economic growth during the period.

We also observed that government spending on the communication sector COMM has a positive impact on economic growth in Nigeria. Precisely, a per cent increase in the growth rate of government spending in COMM leads to 2.6 per cent increase in economic growth in Nigeria during the SAP period. This is understandable since the importance of communication was not as sophisticated as it is in recent times. This variable supports the a priori predicted sign of positive

and is significant at 5 per cent significance level with a probability value of 0.0395. This means that government spending on the communication sector significantly increased economic growth in Nigeria during the period.

The coefficient of government spending on the health sector HTH is 0.445643. This implies that a per cent increase in the growth rate of government spending in HTH variable results in a 0.44 per cent increase in Nigeria's GDPGR. This is in line with the a priori expectations. This variable is also found to be statistically insignificant at 0.05 per cent levels of significance judging from the slightly high probability value estimate of 0.1785. The implication of this finding is that during the SAP period, the government spending in Nigeria's health sector has not brought about the proposed growth in the economy which it has the potentials not minding government investment on it.

The estimated coefficient of government spending on the education sector EDU is found to be 4.358202. Thus, a direct relationship with GDPGR is established during the SAP period. This is consistent with the a-priori expectation because providing education services to people is one of the major ways of improving the quality of human capital and no country has achieved sustained economic development without substantial investment in education. The variable is also significant at 0.05 per cent levels of significance with a probability of 0.0444. The implication of this is that the education sector is a vital ingredient to the economic growth of the Nigerian economy even in the short run.

The government spending on the utility sector (UTL) coefficient bears a positive sign. With the value of the coefficient as 7.822980 means that a per cent increase in growth rate of government spending on the utility sector leads to about 7.82 per cent increase in GDPGR on average. This is in line with the a-priori expectation but was significant at 5 per cent significance level which was confirmed by the probability value of 0.0537. This means that there is a positive significant impact of utility sector on economic growth in the short run during the SAP period and it is attributable to poor emphasis laid on the water resource sector in the country at the period when compared to the scenario in recent times.

Of particular interest is the ECM. The coefficient of error correction mechanism (ECM) is negative --2.811994 and significant at 0.05 per cent critical level as evident by the low

probability value of 0.0295. This shows that about 28 per cent speed of adjustment is needed to correct the disequilibrium in Nigeria's GDPGR in the previous year in the current year. The significance of the ECM is an indication and a confirmation of the existence of a long-run equilibrium relationship between the value of GDPGR and all the explanatory variables in the model. This is indicated in the Wald Bounds test and also reveals that the variables are co-integrated.

Table 4.9: Short-Run Dynamic Analysis for the post- SAP period

Dependent variable: LOGGDPGR

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.333140	0.208143	-1.600534	0.1237
LOG((GDPGR(-1))	0.632766	0.962194	0.658668	0.5169
DLOG(GFCGR,1)	0.008823	0.017772	0.496452	0.6245
DLOG(HDI,1)	-0.436276	0.691941	-0.630511	0.5349
DLOG(TRANSGR,1)	-0.010461	0.008389	-1.246935	0.2255
DLOG(COMMGR,1)	0.001677	0.011184	0.149942	0.8822
DLOG(HTHGR,1)	-0.018959	0.030386	-0.623929	0.5391
DLOG(EDUGR,1)	-0.000719	0.001793	-0.456804	0.6523
LOG(UTLGR)	0.000313	0.000556	0.562570	0.5794
ECMSAP(-1)	-18.342305	6.000341	-3.053848	0.0575
R-squared	0.633217			
Adjusted R-squared	0.583041			
F-statistic	1.150936			
Prob. (F-statistic)	0.007923			
Durbin-Watson stat	1.894911			

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From the above short run analysis in Table 4.9, we observed that the constant term is given as 0.333140 which indicates that if all the independent variables are held constant, GDPGR increased on average by 0.33 per cent during the post- SAP period. The variable is also insignificant as its probability value is greater than 0.05 (0.1237).

The coefficient of GDPGR $_{-1}$ (0.632766) has a positive impact on economic growth which shows that a per cent increase in the growth rate of past GDP growth rate leads to an increase in expected economic growth by 0.63 per cent on average. This agrees with the a-priori expectation as no nation can witness economic growth in the current period without its previous economic performance. This variable is also insignificant which means that the role of previous economic

performance (the lagged value) should not be included in promoting economic growth in the economy.

The coefficient of capital (0.008823) has a positive impact on GDPGR of the country during the post- SAP period. This simply means that a per cent increase in capital accumulation in the economy leads to an increase in growth of the economy. Specifically, on the average, a per cent increase in the growth rate of capital leads to about 0.01 per cent increase in economic growth in Nigeria. This supports the a-priori expectations that capital accumulation in an economy is a necessary determinant of economic growth and development. The variable is insignificant as its probability value is given as 0.6245, which could be interpreted that there was not enough capital accumulation in the economy after SAP to enhance economic growth.

The coefficient of labour (-0.436276) has a negative impact on GDPGR of the country during the post- SAP period. This simply means that a per cent increase in growth rate of human development in the economy leads to a decrease in growth of the economy to about 0.44 per cent. This goes against the a-priori expectation that human capital in an economy is a necessary determinant of economic growth. The variable is also insignificant as its probability value is more than 0.05 (0.5349), further stressing that available human resources in the country has not been fully utilized as supposed to achieve economic growth.

The coefficient of government spending on the transport sector (-0.010461) has a negative impact on GDPGR of the country during the post- SAP period. This simply means that a per cent increase in the growth rate of government spending on the transport sector in the economy leads to a decrease in growth of the economy to about 0.01 per cent. This does not support the a priori expectations. The fact remains that transport infrastructure needs cut across sectors and is central to economic growth and development. This variable is also insignificant as its probability value is 0.2255 further meaning that the government spending on the transport sector was not well utilised in promoting economic growth during the period.

We also observed that government spending on the communication sector COMM has a positive impact on economic growth in Nigeria. Precisely, a per cent increase in the growth rate of government spending in COMM leads to 0.002 per cent increase in economic growth in Nigeria during the post- SAP period. This is understandable because the effect of the stock of

communication infrastructure that play prominent roles in determining growth and productivity in Nigeria made available by the SAP policy was still being felt after the policy. This variable supports the a priori predicted sign of positive but is insignificant at 5 per cent significance level with a probability value of 0.8822. This means that government spending on the communication sector should be sustained so as to significantly increase economic growth in Nigeria.

The coefficient of government spending on the health sector HTH is -0.018959. This implies that a per cent increase in the growth rate of government spending in HTH variable results in a 0.02 per cent decrease in Nigeria's GDPGR. The economic explanation could be that the level of dichotomy existing among health workers as well as the frequent strikes experienced in the health sector have contributed to the inability of the sector to meet-up with the required level of health infrastructure needs and services required to achieve the desired rate of economic growth in Nigeria. This is not in line with the a priori expectations. This variable is also found to be statistically insignificant at 0.05 per cent levels of significance judging from the high probability value estimate of 0.5391. The implication of this finding is that ever since the SAP policy, the Nigeria's health sector has not brought about the proposed growth in the economy which it has the potentials to do if carefully invested in.

The estimated coefficient of government spending on the education sector EDU is found to be -0.000719. Thus, an inverse relationship with GDPGR is established during the post- SAP period. This is inconsistent with the a priori expectation because providing education services to people is one of the major ways of improving the quality of human capital and no country has achieved sustained economic development without substantial investment in human capital. Unfortunately this is not in line with our findings. The variable was also insignificant at 0.05 per cent levels of significance due to the value of the probability of 0.6523. The implication of this is that the education sector during the post- SAP period does not contribute to economic growth of the Nigerian economy in the short run.

The government spending on the utility sector (UTL) coefficient bears a positive sign. With the value of the coefficient as 0.000313 means that a per cent increase in the growth rate of government spending on the utility sector leads to about 0.0003 per cent increase in GDPGR on average. This is in line with the a-priori expectation but was insignificant at 5 per cent significance level which was confirmed by the probability value of 0.5794. This means that there

is a positive insignificant impact of utility sector on economic growth in the short run during the post-SAP period and it is attributable to inadequate power generation and distribution experienced in the country.

Of particular interest is the ECM. The coefficient of error correction mechanism (ECM) is negative -18.342305 and significant at 0.05 per cent critical level as evident by the low probability value of 0.0575. This shows that about 183 per cent speed of adjustment is needed to correct the disequilibrium in Nigeria's GDPGR in the previous year in the current year. The significance of the ECM is an indication and a confirmation of the existence of a long-run equilibrium relationship between the value of GDPGR and all the explanatory variables in the model.

Table 4.10: Short-Run Dynamic Analysis for the entire period

Dependent variable: GDPGR

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.537092	31.87586	0.205080	0.8387
LOG(GDPGR(-1))	0.019381	0.160168	-0.121002	0.9043
LOG(GFCGR)	0.183028	0.195952	0.934047	0.3562
DLOG(HDI,1)	0.036832	0.447728	-0.082264	0.9349
LOG(TRANSGR)	-0.086898	0.477654	0.181927	0.8566
LOG(COMMGR)	0.081565	0.292883	-0.278490	0.7821
DLOG(HTHGR,1)	-0.343580	0.300338	-1.143978	0.2598
DLOG(EDUGR,1)	-0.128673	0.161151	0.798459	0.4296
LOG(UTLGR)	0.028482	0.111852	-0.254637	0.8004
ECM01(-1)	-58.814457	22.88350	2.570764	0.0245
R-squared	0.725013			
Adjusted R-squared	0.593734			
F-statistic	5.571497			
Prob. (F-statistic)	0.000071			
Durbin-Watson stat	1.981283			

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From the above short run analysis in Table 4.10, we observed that the constant term is given as 6.537092 which indicates that if all the independent variables are held constant, GDPGR increased on average by 6.53 per cent during the entire period. The variable is also insignificant as its probability value is greater than 0.05 (0.8387).

The coefficient of GDPGR $_{-1}$ (0.019381) has a positive impact on economic growth which shows that a per cent increase in the growth rate of past GDP growth rate leads to an increase in expected economic growth by 0.02 per cent on average. This agrees with the a-priori expectation as no nation can witness economic growth in the current period without its previous economic performance. This variable is also insignificant which means that the role of previous economic performance (the lagged value) should not be included in promoting economic growth in the economy.

The coefficient of capital (0.183028) has a positive impact on GDPGR of the country during the entire period. This simply means that a per cent increase in capital accumulation in the economy leads to an increase in growth of the economy. Specifically, on the average, a per cent increase in the growth rate of capital leads to about 0.18 per cent increase in economic growth in Nigeria. This supports the a-priori expectations that capital accumulation in an economy is a necessary determinant of economic growth and development. The variable is insignificant as its probability value is given as 0.3562, which could be interpreted that there was not enough capital accumulation in the economy to enhance economic growth.

The coefficient of labour (0.036832) has a positive impact on GDPGR of the country during the entire period. This simply means that a per cent increase in growth rate of human development in the economy leads to an increase in growth of the economy to about 0.037 per cent. This goes in line with the a-priori expectation that human capital in an economy is a necessary determinant of economic growth. The variable is also insignificant as its probability value is more than 0.05 (0.9349), further stressing that available human resources in the country has not been fully utilized as supposed to achieve economic growth.

The coefficient of government spending on the transport sector (-0.086898) has a negative impact on GDPGR of the country during the entire period. This simply means that a per cent increase in the growth rate of government spending on the transport sector in the economy leads to a decrease in growth of the economy to about 0.09 per cent. This does not support the a priori expectations. The fact remains that transport infrastructure needs cut across sectors and is central to economic growth and development. This variable is also insignificant as its probability value is 0.8566 further meaning that the government spending on the transport sector was not well utilised in promoting economic growth during the period.

We also observed that government spending on the communication sector COMM has a positive impact on economic growth in Nigeria. Precisely, a per cent increase in the growth rate of government spending in COMM leads to 0.08 per cent increase in economic growth in Nigeria during the entire period. This is understandable because the effect of the stock of communication infrastructure that play prominent roles in determining growth and productivity in Nigeria was still being felt in the economy. This variable supports the a priori predicted sign of positive but is insignificant at 5 per cent significance level with a probability value of 0.7821. This means that government spending on the communication sector should be sustained so as to significantly increase economic growth in Nigeria.

The coefficient of government spending on the health sector HTH is -0.343580. This implies that a per cent increase in the growth rate of government spending in HTH variable results in a 0.34 per cent decrease in Nigeria's GDPGR. The economic explanation could be that the level of dichotomy existing among health workers as well as the frequent strikes experienced in the health sector have contributed to the inability of the sector to meet-up with the required level of health infrastructure needs and services required to achieve the desired rate of economic growth in Nigeria. This is not in line with the a priori expectations. This variable is also found to be statistically insignificant at 0.05 per cent levels of significance judging from the high probability value estimate of 0.2598. The implication of this finding is that the Nigeria's health sector has not brought about the proposed growth in the economy which it has the potentials to do if carefully invested in.

The estimated coefficient of government spending on the education sector EDU is found to be -0.128673. Thus, an inverse relationship with GDPGR is established during the entire period. This is inconsistent with the a priori expectation because providing education services to people is one of the major ways of improving the quality of human capital and no country has achieved sustained economic development without substantial investment in human capital. Unfortunately this is not in line with our findings. The variable was also insignificant at 0.05 per cent levels of significance due to the value of the probability of 0.4296. The implication of this is that the education sector during the entire period does not contribute to economic growth of the Nigerian economy in the short run.

The government spending on the utility sector (UTL) coefficient bears a positive sign. With the value of the coefficient as 0.028482 means that a per cent increase in the growth rate of government spending on the utility sector leads to about 0.03 per cent increase in GDPGR on average. This is in line with the a-priori expectation but was insignificant at 5 per cent significance level which was confirmed by the probability value of 0.8004. This means that there is a positive insignificant impact of utility sector on economic growth in the short run during the entire period and it is attributable to inadequate power generation and distribution experienced in the country.

Of particular interest is the ECM. The coefficient of error correction mechanism (ECM) is negative -58.814457 and significant at 0.05 per cent critical level as evident by the low probability value of 0.0245. This shows that about 59 per cent speed of adjustment is needed to correct the disequilibrium in Nigeria's GDPGR in the previous year in the current year. The significance of the ECM is an indication and a confirmation of the existence of a long-run equilibrium relationship between the value of GDPGR and all the explanatory variables in the model.

4.1.3 Results from European Countries.

Data from Norway and United Kingdom which are top oil producing European countries were selected for analysis since they have the same oil producing status of Nigeria. This was done so as to determine the impact of government spending on transportation, communication, health, education and utility sectors have on their economic growth. The aim is to ascertain if the results obtained from these European countries tallies with the Nigerian experience and give reasons for any differences observed.

Table 4.11: Short-Run Dynamic Analysis from Norway

Dependent variable: GDPGR

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	103.481149	21.653450	4.789075	0.0000
GDPGR(-1)	5.175288	2.364146	2.192783	0.0342
TRANSGR	79.365560	21.876880	3.638259	0.0088
COMMGR	17.540540	5.678562	3.091336	0.0281
HTHGR	14.808457	6.017891	2.472707	0.0389
EDUGR	21.563796	6.202843	3.482002	0.0123
UTLGR	16.901903	6.202843	2.669354	0.0049
ECM01(-1)	-11.177470	3.865659	2.902116	0.0025
R-squared	0.899580	F-statistic	4.719967	
Adjusted R-squared	0.571143	Prob(F-statistic)	0.000075	
		Durbin-Watson stat	1.812854	

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From the above short run analysis in Table 4.11, we observed that **t**he coefficient of government spending on the transport sector (79.365560) has a positive and significant impact on GDPGR of the country. This simply means that a unit growth rate increase in government spending on the transport sector in their economy leads to an increase in growth of the economy to about 794 units. Also government spending on the communication sector COMM has a positive and significant impact on their economic growth. Precisely, a unit growth rate increase in COMM leads to 175 unit increase in Norway's economic growth.

We equally observed that **t**he coefficient of government spending on the health sector (14.808457) has a positive and significant impact on GDPGR of the country. This simply means that a unit growth rate increase in government spending on the health sector in their economy leads to an increase in growth of the economy to about 148 units. Also government spending on the education sector has a positive and significant impact on their economic growth. Precisely, a unit growth rate increase in EDU leads to 216 unit increase in Norway's economic growth. Lastly we observed that **t**he coefficient of government spending on the utility sector (16.901903) has a positive and significant impact on GDPGR of the country. This simply means that a unit growth rate increase in government spending on the utility sector in their economy leads to an increase in growth of the economy to about 169 units.

Table 4.12: Short-Run Dynamic Analysis from United Kingdom

Dependent variable: GDPGR

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	81.416499	22.459450	3.619075	0.0000
GDPGR(-1)	14.405288	5.724146	2.602783	0.0152
TRANSGR	57.826556	23.186880	2.498259	0.0028
COMMGR	14.460540	4.558562	3.121336	0.0311
HTHGR	11.205457	5.012891	2.342707	0.0221
EDUGR	18.663796	7.647291	2.482002	0.0323
UTLGR	10.250001	4.329172	2.324167	0.0051
ECM01(-1)	-8.827470	4.239659	2.102112	0.0030
R-squared	0.749580	F-statistic	3.019967	
Adjusted R-squared	0.521143	Prob(F-statistic)	0.000043	
		Durbin-Watson stat	1.923454	

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From the above short run analysis in Table 4.12, we observed that **t**he coefficient of government spending on the transport sector (57.826556) has a positive and significant impact on GDPGR of the country. This simply means that a unit growth rate increase in government spending on the transport sector in their economy leads to an increase in growth of the economy to about 578 units. Also government spending on the communication sector COMM has a positive and significant impact on their economic growth. Precisely, a unit growth rate increase in COMM leads to 145 unit increase in United Kingdom's economic growth.

We equally observed that **t**he coefficient of government spending on the health sector (11.205457) has a positive and significant impact on GDPGR of the country. This simply means that a unit growth rate increase in government spending on the health sector in their economy leads to an increase in growth of the economy to about 112 units. Also government spending on the education sector has a positive and significant impact on their economic growth. Precisely, a unit growth rate increase in EDU leads to 186 unit increase in United Kingdom's economic growth. Lastly we observed that the coefficient of government spending on the utility sector (10.250001) has a positive and significant impact on GDPGR of the country. This simply means that a unit growth rate increase in government spending on the utility sector in their economy leads to an increase in growth of the economy to about 1025 units.

4.1.4 Zivot-Andrews Test

Zivot-Andrews Test is an econometric test used in time series analysis to test for the presence of a structural break. It was done in such a manner that economic growth proxied by growth rate of gross domestic product was tested to ascertain if it experienced structural breaks during the pre SAP, SAP and post SAP periods. The government spending on the key sectors selected for the analysis were aggregated and was tested to ascertain if it experienced structural breaks during the pre SAP, SAP, post SAP and entire study periods. It is observed that structure breaks existed within the periods under study and the analysis is thus:

During the pre-SAP period, as the economy was enlarging, aggregate spending declined gradually until it got to -3.2 by 1977. It experienced accelerated increase to -2.0 by 1979 and then declined to -2.8 by 1981. It experienced another accelerated increase to -1.3 by 1981 before finally declining sharply in 1982 to that initial -3.2 where it was by 1977. These breaks took place within 1977 and 1982, a period short enough for the impact of huge government expenditure in the selected sectors to be felt within the economy (see Appendix). On the other hand, the economy declined from -4.0 from 1972 to a sharp break of -5.2 by 1974 after which it accelerated sharply and peaked at -3.2 by 1975 and the experienced dwindling decline between 1976 and 1983 (see Appendix). When the structural breaks in aggregate spending is studied in line with the structural breaks experienced in economic growth during the pre-SAP period, it is observed that aggregate spending had two lowest breaks of -3.2 in 1977 and 1982 and highest breaks of -1.3 in 1981 while economic growth had its lowest break of -5.2 in 1974 and highest break of -3.2 in 1975.

During the SAP period, as the economy was enlarging, aggregate spending declined consistently until it got to -8.4 by 1994. It increased sharply to -5 by 1995 before finally declining (see Appendix). Economic growth on the other hand was at almost a constant pace of -2 between 1991 and 1993 before declining sharply to -12.2 by 1995. It rose sharply and peaked at -1 by 1996 before finally declining (see Appendix). When the structural breaks in aggregate spending is studied in line with the structural breaks experienced in economic growth during the SAP period, it is observed that aggregate spending had the lowest break of -8.4 in 1994 and highest breaks of -5 in 1995 while economic growth had its lowest break of -12.2 in 1995 and highest break of -2 in 1994.

During the post-SAP period, aggregate spending fell sharply from -4.5 to -5.4 by 2003 before rising -5 in 2004 and then experiencing dwindling decline from then till it reached -5.5 in 2010. It rose afterwards to -5 once again before finally declining (see Appendix).GDP on the other hand had a dwindling decline between 2002 and 2006 before finally declining sharply to -5.2 in 2010. It accelerated sharply to -3.6 in 2011 before finally declining (see Appendix). When the structural breaks in aggregate spending is studied in line with the structural breaks experienced in economic growth during the post-SAP period, it is observed that aggregate spending had two lowest break of -5.4 in 2003 and -5.5 in 2010 and two highest breaks of -5 in 2007 and -4.9 in 2013 while economic growth had its lowest break of -5.2 in 2010 and highest break of -3.6 in 2011.

Finally during the entire study period, aggregate spending fell gradually from 1975 till it reached -7 by 1983. It rose consistently and remained in between -6.35 and -6.3 from 1985 to 2017 (see Appendix).GDP on the other hand fell gradually from 1975 till it reached -9.2 by 1987. It rose consistently and remained in between -7.5 and -7 from 1988 to 2017 (see Appendix). When the structural breaks in aggregate spending is studied in line with the structural breaks experienced in economic growth during the entire study period, it is observed that aggregate spending had the lowest break of -7 in 1983 and highest breaks remained consistently between -6.35 and -6.3 from 1985 to 2017 while economic growth had its lowest break of -9.1 in 1982 and highest breaks remained consistently between -7.5 and -7 from 1988 to 2017.

4.1.5 Granger Causality Test

Granger causality is a statistical concept of causality that is based on prediction. Its mathematical formulation is based on linear regression modelling of stochastic processes (Engle & Granger, 1987). It determines the direction of causality between variables. If a variable granger causes another, then it means that causality runs from the former to the latter. If the null hypothesis is rejected, it implies that we accept the alternate hypothesis and conclude that granger causality runs from the former to the latter.

Table 4.13: Granger Causality Test

Pairwise Granger Causality Tests
Date: 11/16/18 Time: 13:22
Sample: 1970 2017
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GFCGR does not Granger Cause GDPGR	46	0.12045	0.8868
GDPGR does not Granger Cause GFCGR		0.43671	0.6491
HDI does not Granger Cause GDPGR	46	0.48691	0.6180
GDPGR does not Granger Cause HDI		0.32722	0.7228
TRANSGR does not Granger Cause GDPGR	46	0.98742	0.3812
GDPGR does not Granger Cause TRANSGR		0.50982	0.6044
COMMGR does not Granger Cause GDPGR	46	0.90319	0.4132
GDPGR does not Granger Cause COMMGR		0.63233	0.5365
HTHGR does not Granger Cause GDPGR	46	1.21859	0.3061
GDPGR does not Granger Cause HTHGR		0.70982	0.4977
EDUGR does not Granger Cause GDPGR	46	0.22305	0.8010
GDPGR does not Granger Cause EDUGR		0.00513	0.9949
UTLGR does not Granger Cause GDPGR	46	0.39733	0.6747
GDPGR does not Granger Cause UTLGR		0.70442	0.5003

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From table 4.13, we observe that the null hypothesis that TRANSGR does not granger cause GDPGR was accepted because its probability value was more than 0.05(0.3812). The implication of accepting the null hypothesis is the rejection of the alternative hypothesis meaning that the growth rate of government spending on the transport sector granger causes economic growth rate. Also, we observed that economic growth does not granger cause the growth rate of government spending on the transportation sector as the probability value was more than 0.05 (0.6044) which is the acceptance of the null hypothesis. This simply means that there is no causality between the growth rate of government spending on the transport sector and economic growth rate in Nigeria.

Similarly, we observe that the null hypothesis that COMMGR does not granger cause GDPGR was accepted because its probability value was more than 0.05 (0.4132). The implication of

accepting the null hypothesis is the rejection of the alternative hypothesis meaning that the growth rate of government spending on the communication sector granger causes economic growth rate. Also, we observe that economic growth rate does not granger cause the growth rate of government spending on the communication sector as the probability value was more than 0.05 (0.5365) which is the acceptance of the null hypothesis. This simply means that there is also no causality between the growth rate of government spending on the communication sector and economic growth rate in Nigeria.

We also observe that the null hypothesis that UTLGR does not granger cause GDPGR was accepted because its probability value was more than 0.05 (0.6747). The implication of accepting the null hypothesis is the rejection of the alternative hypothesis meaning that the growth rate of government spending on the utility sector does not granger cause economic growth rate. Also, we observed that economic growth rate does not granger cause the growth rate of government spending on the utility sector as the probability value was more than 0.05 (0.5003) which is the acceptance of the null hypothesis. This simply means that there is also no causality between the growth rate of government spending on the utility sector and economic growth rate in Nigeria.

In the rest of the variables examined, there is no causality between the growth rate of capital and labour as well as the growth rate of government spending on the health and education sectors with economic growth rate in Nigeria. Thus, growth rate of government spending on these sectors do not granger cause economic rate in Nigeria.

4.2 Evaluation of Research Hypotheses

Hypothesis 1

H_0: Government spending on infrastructure has no significant impact on Nigeria's economic growth during the pre SAP, SAP and post SAP periods

H_1: Government spending on infrastructure has significant impact on Nigeria's economic growth during the pre SAP, SAP and post SAP periods

Hypothesis 2

$\mathbf{H_0}$: There were no structural breaks experienced during the pre SAP, SAP and post SAP periods for economic growth and aggregate spending in Nigeria.

H_i: There were structural breaks experienced during the pre SAP, SAP and post SAP periods for economic growth and aggregate spending in Nigeria.

Hypothesis 3

H_0: There is no causal link between government spending on infrastructure and Nigeria's economic growth**.**

H_i: There is causal link between government spending on infrastructure and Nigeria's economic growth**.**

Hypothesis 1

This is the proposition that government spending for infrastructure has no significant impact on economic growth in Nigeria during the pre – SAP, SAP and post SAP periods.

From our ARDL short run analysis during the pre-SAP period, we observed that the variables employed to examine the impact of government spending for infrastructure on economic growth (transport sector, communication sector, health sector, education sector and utilities), with the exception of the health sector, were all significant as the probabilities of their absolute t-statistics were less than the critical $t_{0.05}$ value. This means that the sectors included in the model with the exception of the health sector, have positively significant impact on economic growth in Nigeria during the pre-SAP period.

From the ARDL short run analysis during the SAP period, we observed that the variables employed to examine the impact of government spending for infrastructure on economic growth (transport sector, communication sector, health sector, education sector and utilities), with the exception of the health sector, were all positively significant as the probabilities of their absolute t-statistics were less than the critical $t_{0.05}$ value. This means that the sectors included in the model with the exception of the health sector, have significant impact on economic growth in Nigeria during the SAP period.

We also observed from the ARDL short run analysis during the post-SAP period that the variables employed to examine the impact of government spending for infrastructure on economic growth (transport sector, communication sector, health sector, education sector and utilities), were all insignificant as the probabilities of their absolute t-statistics were greater than the critical $t_{0.05}$ value. This means that the sectors included in the model have no significant impact on economic growth in Nigeria during the post-SAP period.

Lastly we also observed from the ARDL short run analysis for the entire period that the variables employed to examine the impact of government spending for infrastructure on economic growth

(transport sector, communication sector, health sector, education sector and utilities), were all insignificant as the probabilities of their absolute t-statistics were greater than the critical $t_{0.05}$ value. This means that the sectors included in the model have no significant impact on economic growth in Nigeria during the entire period.

Judging from the result above especially that of the post-SAP and the entire periods, with the health and communication sector outcome in the pre-SAP and SAP periods, this leads to the acceptance of the proposition and the rejection of the alternative hypothesis making us to conclude that government spending for infrastructure have no significant impact on economic growth in Nigeria during the pre – SAP, SAP and post SAP periods.

Hypothesis 2

This is the proposition that there were no structural breaks experienced during the pre SAP, SAP and post SAP periods for economic growth and aggregate spending in Nigeria. From the Zivot-Andrews test analysis, we observed there were structural breaks both highest peaks and lowest peaks experienced during the pre SAP, SAP and post SAP periods for economic growth and aggregate spending in Nigeria. This leads to the acceptance of the alternative hypothesis making us to conclude that there were no structural breaks experienced during the pre SAP, SAP and post SAP periods for economic growth and aggregate spending in Nigeria.

Hypothesis 3

This is the proposition that there is no causal link between government spending for infrastructure and economic growth in Nigeria for the entire period. From our granger-causality analysis, we observed closely that there exists no causal link between the growth rate of the government spending for infrastructure in the sectors included in the model (transport, communication, health, education and utility sectors) and economic growth rate in Nigeria. We therefore accept the null hypothesis making us conclude that the there is no causal link between government spending on infrastructure and Nigeria’s economic growth.

4.3 Discussion of Findings

The interpretation of result was evaluated with the aid of three criteria:

4.3.1 Economic Criteria – this involves checking the a priori expectations to know whether the observed estimate conform to the economic theory. Let us see the a priori expectations with the observed estimate for the periods in our computations.

Table 4.14: Summary of a-priori expectations

Variable	Expected Sign	Observed Sign during the pre-SAP period	Observed Sign during the SAP period	Observed Sign during the post-SAP period	Observed Sign during the entire period
GFCGR	+	+	+	+	+
HDIGR	+	+	+	-	+
TRANSGR	+	+	+	-	-
COMMGR	+	+	+	+	+
HTHGR	+	+	+	-	-
EDUGR	+	+	+	-	-
UTLGR	+	+	+	+	+
ECM	-	-	-	-	-

Source: Researchers' compilation (2019).

Table 4.14 shows that the growth rate of government spending for infrastructure on all the sectors included in the model during the pre-SAP and SAP periods have positive relationships with the dependent variable (GDPGR). Also, the growth rate of government spending on the communication and utility sectors during the post-SAP and the entire period have positive relationships with the dependent variable (GDPGR) whereas the growth rate of government spending on the transport, health and education sectors have negative relationships. This therefore implies that only the communication and utility sectors conformed to the postulate of economic theory for the four periods under study. This negative relationship of the growth rate of government spending on transport, health and education sectors with the dependent variable could be ascribed to the fact that the percentage of total government spending accorded to these critical sectors as against the need for them have not been sufficient to attain growth in the Nigerian economy.

4.3.2 Statistical Criteria – this involves checking the statistical tool of analysis which includes the t-statistics, f-statistics, R-squared, Adjusted R-squared.

T-statistics

This is the test for individual significance of variables and a variable is said to be significant when the absolute t-statistics is greater than the critical $t_{0.05}$ value at 5 per cent level of significance. Using 95 per cent confidence interval and 39degrees of freedom (48-9) gives the value 1.697 from the statistical table.

Table 4.15 Summary of t-statistics

Variable	t tabulated	t calculated during the pre-SAP period	t calculated during the SAP period	t calculated during the post-SAP period	t calculated during the entire period
GFCGR	1.697	5.800278	4.043657	0.496452	0.934047
HDIGR	1.697	-3.900243	2.542791	-0.630511	-0.082264
TRANSGR	1.697	4.555102	-2.268479	-1.246935	0.181927
COMMGR	1.697	-6.065496	2.241512	0.149942	-0.278490
HTHGR	1.697	1.765575	1.407275	-0.623929	-1.143978
EDUGR	1.697	-2.678548	3.181997	-0.456804	0.798459
UTLGR	1.697	-4.760009	-3.305837	0.562570	-0.254637
ECM	1.697	-6.773939	-2.390779	-3.053848	2.570764

Source: Researchers' compilation (2019).

Using information from short run analysis during the pre-SAP period presented in Table 4.15, since the absolute t-statistics of GFCGR (5.800278), HDI (-3.900243), TRANSGR (4.555102), COMMGR (-6.065496), HTHGR (1.765575) EDUGR (-2.678548), UTLGR (-4.760009) and ECM (-6.773939) are higher than the one from the table (1.697), it can be concluded that the growth rate of government spending on transportation sector, communication sector, education sector and utility sector are significant in describing variations in economic growth in Nigeria and cannot be ignored.

Using information from short run analysis during the SAP period, since the absolute t-statistics of GFCGR (4.043657), HDI (2.542791), TRANSGR (-2.268479), COMMGR (2.241512), EDUGR (3.181997), UTLGR (-3.305837) and ECM (-2.390779) are higher than the one from the table (1.697), it can be concluded that the growth rate of government spending on transportation sector, communication sector, health sector, education sector and utility sector are significant in describing variations in economic growth in Nigeria and cannot be ignored, but

only the growth rate of government spending on the health sector is not significant as its absolute t-statistics (1.407275) is less than the critical $t_{0.05}$ value (1.697).

Using information from short run analysis during the post-SAP period, since the absolute t-statistics of GFCGR (0.496452), HDI (-0.630511), TRANSGR (-1.246935), COMMGR (0.149942) HTHGR (-0.623929), EDUGR (-0.456804) and UTLGR (0.562570) are lower than the one from the table (1.697), it can be concluded that the growth rate of government spending on transportation sector, communication sector, health sector, education sector and utility sector are not significant in describing variations in economic growth in Nigeria and should be ignored.

Using information from short run analysis during the entire period, since the absolute t-statistics of ECM (2.570764) is higher than the one from the table (1.697) while the absolute t-statistics of GFCGR (0.934047), HDI (-0.082264), TRANSGR (0.181927), COMMGR (-0.278490), HTHGR (-1.143978), EDUGR (0.798459) and UTLGR (-0.254637) are lower, it can be concluded that the growth rate of government spending on transportation sector, communication sector, health sector and education sector are not significant in describing variations in economic growth in Nigeria and should be ignored.

F-statistics

In testing for the overall significance of the sample regression model, the f-test was applied. The hypotheses tested are:

H_0: $\beta_1 = \beta_2 = \beta_3 = 0$ (the model is not significant)

H_1: $\beta_1 \neq \beta_2 \neq \beta_3 \neq 0$ (the model is significant)

The critical F-value is obtained using $F_{\alpha\,(k-1,\,n-k)}$

Where:

$F_{\alpha\,(k-1,\,n-k)}$ = critical F-value
α = 5 per cent level of significance
k-1 = numerator degree of freedom
n-k = denominator degree of freedom
n = (number of observations) is:
16 during the pre-SAP period
13 during the SAP period

19 during the post-SAP period
36 in the entire period
k = 9 (number of parameters)

Table 4.16 Summary of F-statistics

Pre-SAP period		SAP period		Post-SAP period		Entire period	
F_{cal}	F_{tab}	F_{cal}	F_{tab}	F_{cal}	F_{tab}	F_{cal}	F_{tab}
6.945191	3.73	7.033840	6.04	1.150936	3.07	5.571497	2.27

Source: Researchers' compilation (2019).

Decision Rule:
Reject H_0 if $F_{cal}>F_{\alpha(k-1,n-k)}$, otherwise, do not reject.

Therefore, using Table 4.16, we have the results that $Fcal>F_{tab}$

6.95 > 3.73 during the pre-SAP period

7.03 > 6.04 during the SAP period

1.15 < 3.07 during the post-SAP period

5.57 > 2.27 during the entire period

Hence, we reject the null hypothesis in the pre-SAP, SAP and entire periods and conclude that the models were significant because the individual parameters were not simultaneously equal to zero, which implies that the variables included in the models (growth rates of government spending on transport sector, communication sector, health sector, education sector and utility sector) have influence on economic growth in Nigeria.

R-squared

This is the explanatory power of the variables modelled. From our results, the coefficient of determination (R^2) during the pre-SAP, SAP, post-SAP and entire periods are 0.680172, 0.844323, 0.633217 and 0.725013 respectively. This simply means that 68 per cent, 84 per cent, 63 per cent and 73 per cent respectively of the variations in GDPGR in Nigeria are accounted for by the included explanatory variables of growth rate of government spending on transportation sector, communication sector, health sector, education sector and utility sector respectively.

Adjusted R-squared

This is the explanatory power of the insensitive number of variables modelled. From our results, the adjusted coefficient of determination (Adjusted R^2) during the pre-SAP, SAP, post-SAP and entire periods are 0.539441, 0.529186, 0.583041 and 0.593734 respectively. This simply means that 54 per cent, 53 per cent, 58 per cent and 59 per cent respectively of the variations in GDPGR are accounted for by the included variables, after the coefficient of determination has been adjusted to make it insensitive to the number of included variables.

4.3.3 Econometric Criteria – this involves checking for the presence of econometric problems of estimation like autocorrelation, heteroskedasticity etc.

i. Autocorrelation

This is the correlation between members of series of observations ordered in time. The Durbin–Watson statistics was adopted to check for the presence of autocorrelation in the model.

Autocorrelation hypothesis:

$H_{0:}\ u_i = 0$ (the error terms are not autocorrelated with a first order scheme)

$H_{0:}\ u_i \neq 0$ (the error terms are autocorrelated with a first order scheme)

Decision rule

If $0 < d < d_L$, reject H_0 of no positive autocorrelation

If $4 \leq d \leq d_u$, take no decision on H_0 of no positive autocorrelation.

If $4\text{-}d_L < d < 4$, Reject H_0 of no negative autocorrelation

If $4\text{-}d_u \leq d\ (4\text{-}d_L)$, take no decision on H_0

If $du < d < 4\text{-}d$, reject H_0 of no autocorrelation, positive or negative.

For the data during the pre-SAP period where d= 1.79; $d_u = 0.304$ and $d_L = 2.860$

1. $0 < d < d_L \rightarrow \quad 0 < 1.79 < 2.860 \rightarrow$
2. $4 \leq d \leq d_u, \rightarrow \ 4 \leq 1.79 \leq 0.304 \rightarrow$
3. $4\text{-}d_L < d < 4, \rightarrow \ 4\text{-}\ 2.860 < 1.79 < 4 \rightarrow$

   $1.14 < 1.79 < 4$
4. $4\text{-}d_u \leq d\ (4\text{-}d_L), \rightarrow 4\text{-}\ 0.304 \leq 1.79\ (4\text{-}\ 2.860)$

   $3.696 \quad \leq 1.79\ (1.14)$

$3.696 \leq 2.041 \rightarrow$

5. $du < d < 4\text{-}d, \rightarrow 0.304 < 1.79 < 4 - 1.79$

   $0.304 < 1.79 < 2.21 \rightarrow$ we therefore reject H_0 of no autocorrelation, positive or negative.

For the data during the SAP period where d= 1.94; $d_u = 0.147$ and $d_L = 3.266$

1. $0 < d < d_L \rightarrow 0 < 1.94 < 3.266 \rightarrow$
2. $4 \leq d \leq d_u, \rightarrow 4 \leq 1.94 \leq 0.147 \rightarrow$
3. $4\text{-}d_L < d < 4, \rightarrow 4 - 3.266 < 1.94 < 4 \rightarrow$

   $0.734 < 1.79 < 4$
4. $4\text{-}d_u \leq d\ (4\text{-}d_L), \rightarrow 4 - 0.147 \leq 1.94\ (4 - 3.266)$

   $3.853 \leq 1.94\ (0.734)$

   $3.853 \leq 1.424 \rightarrow$
5. $du < d < 4\text{-}d, \rightarrow 0.147 < 1.94 < 4 - 1.94$

   $0.147 < 1.94 < 2.06 \rightarrow$ we therefore reject H_0 of no autocorrelation, positive or negative.

For the data during the post-SAP period where d= 1.89; $d_u = 0.456$ and $d_L = 2.589$

1. $0 < d < d_L \rightarrow 0 < 1.89 < 2.589 \rightarrow$
2. $4 \leq d \leq d_u, \rightarrow 4 \leq 1.89 \leq 0.456 \rightarrow$
3. $4\text{-}d_L < d < 4, \rightarrow 4 - 2.589 < 1.89 < 4 \rightarrow$

   $1.411 < 1.89 < 4$
4. $4\text{-}d_u \leq d\ (4\text{-}d_L), \rightarrow 4 - 0.456 \leq 1.89\ (4 - 2.589)$

   $3.544 \leq 1.89\ (1.411)$

   $3.544 \leq 2.667 \rightarrow$
5. $du < d < 4\text{-}d, \rightarrow 0.456 < 1.89 < 4 - 1.89$

   $0.456 < 1.89 < 2.11 \rightarrow$ we therefore reject H_0 of no autocorrelation, positive or negative.

For the data during the entire period where d= 1.98; $d_u = 1.139$ and $d_L = 1.958$

1. $0 < d < d_L \rightarrow 0 < 1.98 < 1.958 \rightarrow$
2. $4 \leq d \leq d_u, \rightarrow 4 \leq 1.98 \leq 1.139 \rightarrow$

3. $4\text{-}d_L < d < 4, \rightarrow 4 - 1.958 < 1.98 < 4 \rightarrow$

   $1.02 < 1.98 < 4$

4. $4\text{-}d_u \leq d\ (4\text{-}d_L), \rightarrow 4 - 1.139 \leq 1.98\ (4 - 1.958)$

   $4.861 \leq 1.89\ (2.02)$

   $4.861 \leq 3.9996 \rightarrow$

5. $du < d < 4\text{-}d, \rightarrow 1.139 < 1.98 < 4 - 1.98$

   $1.139 < 1.98 < 2.02 \rightarrow$ we therefore reject H_0 of no autocorrelation, positive or negative.

ii. Heteroskedasticity

This is the violation of the assumption of constant variance of the error terms i.e. unequal variance. The white's general heteroskedasticity was adopted to check for the presence of heteroskedasticity in the model. The decision rule is that if Prob. (f-stat) < 0.05; accept heteroskedasticity and if Prob. (f-stat) > 0.05; accept no heteroskedasticity.

Table 4.17: Test for Heteroskedasticity

Heteroskedasticity Test: White			
F-statistic	0.207991	Prob. F(38,5)	0.9983
Obs*R-squared	26.95056	Prob. Chi-Square(38)	0.9095
Scaled explained SS	1.430379	Prob. Chi-Square(38)	1.0000

Source: E-views 9 computations

From the Table 4.17, we observed that Prob. (38,5) was 0.9983 i.e. Prob. (f-stat) > 0.05. This simply means that we are accepting no heteroskedasticity on the residuals of the model. Therefore, we safely concluded that there is no presence of heteroskedasticity in the model. This makes our estimates to be efficient.

iii. Multicollinearity

This is the existence of a perfect or exact linear relationship among some or all explanatory variables of a regression model. It is detected through correlation analysis. Let us look at the correlations of our modelled variables.

Table 4.18: Test for Multicollinearity

	GDPGR	GFCGR	HDI	TRANSGR	COMMGR	HTHGR	EDUGR	UTLGR
GDPGR	1.000000	0.120973	-0.089535	-0.161426	-0.143750	-0.209757	0.096732	0.016021
GFCGR	0.120973	1.000000	0.088270	0.144577	0.143163	0.150263	0.230338	0.088945
HDI	-0.089535	0.088270	1.000000	0.090164	0.092391	0.028103	-0.415216	-0.293670
TRANSGR	-0.161426	0.144577	0.090164	1.000000	0.781009	0.462284	0.141228	-0.114791
COMMGR	-0.143750	0.143163	0.092391	0.781009	1.000000	0.341905	0.111225	-0.108961
HTHGR	-0.209757	0.150263	0.028103	0.462284	0.341905	1.000000	0.309246	0.060110
EDUGR	0.096732	0.230338	-0.415216	0.141228	0.111225	0.309246	1.000000	0.303512
UTLGR	0.016021	0.088945	-0.293670	-0.114791	-0.108961	0.060110	0.303512	1.000000

Source: E-views 9 computations

From Table 4.18 we observed that none of the explanatory variables have strong correlation of 0.8 and above. This simply means that there is no presence of multicollinearity among the variables in the models employed for the entire period.

iv. Normality Test

The normality test adopted was the Jarque-Bera (JB) test of normality. The JB test of normality is an asymptotic, or large-sample, and it is based on the OLS residuals. This test computes the skewness and kurtosis measures of the OLS residuals and it follows the chi-square distribution (Gujarati, 2004).

Hypothesis

H_0: $\sigma 1 = 0$ (the error term follows a normal distribution)

H_1: $\sigma 1 \neq 0$ (the error term does not follow a normal distribution)

At $\alpha = 5$ per cent level of significance.

Decision Rule: Reject H_0 if $\chi^2_{cal} > \chi^2_{tab}{}^{(0.05)}$, and accept H_0 if otherwise.

From the result obtained from Jarque-Bera (JB) test of normality, JB = 75.66487 (See appendix), which is greater than chi-square table of χ^2_{tab} = 18.4926. Therefore, we accept H_0 and conclude that the error term follows a normal distribution.

v. Test for Adequacy of the Model:

This test was conducted to test whether the model was well specified. In this test, the Ramsey Reset test was adopted. The test follows the f distribution at 5 per cent level of significance.

Statement of Hypothesis

H_0: The model is not well specified

H_1: The model is well specified

Decision rule: reject the null hypothesis if Fcal > Ftab (k-1,n-k) df and accept if otherwise. Since $F_{0.05}$ (8,39) = 2.27 and Fcal = 0.112988

Since Fcal of 0.112988 < F–tab of 2.27; we accept the alternative hypothesis and conclude that the model used is well specified.

4.4 Policy Implications of Findings

The main objective of this study is to examine the impact of government spending for infrastructure on economic growth in Nigeria during the pre-SAP, SAP and post-SAP periods and also to cover the entire period. The study also undertook to ascertain the existence of structural breaks and the direction of causality existing between government spending for infrastructure and economic growth in Nigeria from 1970 to 2017. The autoregressive distributed lag technique (ARDL), Zivot-Andrew's test and granger causality tests were adopted to capture the short run effects, existence of structural breaks as well as the causal relationship of the variables included in the model.

From the ARDL short run analysis result to study the pre-SAP period, we observed that there is a positive short run effect of growth rate of government spending on transportation sector, communication sector, health sector, education sector and utility sector on economic growth in

Nigeria. This is in consonance with the works of Aschauer (1988), Bougheas et al (1999), Herranz-Loncán (2007), Zainah (2009), Osotimehin et al (2010), Fasoranti (2012), Nedozi et al (2014), Ehizuelen (2016) and Kodongo and Ojah (2016) reviewed. This is also in line with the theory of unbalanced growth which is the theoretical underpinning of this study. There is also an insignificant short-run effect of growth rate of government spending on health sector on economic growth proxied by GDPGR in Nigeria because its t-statistic probability values is greater than the critical $t_{0.05}$ value. This is in consonance with the work of Enimola (2010) reviewed. This led to the rejection of the first null hypothesis for the pre-SAP period.

From the ARDL short run analysis result to study the SAP period, we observed that there is a positive short run effect of growth rate of government spending on transportation sector, communication sector, health sector, education sector and utility sector on economic growth rate in Nigeria. This is in consonance with the works of Haughwout (2000), Paul (2003), Akinbobola and Saibu (2004), Ghosh and Gregoriou (2008), Egert et al (2009), Akinlabi et al (2011), Babatunde et al (2012), Uma et al (2014), Owolabi (2015), Ogunlana et al (2016) and Siyan and Adegoriola (2017) reviewed. This is also in line with the theory of unbalanced growth which is the theoretical underpinning of this study. There is also an insignificant short-run effect of growth rate of government spending on health sector on economic growth proxied by GDPGR in Nigeria. This is in consonance with the work of Ekpung (2014) reviewed. This led to the rejection of the first null hypothesis for the SAP period.

From the ARDL short run analysis result to study the post-SAP period, we observed that there is a positive short run effect of growth rate of government spending on communication sector and utility sector on economic growth rate in Nigeria and also a negative short run effect of growth rate of government spending on transportation sector, health sector and education sector on economic growth rate in Nigeria. Also observed is that there is an insignificant short-run effect of growth rate of government spending on all the sectors included in the model on economic growth during the post-SAP period. This is not in line with the theory of unbalanced growth which is the theoretical underpinning of this study but in consonance with the work of Olorunfemi (2008), Enimola (2010), Narudeen and Usman (2010), Lawal and Abdulkadir (2012), Amadi and Amadi (2013) and Ekpung (2014) reviewed. This led to the acceptance of the first null hypothesis for the post-SAP period.

From the ARDL short run analysis result to study the entire period, we observed that there is a positive short run effect of growth rate of government spending on communication sector and utility sector on economic growth rate in Nigeria and also a negative short run effect of growth rate of government spending on transportation sector, health sector and education sector on economic growth rate in Nigeria. Also observed is that there is an insignificant short-run effect of growth rate of government spending on all the sectors included in the model on economic growth during the entire period. This is not in line with the theory of unbalanced growth which is the theoretical underpinning of this study. This led to the acceptance of the first null hypothesis for the entire period. This study therefore disagrees with the argument that the nexus between government spending for infrastructure and economic growth in Nigeria is inconclusive in line with the works of Ayogu (1999), Moreno, Lo´pez-Bazo and Art´ıs (2002) reviewed.

Table 4.19 Summary of the short run dynamic analysis employed in the study

Variables	1970 - 1985 Pre-SAP	1986 - 1998 SAP	1999 - 2017 Post-SAP	1970 - 2017 Full sample
GDPGR	**21.648009*** **	**34.98542*** **	**0.632766**	**0.019381**
	(2.908612)	(14.40838)	(0.962194)	(0.160168)
	[7.443479]	[-2.428130]	[0.658668]	[-0.121002]
TRANSGR	**11.225555*** **	**4.331397*** **	**-0.010461**	**-0.086898**
	(2.463486)	(1.939571)	(0.008389)	(0.477654)
	[4.555102]	[-2.268479]	[-1.246935]	[0.181927]
COMMGR	**13.999752*** **	**2.587111*** **	**0.001677**	**0.081565**
	(2.269477)	(1.154181)	(0.011184)	(0.292883)
	[-6.065496]	[2.241512]	[0.149942]	[-0.278490]
HTHGR	**2.587632**	**0.445643**	**-0.018959**	**-0.343580**
	(1.479019)	(0.311501)	(0.030386)	(0.300338)
	[1.765575]	[1.407275]	[-0.623929]	[-1.143978]
EDUGR	**3.099085*** **	**4.358202*** **	**-0.000719**	**-0.128673**
	(1.129467)	(1.401561)	(0.001793)	(0.161151)
	[-2.678548]	[3.181997]	[-0.456804]	[0.798459]
UTLGR	**5.348965*** **	**7.822980*** **	**0.000313**	**0.028482**
	(1.117715)	(2.383023)	(0.000556)	(0.111852)
	[-4.760009]	[-3.305837]	[0.562570]	[-0.254637]
Observation	16	13	19	48
R-Square	0.680172	0.844323	0.633217	0.725013
F-Stat	6.945191	7.033840	1.150936	5.571497
DW	1.792935	1.944470	1.894911	1.981283

Note* denotes significance at 5%, standard error in ( ) and t-statistics in [ ]**
Source: Researchers' computation using Eview

From Table 4.19, growth rate of government spending on transport, communication, education and utility sectors have significant positive impact on economic growth during the pre-SAP period. The growth rate of government spending on the health sector has a positive insignificant impact on economic growth in Nigeria. The same scenario repeated itself during the SAP period but in this case, it is the growth rate of government spending on the health sector once again that has a positive insignificant impact on economic growth in Nigeria. This means that government spending for infrastructure was judiciously utilised to cause economic growth in Nigeria during the periods. The opposite becomes the case to cover from the post-SAP period to the entire study sample. In this case, government spending on transport, communication, health, education and utility sectors all have insignificant impact on economic growth. While growth rate of government spending on communication and utility sectors have positive impact, growth rate of government spending on transport, health and education sectors have negative impact on economic growth in Nigeria. This invariably means that the performance of the Nigerian economy worsened after the implementation of the SAP policy especially the transport, health and education sectors. The result is regime dependent. The most appalling situation in the post-SAP period is that it incorporated various other economic policies like petroleum special trust fund, national economic empowerment development strategy and poverty eradication programs. With all the government spending on transport, communication, health, education and utility sectors to implement the policies, we only witnessed negative and insignificant impact of government spending on these sectors on economic growth.

In analysing the second objective, we observed that the economy witnessed the worst performance captured by negative growth rate of -12.4 in 1995 during the SAP period while in analysing the third objective, this study finds that there exists no causal link between the growth rate of government spending on all the sectors included in the model (transport, communication, health, education and utility sectors) and economic growth rate in Nigeria. This is not in line with the work of Akinlabi, Kehinde and Jegede (2011), Usman, Agbede and Bako (2017) reviewed. We therefore accept the second alternative hypothesis that there were structural breaks experienced in the Nigeria within the study period. We also accept the third null hypothesis making us conclude that the there is no causal link between growth rate of government spending on infrastructure and Nigeria's economic growth for the entire period of study.

The ECM results from the pre-SAP, SAP, post-SAP and full sample periods studied indicate that about 76 per cent, 84 per cent, 84 per cent and 83 per cent speed of adjustments respectively is needed to correct the disequilibrium in Nigeria's GDPGR in the previous year in the current year. The post estimation tests conducted using the entire period show a good fit of the regression models, overall significance of the variables included in the models, well specification of the models used, normal distribution of the error terms and the absence of autocorrelation, heteroskedasticity and multicollinearity in the models. This means that the estimators are deemed to be best, linear, unbiased and efficient (BLUE).

In analyzing the result from the European countries selected for this study, it was observed that government spending on transportation, communication, health, education and utility sectors selected in line with the theory of unbalanced growth, all had positive and significant impact on the economic growth of Norway and United Kingdom respectively. The worry now is why did the theory work in these countries but failed in the Nigerian context? This will require a little extrapolation from the results of this study. Nigeria is a highly populated country with seriously huge infrastructural needs of the populace. Therefore even though government expenditure in these selected sectors have been on the increase over the years, this is not adequate to satisfy the demand for these facilities thereby creating a gap in the infrastructural development process of the country. There is the also the vandalization of existing facilities in the country possibly due to insecurity and ignorance. The maintenance and repairs culture of damaged facilities is also very poor. Funds were released but due to leakages, corruption, bureaucratic bottlenecks and delays, they were not fully spent to cater for the increased infrastructural needs of the citizens. This supports Olorunfemi, 2008 findings that funds directed to the provision of infrastructures were either embezzled or out rightly diverted to less productive needs which are susceptible to corruption.

Since the post-SAP period to date, Nigeria's actual output has been below its potential and this is why there is reduction in infrastructural development in the country not minding huge government expenditure. This is more worrisome when considered in line with the huge demand for infrastructure in the country.The outstanding feature that played out in the post SAP to 2017 that performed against expectation is democracy in Nigeria. This results in infrastructural needs of the citizens being greater than the actual infrastructural facilities provided by the government

not minding that government spending for the provision of infrastructure has been on the increase over the years.

Table 4.20 Summary of recursive short run dynamic analysis employed in the study

DEPENDENT VARIABLE		INDEPENDENT VARIABLES (Full study Sample)				
GDPGR		AGRICGR	PETGR	TRANSGR	HTHGR	EDUGR
	Coefficient	15.411676	12.049078	1.010003	-0.162575	-0.034819
	Sig level	0.0563	0.0030	0.0550	0.2374	0.6872
GDPGR		AGRICGR	PETGR			
	Coefficient	24.111648	27.535361			
	Sig level	0.0317	0.0024			
EDUGR		AGRICGR	PETGR			
	Coefficient	-0.165243	7.180802			
	Sig level	0.6445	0.0476			
HTHGR		AGRICGR	PETGR			
	Coefficient	-0.262741	-0.076544			
	Sig level	0.2858	0.4009			
TRANSGR		AGRICGR	PETGR			
	Coefficient	-0.922628	-0.180595			
	Sig level	0.0780	0.3950			

Source: Researchers' computation using Eview

From the analysis on table 4.20, if Nigeria invests in the petroleum sector, unit growth rate increase in government spending on the petroleum sector in the economy leads to a significant increase in growth of the economy to about 1541 units. Also, unit growth rate increase in government spending on the agricultural sector in the economy leads to an increase in growth of the economy to about 1205 units. A unit growth rate increase in government spending on those sectors that negatively impacted on economic growth in the initial analysis are included with the petroleum and agricultural sectors, Transport sector increase economic growth by 110 units, where as health and education sectors decreases economic growth by 16.3 and 3.5 units respectively. If government spending on the petroleum and agricultural sectors are geared towards improving the education sector, agricultural sector reduces it by 16.5 units whereas petroleum sector increases it by 71.8 units. If government spending on the petroleum and agricultural sectors are geared towards improving the health sector, both the agricultural sector and petroleum sector reduces it by 26.3 units and 7.7 units respectively. Finally, if government spending on the petroleum and agricultural sectors are geared towards improving the transport

sector, both the agricultural sector and petroleum sector reduces it by 92.2 units and 18.1 units respectively.

The policy implication of this study therefore is that Nigeria should not adhere to the theory of unbalanced growth not minding it was effective in European countries because evidences from Nigeria do not support this theory. Since Nigeria is an oil rich country and is endowed with vast landmass and human resources, Nigeria should rather look inwards to utilise its abundant natural endowments in the petroleum and agricultural sectors so that government spending in these sectors can enable the country achieve infrastructural development which will in turn positively impact on economic growth. There should also once again be a sincere incorporation of the modalities used for anchoring and implementing SAP policy in this country which ensured economic growth chief of which is the government ensuring that what is annually budgeted for infrastructural development in the country is judiciously and economically spent.

CHAPTER FIVE

SUMMARY, POLICY RECOMMENDATIONS AND CONCLUSION

This chapter summarizes the major findings of the research work. This is followed by the conclusion drawn from the study and subsequently, policy recommendations made towards promoting economic growth through infrastructural development in Nigeria.

5.1 Summary

The study examined the impact of government spending for infrastructural development on economic growth in Nigeria for the period of 48 years sample size (1970-2017). The theoretical under pinning of study was a combination of the endogenous growth model and unbalanced growth theory. The study employed the autoregressive distributive lag technique (ARDL) as its main econometric tool to study the impact of government spending for infrastructure on economic growth in Nigeria during the pre-SAP, SAP and post-SAP periods. This necessitated running the Augmented Dickey-Fuller (ADF) unit root tests and the ARDL tests for the pre-SAP, SAP, post-SAP and entire periods included in the analysis.

The Augmented Dickey-Fuller unit root for pre-SAP period showed that while GDPGR, growth rate of gross fixed capital, growth rates of government spending on transportation sector, communication sector, health sector and education sector passed the stationarity test at level, only the growth rate of human development index and growth rate of government spending on utility sector were stationarized at first difference. For the SAP period, while growth rate of gross fixed capital, growth rate of human development index, growth rates of government spending on transportation sector, communication sector, health sector, education sector and utility sector passed the stationarity test at first difference, only GDPGR was stationarized at level. Also in the post-SAP period, while GDPGR, growth rate of gross fixed capital, growth rate of human development index, growth rates of government spending on transportation sector, communication sector, health sector, and education sector passed the stationarity test at level, only UTLGR was stationarized at first difference. Lastly in the entire period, while GDPGR, growth rate of gross fixed capital, growth rates of government spending on transportation sector, communication sector and utility sector passed the stationarity test at level, the growth rate of human development index, growth rates of government spending on health sector and education

sector were stationarized at first difference. Since all the variables were not stationary at the same order of integration but stationary at first difference I(1) and level I(0), we proceeded to the ARDL co-integration analysis which indicated in the pre-SAP, SAP, post-SAP and entire periods, that there is a sustained long run relationship among the variables included in the models. Hence, our investigation was based on short-run dynamic analysis of ARDL.

From the ARDL result, it shows that the growth rate of government spending for infrastructure on all the sectors included in the model during the pre-SAP and SAP periods have positive relationships with the dependent variable (GDPGR). Also, the growth rate of government spending on the communication and utility sectors during the post-SAP and the entire period have positive relationships with the dependent variable (GDPGR) whereas the growth rate of government spending on the transport, health and education sectors have negative relationships.

5.2 Conclusion

The results and findings of this study have given us the platform to make conclusion on the subject. This study examined the impact of government spending for infrastructure on economic growth in Nigeria and the results show that in the pre-SAP period, the growth rate of government spending on transportation sector, communication sector, education sector and utility sector were significant in describing variations in economic growth in Nigeria where as in the SAP period, the growth rate of government spending on transportation sector, communication sector, health sector, education sector and utility sector were all significant in describing variations in economic growth in Nigeria. On the other hand, while the growth rate of government spending on transportation sector, communication sector, health sector, education sector and utility sector were not significant in describing variations in economic growth in Nigeria in the post-SAP period, the result is same in the entire study period. The result is regime dependent. Since the post-SAP period to 2017, Nigeria's actual output has been below its potential and this is why there is reduction in infrastructural development in the country not minding huge government expenditure.

From the findings, the study shows that the SAP policy embarked upon by the Nigerian government has impact on the economy by the presence of structural breaks observed from the Zivot-Andrew's test and also there exists no causal link between the growth rate of government

spending on all the sectors included in the model (transport, communication, health, education and utility sectors) and economic growth rate in Nigeria. This calls for concerted effort by the government to review and come up with new reform on infrastructure-growth policies, provide adequate infrastructural facilities and appropriate macroeconomic environment that will encourage public infrastructure development in the economy so that the huge amounts budgeted for infrastructural development in the country will promote economic growth.

5.3 Recommendations

Based on our findings and conclusions from our study, the following recommendations are made using Nigeria as a case study and they include:

1. Nigeria should utilise its abundant natural endowments in the petroleum and agricultural sectors so that government spending in these sectors can enable the country achieve infrastructural development which will in turn positively impact on economic growth.
2. The government should not only increase its expenditure in the key sectors of the economy including transport, communication, health, education, utility, petroleum and agricultural sectors but should do so in line with the needs for these infrastructural facilities so that the economy can attain infrastructural development.
3. Generally, there must be regular monitoring and evaluation of Ministries, Departments and Agencies on performance in terms of use of funds allocated to these sectors (transportation, communication, education, health and utility) to ensure that the amounts allocated are judiciously expended.
4. The government of Nigeria should seriously work on creating enabling environment for increase in infrastructural development in Nigeria. This can be achieved through provision of adequate basic infrastructure, easy access to poverty alleviation programs, cutting bureaucracy and combating corruption.
5. The government of Nigeria should place a higher priority on human capital development. This can only be achieved through intensifying conscientious effort to increase investment in education and health sectors to achieve the growth which would engender economic development.
6. There should also be allocation for foreign participation to operate in the transport, health, education and utility sectors so as to ensure accelerated economic growth.

Individual and corporate foreign investors should also be encouraged to participate in the infrastructural development process of the country.

7. The composition of public spending in infrastructure must take into account the needs of the populace and not be biased by political priorities especially in the transport, health and utility sectors.
8. There should also once again be a sincere incorporation of the modalities used for anchoring and implementing SAP policy in this country which ensured economic growth in the formulation and implementation of new or existing policies in the country.
9. Government should also pay serious attention to the inter-professional conflict rampant in the health sector and ensure that assignment to relevant duties be based on abilities and not to a classified set of professionals so that the sector can improve growth.
10. The government should also monitor her spending by reducing wastages so that infrastructure can contribute positively to growth in the country. Nigerian government should ensure she meets the international benchmark by world bank that not less than ten per cent of budgetary allocation on infrastructure should be expended yearly by developing economies.
11. Policy makers in various sectors of the economy should come up with the right policy mix to ensure macroeconomic stability so as to improve the profile of public infrastructure in the economy. This is better achieved by promoting policies that will eschew fraudulent/corrupt practices and abnormal competition in Nigeria sectors and institutions.
12. Finally, the financing options for closing Nigeria's infrastructure gaps should focus on broadening the sources of finance and a better allocation of public resources. In this wise, the government should intensify the utilisation of the public-private-partnership (PPP) framework as government alone cannot finance infrastructural development in an emerging market economy like ours. Therefore, Nigeria needs to be more pragmatic in her infrastructural development, in order to create employment and reduce poverty.

5.4 Contributions to Knowledge

The theory of unbalanced growth as postulated by Hirschman which is the theoretical under pinning of this study states that developing economies in which Nigeria is inclusive should

unbalance their economies by investing in social overhead capital on selected sector of their economy so as to achieve developed status. This theory Hirschman has implemented in some European countries like France, Norway, England, United Kingdom and Holland to come up with the findings that government investments in transport, communication, education, health and utilities sectors (incorporating power and water resources) aid to boost economic growth by keeping those critical areas active and having trickling down effect on other areas of the economy.

This study analysed the government spending made for infrastructural development of these five sectors stipulated by Hirschman as against the growth rates achieved from the huge government spending made on these sectors in the country over the years (1970 to 2017). It was observed from the result that while growth rate of government spending on transport, communication, health, education and utility sectors had positive impact on economic growth during the pre-SAP and SAP periods, in the post-SAP period to the entire study sample, growth rate of government spending on communication and utility sectors had positive impact while growth rate of government spending on transport, health and education sectors had negative impact on economic growth in Nigeria.

In the post-SAP period and the entire period, which are more recent dates, there is a variance between the postulations of the theory and the outcome of this study. Therefore, the theory of unbalanced growth should not be adhered to in the Nigerian context since the sectors specified in the theory have not enhanced growth in this study and evidences from Nigeria do not support this theory. Since Nigeria is an oil rich country and is endowed with vast landmass and human resources, Nigeria should rather look inwards to utilise its abundant natural endowments in the petroleum and agricultural sectors so that government spending in these sectors can enable the country achieve infrastructural development which will in turn positively impact on economic growth. Also since in the pre-SAP and SAP periods, government spending for infrastructure enhanced economic growth, the government should look deep inwards henceforth to ensure that there are no leakages in the expenditure of the budgetary allocations made to these critical sectors highlighted and the modalities used to implement the SAP policy should be revisited in current economic policies so as achieve economic growth.

5.5 Suggestions for Further Studies

This study successfully examined the impact of government spending for infrastructure on economic growth in Nigeria using the unbalanced growth theory framework to cover the pre-SAP, SAP and post-SAP periods. It is therefore recommended that further study should be carried out on the impact of government spending for infrastructure on economic growth in Nigeria using the balanced growth theory framework.

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APPENDICES

NOMINAL VALUES OF DATA

YEAR	Nigerian GDP	Govt spending on TRANS	Govt spending on COMM	Govt spending on HTH	Govt spending on EDU	Govt spending on UTL	Human Dev Index	Gross Fixed Capital	Govt spending on AGRIC	Govt spending on PET
1969	3549.3	2.9	3	7.55	14.79	4.01	0	12013	1711.7	120
1970	5281.1	4.79	4.96	12.48	24.44	6.63	0	12215	2576.4	166.6
1971	6650.9	5.2	3.5	12.64	3.94	1.7	0	1283	3033.7	510.1
1972	7187.5	5.3	4.01	14.26	5.23	1.58	0	1401	3092.7	764.3
1973	8630.5	7.86	5.77	14.68	8.34	1.92	0	2615	3261.2	1016
1974	18823.1	5.54	5.09	15.29	34.98	1.85	0	3167	4375	3724
1975	21475.2	11.56	10.23	36.07	121.54	3.58	0	5513	5872.9	4271.5
1976	26655.8	17.28	14.12	52.85	330.41	18.42	0	8107	6122	5385.2
1977	31520.3	18.96	34.77	59.47	173.72	24.49	0	9420	7401.6	1749.8
1978	34540.1	17.67	27.48	40.48	169.29	16.7	0	9386	8033.6	4555.8
1979	61974.7	14.02	22.53	15.32	151.23	47.88	0	9095	9213.1	8880.8
1980	49632.3	27.03	18.06	52.79	155.81	61.85	63.7646	11431	10011.5	12353.3
1981	144.83	264.5127	263.4094	110.6977	242.5559	18.39365	64.8536	18220.59	17.05	5.92
1982	154.98	211.8914	281.2354	113.2826	248.2198	17.17434	65.5892	17145.82	20.13	4.93
1983	163.00	178.3223	278.7865	115.8675	253.8838	22.26313	65.3249	13335.33	23.80	4.28
1984	170.38	170.2798	253.7567	118.4524	259.5477	19.31083	57.0606	9149.76	30.37	5.24
1985	192.27	203.5712	202.383	121.0373	265.2117	15.49805	57.7962	8799.48	34.24	6.59
1986	202.44	180.1533	202.8916	123.6222	270.8757	13.52165	58.5319	11351.46	35.70	5.54
1987	249.44	180.2201	204.9246	126.2072	276.5396	14.42883	57.3033	15228.58	50.29	15.48
1988	320.33	180.5202	206.9748	128.7921	282.2036	15.88424	56.2413	17562.21	73.76	17.30
1989	419.20	180.9554	210.1569	131.377	287.8675	17.25802	55.1793	26825.51	88.26	44.33
1990	499.68	184.5745	214.3605	133.9619	293.5315	19.36432	52.1174	40121.31	106.63	58.06
1991	596.04	189.8559	217.6832	135.3813	296.6415	19.91044	51.0554	45190.23	123.24	67.50
1992	909.80	199.2002	229.2864	139.2754	305.1742	21.45739	49.9935	70809.16	184.12	142.98
1993	1,259.07	205.2966	245.0771	143.3069	314.0077	22.7133	46.6815	96915.51	295.32	140.25
1994	1,762.81	205.5927	255.6721	145.3524	318.4899	23.60294	44.4172	105575.5	445.27	126.92
1995	2,895.20	208.5841	271.825	145.2674	318.3035	23.63791	45.1528	141920.2	790.14	444.02

NOMINAL VALUES OF DATA CONTINUED

YEAR	Nigerian GDP	Govt spending on TRANS	Govt spending on COMM	Govt spending on HTH	Govt spending on EDU	Govt spending on UTL	Human Dev Index	Gross Fixed Capital	Govt spending on AGRIC	Govt spending on PET
1996	3,779.13	213.7411	291.5249	149.4714	327.5153	23.94901	45.8885	204047.6	1,070.51	670.74
1997	4,111.64	220.7498	320.1934	152.0563	333.1792	24.14468	46.6242	242899.8	1,211.46	619.22
1998	4,588.99	229.6038	363.1814	154.6413	338.8432	23.81402	47.3598	242256.3	1,341.04	426.80
1999	5,307.36	238.1218	414.8108	157.2262	344.5071	24.43024	48.0955	231661.7	1,426.97	593.44
2000	6,897.48	246.3475	455.9068	159.8111	350.1711	25.17524	46.2826	331056.7	1,508.41	1,266.67
2001	8,134.14	257.6921	814.9829	162.3965	355.834	107.9264	51.1314	372135.7	2,015.42	966.79
2002	11,332.25	306.999	946.4907	163.6968	383.8266	121.8371	51.6912	499681.5	4,251.52	1,042.00
2003	13,301.56	310.7679	1075.802	167.0431	410.8275	140.9646	51.4236	865876.5	4,585.93	1,588.09
2004	17,321.30	465.1927	1450.394	185.166	455.3991	163.6463	52.1427	863072.6	4,935.26	2,460.55
2005	22,269.98	495.1319	1765.774	203.6826	503.4438	175.2254	52.2066	804400.8	6,032.33	3,281.47
2006	28,662.47	529.9947	2213.22	224.7231	557.6702	184.9963	52.6896	1546526	7,513.30	4,044.97
2007	32,995.38	567.5085	2800.414	247.9735	617.7762	195.4774	53.941	1936958	8,551.98	4,363.63
2008	39,157.88	607.8126	3575.143	273.614	684.3107	204.5859	54.2661	2053006	10,100.33	5,270.01
2009	44,285.56	650.2125	4596.653	300.9939	752.7918	213.1466	55.4065	3050576	11,625.44	4,297.07
2010	54,612.26	694.7718	5955.06	330.9637	826.6716	222.2645	56.6054	4012919	13,048.89	8,402.68
2011	62,980.40	736.2432	6083.047	374.1155	1087.67	294.546	56.7403	3908280	14,037.83	11,039.41
2012	71,713.94	711.0762	6268.513	390.3007	1105.896	332.9421	57.6591	3357398	15,816.00	11,315.03
2013	80,092.56	738.0785	6783.07	427.7174	1278.414	395.5779	58.3947	11478000	16,816.55	10,296.33
2014	89,043.62	770.6909	7257.062	472.6337	1391.953	382.4413	50.8302	13596000	18,018.61	9,616.49
2015	94,144.96	805.4557	7708.114	484.3365	1498.707	367.3147	50.6725	14112000	19,636.97	5,990.42
2016	101,489.49	808.5973	7858.698	475.69	1518.933	335.2452	56.7403	13854000	16,607.34	5,672.21
2017	113,711.63	839.85	7776.9	474.24	1507.98	377.61	58.3947	13983000	17,179.50	5,938.05

Source: CBN Statistical Bulletin (2017).

Growth Rate values of Data

YEAR	GDPGR	TRANSGR	COMMGR	HTHGR	EDUGR	UTLGR	HDI	GFCFGR	AGRICGR	PETGR
1970	48.7927197	65.17241379	65.33333333	65.29801	65.24679	65.33666	0	1.681511696	50.5170	38.83333333
1971	25.9377781	8.559498956	-29.4354839	1.282051	-83.8789	-74.359	0	-89.4965207	17.7495	206.182473
1972	8.06808101	1.923076923	14.57142857	12.81646	32.74112	-7.05882	0	9.197194076	1.9448	49.83336601
1973	20.0765217	48.30188679	43.89027431	2.945302	59.46463	21.51899	0	86.65239115	5.4483	32.93209473
1974	118.099762	-29.5165394	-11.7850953	4.155313	319.4245	-3.64583	0	21.10898662	34.1530	266.5354331
1975	14.0896027	108.6642599	100.9823183	135.9058	247.4557	93.51351	0	74.07641301	34.2377	14.7019334
1976	24.1236403	49.48096886	38.02541544	46.52065	171.8529	414.5251	0	47.05242155	4.2415	26.07280815
1977	18.2493116	9.722222222	146.2464589	12.52602	-47.4229	32.95331	0	16.1958801	20.9016	67.50724207
1978	9.58049257	-6.80379747	-20.9663503	-31.9321	-2.55008	-31.8089	0	-0.36093418	8.5386	160.3611841
1979	79.4282587	-20.6564799	-18.0131004	-62.1542	-10.6681	186.7066	0	-3.10036224	14.6820	94.93393037
1980	-19.9152235	92.79600571	-19.840213	244.5822	3.0285	29.17711	63.7646	25.684442	8.6659	39.1012071
1981	-15.9257911	878.5893452	1358.52381	109.6944	55.67415	-70.2609	64.8536	59.39629079	-99.8296	99.95207782
1982	-16.7015159	-19.8936762	6.767412249	2.335098	2.335091	-6.62897	65.5892	-5.89865641	18.0255	16.70151594
1983	-13.2058362	-15.8425967	-0.8707652	2.281816	2.281849	29.63019	65.3249	-22.2240173	18.2445	13.20583621
1984	-22.3138464	-4.51009212	-8.97812484	2.23091	2.230902	-13.2609	57.0606	-31.3870748	27.5965	22.31384642
1985	25.8668897	19.55099783	-20.2452585	2.182227	2.182258	-19.7443	57.7962	-3.82829714	12.7511	25.86688972
1986	15.9671686	-11.5035427	0.251305693	2.135623	2.135652	-12.7526	58.5319	29.00148645	4.2805	15.96716864
1987	179.560978	0.037079532	1.002012898	2.091048	2.090959	6.709092	57.3033	34.15525404	40.8493	179.5609784
1988	11.7365591	0.166518607	1.000465537	2.04814	2.04817	10.08682	56.2413	15.32401577	46.6872	11.73655907
1989	156.304064	0.241081054	1.537433543	2.007033	2.007026	8.648698	55.1793	52.74563964	19.6566	156.3040643
1990	30.9590347	1.999995579	2.000219836	1.967544	1.967572	12.20476	52.1174	49.56401574	20.8041	30.9590347
1991	-16.2661372	2.861392012	1.550052365	1.059555	1.059512	2.820238	51.0554	12.63398428	15.5767	16.26613718
1992	111.822549	4.921785417	5.33031488	2.876394	2.876435	7.769542	49.9935	56.69130252	49.4012	111.8225488
1993	1.91156035	3.060438694	6.886889061	2.894625	2.894576	5.853042	46.6815	36.8686057	60.4016	1.911560353
1994	9.50000918	0.144230348	4.323129334	1.427356	1.427417	3.916824	44.4172	8.935597615	50.7740	9.500009176
1995	249.833665	1.455012751	6.3178188	-0.05848	-0.05853	0.14816	45.1528	34.4253671	77.4510	249.833665
1996	51.0612148	2.472384041	7.247273062	2.893973	2.89403	1.316106	45.8885	43.77625771	35.4839	51.06121475

YEAR	GDPGR	TRANSGR	COMMGR	HTHGR	EDUGR	UTLGR	HDI	GFCFGR	AGRICGR	PETGR
1997	7.6804507	3.279060508	9.833979876	1.729361	1.729354	0.817028	46.6242	19.0407425	13.1663	7.680450704
1998	31.0748302	4.010875661	13.42563588	1.700028	1.699986	-1.36949	47.3598	-0.26493642	10.6960	31.07483015
1999	39.043282	3.709868913	14.21587119	1.671546	1.67154	2.587635	48.0955	-4.3732905	6.4079	39.04328199
2000	113.446426	3.454408626	9.907167316	1.644064	1.644088	3.049499	46.2826	42.9052555	5.7068	113.4464258
2001	23.6742837	4.605120815	78.76085639	1.617785	1.617181	328.7006	51.1314	12.40842317	33.6124	23.67428374
2002	7.77844618	19.13403632	16.13626494	0.800695	7.866758	12.88906	51.6912	34.27402884	110.9494	7.778446182
2003	52.4081697	1.227658722	13.6621839	2.044206	7.034661	15.69924	51.4236	73.28566457	7.8655	52.40816967
2004	54.9382678	49.6913613	34.81979026	10.84924	10.84923	16.09035	52.1427	-0.32381525	7.6176	54.93826779
2005	33.3630391	6.435870554	21.74443634	10	10.55002	7.075687	52.2066	-6.79801429	22.2291	33.36303908
2006	23.267068	7.041113691	25.33993591	10.33004	10.77109	5.576189	52.6896	92.25808969	24.5504	23.26706799
2007	7.87787835	7.078146253	26.53120792	10.34624	10.77805	5.665573	53.941	25.24578626	13.8246	7.877878345
2008	20.7712632	7.10193768	27.66480242	10.34002	10.77	4.659618	54.2661	5.991236125	18.1050	20.77126315
2009	18.4617258	6.975817875	28.57256339	10.00676	10.00731	4.184404	55.4065	48.59070038	15.0996	18.46172583
2010	95.5441916	6.853036507	29.55208931	9.956946	9.814108	4.27776	56.6054	31.54626389	12.2442	95.54419162
2011	31.3796678	5.969067829	2.149214282	13.03823	31.5722	32.52049	56.7403	-2.60753679	7.5786	31.37966775
2012	2.49673654	-3.41829982	3.048899671	4.326258	1.675692	13.03569	57.6591	-14.0952671	12.6670	2.49673654
2013	9.00312049	3.797384865	8.208597478	9.586634	15.59984	18.81282	58.3947	241.8719135	6.3262	9.003120492
2014	6.60272028	4.418554395	6.987868325	10.5014	8.881239	-3.32086	50.8302	18.45269211	7.1480	6.602720277
2015	-7.77068207	4.510861618	6.215352714	2.476082	7.669368	-3.95527	50.6725	3.795233892	8.9815	37.70682068
2016	-10.4015191	0.390040073	1.953577749	-1.78523	1.349563	-8.7308	56.7403	-1.82823129	-15.4282	5.311984904
2017	0.82398679	3.865051244	-1.04085944	-0.30482	-0.7211	12.63696	58.3947	0.931139021	3.4452	4.686723849

Source: Researcher's compilation (2019).

UNIT ROOT TEST FOR PRE-SAP PERIOD

GDPGR I(0)

Null Hypothesis: GDPGR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.420429	0.0271
Test critical values:	1% level	-3.959148	
	5% level	-3.081002	
	10% level	-2.681330	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 15

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDPGR)
Method: Least Squares
Date: 11/09/18 Time: 12:58
Sample (adjusted): 1971 1985
Included observations: 15 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPGR(-1)	-0.925947	0.270711	-3.420429	0.0046
C	15.65619	11.39664	1.373755	0.1927

R-squared	0.473670	Mean dependent var	-1.528389
Adjusted R-squared	0.433183	S.D. dependent var	52.62316
S.E. of regression	39.61853	Akaike info criterion	10.32004
Sum squared resid	20405.16	Schwarz criterion	10.41444
Log likelihood	-75.40028	Hannan-Quinn criter.	10.31903
F-statistic	11.69933	Durbin-Watson stat	2.018650
Prob(F-statistic)	0.004560		

GFCGR I(0)

Null Hypothesis: D(GFCGR) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on AIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.413725	0.0039
Test critical values:	1% level	-4.800080	
	5% level	-3.791172	
	10% level	-3.342253	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations

and may not be accurate for a sample size of 14

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GFCGR,2)
Method: Least Squares
Date: 11/09/18 Time: 13:14
Sample (adjusted): 1972 1985
Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GFCGR(-1))	-1.300572	0.240236	-5.413725	0.0002
C	43.02030	29.70806	1.448102	0.1755
@TREND("1970")	-4.424836	3.170314	-1.395709	0.1903

R-squared	0.730023	Mean dependent var	8.481201
Adjusted R-squared	0.680936	S.D. dependent var	83.85686
S.E. of regression	47.36716	Akaike info criterion	10.74114
Sum squared resid	24680.13	Schwarz criterion	10.87809
Log likelihood	-72.18801	Hannan-Quinn criter.	10.72847
F-statistic	14.87210	Durbin-Watson stat	1.853489
Prob(F-statistic)	0.000745		

HDI I(I)

Null Hypothesis: D(HDI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.620408	0.0199
Test critical values:	1% level	-4.004425	
	5% level	-3.098896	
	10% level	-2.690439	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 14

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HDI,2)
Method: Least Squares
Date: 11/09/18 Time: 13:19
Sample (adjusted): 1972 1985
Included observations: 14 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HDI(-1))	-1.043401	0.288200	-3.620408	0.0035
C	4.305190	4.953599	0.869103	0.4018

R-squared	0.522052	Mean dependent var	0.052543

Adjusted R-squared	0.482223	S.D. dependent var	25.02343
S.E. of regression	18.00604	Akaike info criterion	8.750855
Sum squared resid	3890.608	Schwarz criterion	8.842149
Log likelihood	-59.25598	Hannan-Quinn criter.	8.742404
F-statistic	13.10735	Durbin-Watson stat	2.006102
Prob(F-statistic)	0.003512		

TRANSGR I(0)

Null Hypothesis: TRANSGR has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on AIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.461284	0.0020
Test critical values:	1% level	-2.728252	
	5% level	-1.966270	
	10% level	-1.605026	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 15

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TRANSGR)
Method: Least Squares
Date: 11/09/18 Time: 13:22
Sample (adjusted): 1971 1985
Included observations: 15 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TRANSGR(-1)	-0.919857	0.265756	-3.461284	0.0038

R-squared	0.461083	Mean dependent var	-3.041428
Adjusted R-squared	0.461083	S.D. dependent var	324.5103
S.E. of regression	238.2261	Akaike info criterion	13.84866
Sum squared resid	794523.6	Schwarz criterion	13.89586
Log likelihood	-102.8649	Hannan-Quinn criter.	13.84816
Durbin-Watson stat	1.992944		

COMMGR I(0)

Null Hypothesis: COMMGR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.013553	0.0090
Test critical values:	1% level	-3.959148	
	5% level	-3.081002	

	10% level	-2.681330

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 15

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(COMMGR)
Method: Least Squares
Date: 11/09/18 Time: 13:24
Sample (adjusted): 1971 1985
Included observations: 15 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COMMGR(-1)	-1.111078	0.276831	-4.013553	0.0015
C	117.5837	98.19561	1.197444	0.2525

R-squared	0.553397	Mean dependent var	-5.705239
Adjusted R-squared	0.519043	S.D. dependent var	520.8603
S.E. of regression	361.2223	Akaike info criterion	14.74043
Sum squared resid	1696260.	Schwarz criterion	14.83484
Log likelihood	-108.5532	Hannan-Quinn criter.	14.73942
F-statistic	16.10861	Durbin-Watson stat	2.013097
Prob(F-statistic)	0.001474		

HTHGR I(0)

Null Hypothesis: HTHGR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on AIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.569309	0.0077
Test critical values:	1% level	-3.092279	
	5% level	-3.075302	
	10% level	-3.388330	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 12

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HTHGR)
Method: Least Squares
Date: 11/09/18 Time: 13:30
Sample (adjusted): 1974 1985
Included observations: 12 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HTHGR(-1)	-3.529941	0.988971	-3.569309	0.0118

D(HTHGR(-1))	2.102204	0.765581	2.745894	0.0335
C	70.70629	64.24927	1.100499	0.3133
@TREND("1970")	7.691690	7.489776	1.026959	0.3440

R-squared	0.780078	Mean dependent var	-0.063590
Adjusted R-squared	0.596810	S.D. dependent var	118.0149
S.E. of regression	74.93629	Akaike info criterion	11.77801
Sum squared resid	33692.68	Schwarz criterion	12.02046
Log likelihood	-64.66804	Hannan-Quinn criter.	11.68824
F-statistic	4.256478	Durbin-Watson stat	2.413766
Prob(F-statistic)	0.053318		

EDUGR I(0)

Null Hypothesis: EDUGR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on AIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.102572	0.0073
Test critical values:	1% level	-4.886426	
	5% level	-3.828975	
	10% level	-3.362984	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 13

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EDUGR)
Method: Least Squares
Date: 11/09/18 Time: 13:32
Sample (adjusted): 1973 1985
Included observations: 13 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EDUGR(-1)	-1.243800	0.243759	-5.102572	0.0009
D(EDUGR(-1))	0.478001	0.193386	2.471753	0.0386
D(EDUGR(-2))	0.636021	0.184635	3.444742	0.0088
C	225.5894	60.77578	3.711831	0.0059
@TREND("1970")	-16.45049	5.447693	-3.019716	0.0166

R-squared	0.771343	Mean dependent var	-2.350682
Adjusted R-squared	0.657015	S.D. dependent var	106.0983
S.E. of regression	62.13645	Akaike info criterion	11.38027
Sum squared resid	30887.51	Schwarz criterion	11.59755
Log likelihood	-68.97173	Hannan-Quinn criter.	11.33560
F-statistic	6.746727	Durbin-Watson stat	2.193162
Prob(F-statistic)	0.011168		

UTLGR I(I)

Null Hypothesis: D(UTLGR) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on AIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.501198	0.0041
Test critical values:	1% level	-4.886426	
	5% level	-3.828975	
	10% level	-3.362984	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 13

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UTLGR,2)
Method: Least Squares
Date: 11/09/18 Time: 13:33
Sample (adjusted): 1973 1985
Included observations: 13 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UTLGR(-1))	-2.177189	0.395766	-5.501198	0.0004
D(UTLGR(-1),2)	0.644609	0.239265	2.694125	0.0246
C	73.90936	101.6373	0.727187	0.4856
@TREND("1970")	-8.239182	10.43229	-0.789777	0.4500

R-squared	0.811756	Mean dependent var	-5.675660
Adjusted R-squared	0.749007	S.D. dependent var	277.3379
S.E. of regression	138.9440	Akaike info criterion	12.95368
Sum squared resid	173748.8	Schwarz criterion	13.12751
Log likelihood	-80.19891	Hannan-Quinn criter.	12.91795
F-statistic	12.93673	Durbin-Watson stat	2.018006
Prob(F-statistic)	0.001296		

LONG-RUN RESULT PRE-SAP

ARDL Bounds Test
Date: 11/09/18 Time: 13:45
Sample: 1971 1985
Included observations: 15
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	7.039273	7

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.03	3.13
5%	2.32	3.5
2.5%	2.6	3.84
1%	2.96	4.26

SHORT- RUN RESULT PRE-SAP

Dependent Variable: LOG(GDPGR)
Method: ARDL
Date: 10/29/18 Time: 13:49
Sample (adjusted): 1972 1985
Included observations: 14 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (0 lag, automatic): GFCGR HDI TRANSGR COMMGR HTHGR EDUGR UTLGR ECM01(-1)
Fixed regressors: C

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOG((GDPGR(-1))	21.648009	2.908612	7.443479	0.0004
LOG(GFCGR)	9.686066	1.678235	5.800278	0.0231
DLOG(HDI,1)	11.440001	2.934449	-3.900243	0.0000
LOG(TRANSGR)	11.225555	2.463486	4.555102	0.0006
LOG(COMMGR)	13.999752	2.269477	-6.065496	0.0009
LOG(HTHGR)	2.587632	1.479019	1.765575	0.0757
LOG(EDUGR)	3.099085	1.129467	-2.678548	0.0531
DLOG((UTLGR,1))	5.348965	1.117715	-4.760009	0.0051
ECMPRSAP(-1)	-15.298074	2.240103	-6.773939	0.0013
C	105.58408	36.42368	2.895131	0.4348

R-squared	0.680172	Mean dependent var	20.78431
Adjusted R-squared	0.539441	S.D. dependent var	49.00002
S.E. of regression	40.42437	Akaike info criterion	20.01255
Sum squared resid	6536.520	Schwarz criterion	20.86902
Log likelihood	-62.88786	Hannan-Quinn criter.	20.27030
F-statistic	6.945191	Durbin-Watson stat	1.792935
Prob(F-statistic)	0.006000		

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

UNIT ROOT TEST FOR SAP PERIOD

GDPGR I(0)

Null Hypothesis: GDPGR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=2)

			t-Statistic	Prob.*

Augmented Dickey-Fuller test statistic		-4.873302	0.0026
Test critical values:	1% level	-4.057910	
	5% level	-3.119910	
	10% level	-2.701103	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 12

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDPGR)
Method: Least Squares
Date: 11/09/18 Time: 15:38
Sample (adjusted): 1987 1998
Included observations: 12 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPGR(-1)	-1.356154	0.278282	-4.873302	0.0005
C	89.52302	28.56093	3.134457	0.0095

R-squared	0.683445	Mean dependent var	1.775086
Adjusted R-squared	0.654667	S.D. dependent var	136.0259
S.E. of regression	79.93567	Akaike info criterion	11.74096
Sum squared resid	70286.82	Schwarz criterion	11.82787
Log likelihood	-74.31624	Hannan-Quinn criter.	11.72309
F-statistic	23.74907	Durbin-Watson stat	1.932631
Prob(F-statistic)	0.000492		

GFCGR I(I)

Null Hypothesis: D(GFCGR) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on AIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.414294	0.0006
Test critical values:	1% level	-5.124875	
	5% level	-3.933364	
	10% level	-3.420030	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 10

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GFCGR,2)
Method: Least Squares
Date: 11/09/18 Time: 15:41
Sample (adjusted): 1989 1998
Included observations: 10 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

D(GFCGR(-1))	-2.533146	0.341657	-7.414294	0.0001
D(GFCGR(-1),2)	0.783092	0.203646	3.845361	0.0063
C	28.77071	13.40766	2.145841	0.0690
@TREND("1986")	-4.202185	1.584145	-2.652652	0.0328

R-squared	0.915021	Mean dependent var	1.338444
Adjusted R-squared	0.878601	S.D. dependent var	46.01568
S.E. of regression	16.03294	Akaike info criterion	8.662456
Sum squared resid	1799.387	Schwarz criterion	8.807145
Log likelihood	-43.64351	Hannan-Quinn criter.	8.571249
F-statistic	25.12435	Durbin-Watson stat	1.830040
Prob(F-statistic)	0.000402		

HDI I(I)

Null Hypothesis: D(HDI) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on AIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.606565	0.2848
Test critical values:	1% level	-3.124875	
	5% level	-3.933364	
	10% level	-3.420030	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 10

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HDI,2)
Method: Least Squares
Date: 11/09/18 Time: 15:43
Sample (adjusted): 1989 1998
Included observations: 10 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HDI(-1))	-1.037847	0.398166	-4.606565	0.0351
D(HDI(-1),2)	0.313827	0.327086	0.959464	0.3693
C	-3.432278	1.544346	-2.222480	0.0617
@TREND("1986")	0.325188	0.153401	2.119849	0.0717

R-squared	0.519738	Mean dependent var	0.163427
Adjusted R-squared	0.313911	S.D. dependent var	1.512132
S.E. of regression	1.252507	Akaike info criterion	3.563458
Sum squared resid	10.98141	Schwarz criterion	3.708147
Log likelihood	-15.59902	Hannan-Quinn criter.	3.472252
F-statistic	2.525121	Durbin-Watson stat	2.010406
Prob(F-statistic)	0.141153		

TRANSGR I(I)

Null Hypothesis: D(TRANSGR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.699193	0.0001
Test critical values:	1% level	-4.121990	
	5% level	-3.144920	
	10% level	-2.713751	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 11

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TRANSGR,2)
Method: Least Squares
Date: 11/09/18 Time: 15:47
Sample (adjusted): 1988 1998
Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TRANSGR(-1))	-0.996567	0.129438	-7.699193	0.0000
C	0.301627	0.468483	0.643838	0.5342

R-squared	0.855653	Mean dependent var	-0.986802
Adjusted R-squared	0.841218	S.D. dependent var	3.804017
S.E. of regression	1.515802	Akaike info criterion	3.820778
Sum squared resid	22.97655	Schwarz criterion	3.901596
Log likelihood	-20.92467	Hannan-Quinn criter.	3.790856
F-statistic	59.27758	Durbin-Watson stat	1.771558
Prob(F-statistic)	0.000016		

COMMGR I(I)

Null Hypothesis: D(COMMGR) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on AIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.609122	0.0140
Test critical values:	1% level	-2.271926	
	5% level	-1.974028	
	10% level	-1.602922	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 11

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(COMMGR,2)
Method: Least Squares
Date: 11/09/18 Time: 15:53
Sample (adjusted): 1988 1998
Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(COMMGR(-1))	-0.765188	0.293274	-2.609122	0.0243

R-squared	0.382282	Mean dependent var	0.003294
Adjusted R-squared	0.382282	S.D. dependent var	2.611718
S.E. of regression	2.052680	Akaike info criterion	4.355825
Sum squared resid	46.34845	Schwarz criterion	4.396234
Log likelihood	-25.13495	Hannan-Quinn criter.	4.340864
Durbin-Watson stat	2.001067		

HTHGR I(I)

Null Hypothesis: D(HTHGR) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on AIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.106165	0.0132
Test critical values:	1% level	-4.097073	
	5% level	-3.212696	
	10% level	-2.747676	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HTHGR,2)
Method: Least Squares
Date: 11/09/18 Time: 16:00
Sample (adjusted): 1990 1998
Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HTHGR(-1))	-3.511082	0.855076	-4.106165	0.0063
D(HTHGR(-1),2)	1.573404	0.609595	2.581064	0.0417
C	-0.049205	0.343630	-0.143191	0.8908

R-squared	0.863068	Mean dependent var	0.001262
Adjusted R-squared	0.794603	S.D. dependent var	2.393475
S.E. of regression	1.084742	Akaike info criterion	3.289735
Sum squared resid	7.059987	Schwarz criterion	3.410769
Log likelihood	-12.44868	Hannan-Quinn criter.	3.156961
F-statistic	12.60584	Durbin-Watson stat	1.952540

Prob(F-statistic)	0.005320

EDUGR I(I)

Null Hypothesis: D(EDUGR) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on AIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.106393	0.0132
Test critical values:	1% level	-4.007073	
	5% level	-3.212696	
	10% level	-2.747676	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EDUGR,2)
Method: Least Squares
Date: 11/09/18 Time: 16:04
Sample (adjusted): 1990 1998
Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EDUGR(-1))	-3.511197	0.855056	-4.106393	0.0063
D(EDUGR(-1),2)	1.573475	0.609587	2.581214	0.0417
D(EDUGR(-2),2)	0.659784	0.342088	1.928695	0.1020
C	-0.049202	0.343629	-0.143182	0.8908

R-squared	0.863081	Mean dependent var	0.001270
Adjusted R-squared	0.794622	S.D. dependent var	2.393579
S.E. of regression	1.084738	Akaike info criterion	3.289729
Sum squared resid	7.059942	Schwarz criterion	3.410763
Log likelihood	-12.44864	Hannan-Quinn criter.	3.156955
F-statistic	12.60720	Durbin-Watson stat	1.952473
Prob(F-statistic)	0.005318		

UTLGR I(I)

Null Hypothesis: D(UTLGR) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=2)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.862513	0.0120

Test critical values:	1% level	-3.092279
	5% level	-3.395302
	10% level	-3.388330

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 11

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UTLGR,2)
Method: Least Squares
Date: 11/16/18 Time: 14:15
Sample (adjusted): 1988 1998
Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UTLGR(-1))	-1.080210	0.222151	-4.862513	0.0009
C	0.369639	3.571069	0.103509	0.9198
@TREND("1986")	-0.084934	0.429557	-0.197726	0.8477

R-squared	0.770734	Mean dependent var	-1.292047
Adjusted R-squared	0.719785	S.D. dependent var	8.409687
S.E. of regression	4.451693	Akaike info criterion	6.036764
Sum squared resid	178.3581	Schwarz criterion	6.157990
Log likelihood	-33.22058	Hannan-Quinn criter.	5.991881
F-statistic	15.12782	Durbin-Watson stat	2.762784
Prob(F-statistic)	0.001323		

LONG RUN RESULT SAP ERA

ARDL Bounds Test
Date: 11/09/18 Time: 16:17
Sample: 1987 1998
Included observations: 12
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	12.36043	7

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.03	3.13
5%	2.32	3.5
2.5%	2.6	3.84
1%	2.96	4.26

SHORT RUN RESULT SAP

Dependent Variable: LOG(GDPGR)
Method: Least Squares
Date: 10/29/18 Time: 14:26
Sample (adjusted): 1988 1998
Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(GFCGR,1)	6.883919	1.726110	4.043657	0.0578
DLOG(HDI,1)	7.108116	2.829056	2.542791	0.0217
DLOG(TRANSGR,1)	4.331397	1.939571	-2.268479	0.0375
DLOG(COMMGR,1)	2.587111	1.154181	2.241512	0.0395
DLOG(HTHGR,1)	0.445643	0.311501	1.407275	0.1785
DLOG(EDUGR,1)	4.358202	1.401561	3.181997	0.0444
LOG(UTLGR)	7.822980	2.383023	-3.305837	0.0537
ECMSAP(-1)	-2.811994	1.176183	-2.390779	0.0295
C	3.153336	1.095399	-2.878710	0.0109
LOG((GDPGR(-1))	34.98542	14.40838	-2.428130	0.0273

R-squared	0.844323	Mean dependent var	45.05509
Adjusted R-squared	0.529186	S.D. dependent var	79.98582
S.E. of regression	58.92004	Akaike info criterion	30.10395
Sum squared resid	10414.71	Schwarz criterion	34.46763
Log likelihood	-57.62367	Hannan-Quinn criter.	33.96930
F-statistic	7.033840	Durbin-Watson stat	1.944470
Prob(F-statistic)	0.000092		

UNIT ROOT TEST FOR POST-SAP PERIOD

GDPGR I(0)

Null Hypothesis: GDPGR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.673301	0.0024
Test critical values:	1% level	-4.027910	
	5% level	-3.219910	
	10% level	-2.501103	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDPGR)
Method: Least Squares
Date: 11/09/18 Time: 15:38
Sample (adjusted): 2000 2017

Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPGR(-1)	-1.456154	0.278282	-4.873302	0.0005
C	82.52302	28.56093	3.134457	0.0095

R-squared	0.643445	Mean dependent var	1.775086
Adjusted R-squared	0.554667	S.D. dependent var	136.0259
S.E. of regression	79.93567	Akaike info criterion	11.74096
Sum squared resid	70286.82	Schwarz criterion	11.82787
Log likelihood	-74.31624	Hannan-Quinn criter.	11.72309
F-statistic	23.74907	Durbin-Watson stat	1.932631
Prob(F-statistic)	0.000492		

GFCGR I(0)

Null Hypothesis: GFCGR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.929860	0.0011
Test critical values:	1% level	-3.857386	
	5% level	-3.040391	
	10% level	-2.660551	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GFCGR)
Method: Least Squares
Date: 11/16/18 Time: 11:34
Sample (adjusted): 2000 2017
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GFCGR(-1)	-1.202911	0.244005	-4.929860	0.0002
C	40.43174	16.28859	2.482212	0.0245

R-squared	0.603012	Mean dependent var	0.294691
Adjusted R-squared	0.578201	S.D. dependent var	92.16055
S.E. of regression	59.85467	Akaike info criterion	11.12616
Sum squared resid	57321.31	Schwarz criterion	11.22509
Log likelihood	-98.13540	Hannan-Quinn criter.	11.13980
F-statistic	24.30352	Durbin-Watson stat	2.109378
Prob(F-statistic)	0.000151		

HDI I(0)

Null Hypothesis: D(HDI) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.628139	0.0026
Test critical values:	1% level	-3.920350	
	5% level	-3.065585	
	10% level	-2.673459	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 16

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HDI,2)
Method: Least Squares
Date: 11/16/18 Time: 11:36
Sample (adjusted): 2002 2017
Included observations: 16 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HDI(-1))	-1.575351	0.340385	-4.628139	0.0005
D(HDI(-1),2)	0.579860	0.244792	2.368788	0.0340
C	0.544403	0.598812	0.909138	0.3798

R-squared	0.660293	Mean dependent var	-0.199650
Adjusted R-squared	0.608030	S.D. dependent var	3.704996
S.E. of regression	2.319605	Akaike info criterion	4.688031
Sum squared resid	69.94737	Schwarz criterion	4.832892
Log likelihood	-34.50425	Hannan-Quinn criter.	4.695450
F-statistic	12.63413	Durbin-Watson stat	1.934230
Prob(F-statistic)	0.000896		

TRANSGR I(0)

Null Hypothesis: TRANSGR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.511487	0.0027
Test critical values:	1% level	-3.857386	
	5% level	-3.040391	
	10% level	-2.660551	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TRANSGR)
Method: Least Squares
Date: 11/16/18 Time: 11:38
Sample (adjusted): 2000 2017
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TRANSGR(-1)	-1.119477	0.248139	-4.511487	0.0004
C	8.651979	3.345882	2.585859	0.0199

R-squared	0.559877	Mean dependent var	0.008621
Adjusted R-squared	0.532370	S.D. dependent var	17.01851
S.E. of regression	11.63785	Akaike info criterion	7.850842
Sum squared resid	2167.033	Schwarz criterion	7.949772
Log likelihood	-68.65758	Hannan-Quinn criter.	7.864483
F-statistic	20.35351	Durbin-Watson stat	1.940149
Prob(F-statistic)	0.000355		

COMMGR I(0)

Null Hypothesis: COMMGR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.681050	0.0003
Test critical values:	1% level	-4.616209	
	5% level	-3.710482	
	10% level	-3.297799	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(COMMGR)
Method: Least Squares
Date: 11/16/18 Time: 11:39
Sample (adjusted): 2001 2017
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COMMGR(-1)	-1.905115	0.285152	-6.681050	0.0000
D(COMMGR(-1))	0.410688	0.177406	2.314967	0.0376
C	80.87437	12.59465	6.421327	0.0000
@TREND("1999")	-4.297923	0.761032	-5.647492	0.0001

R-squared	0.833934	Mean dependent var	-0.644002
Adjusted R-squared	0.795611	S.D. dependent var	25.13132
S.E. of regression	11.36172	Akaike info criterion	7.900702

Sum squared resid	1678.154	Schwarz criterion	8.096752
Log likelihood	-63.15596	Hannan-Quinn criter.	7.920189
F-statistic	21.76068	Durbin-Watson stat	0.920740
Prob(F-statistic)	0.000024		

HTHGR I(0)

Null Hypothesis: D(HTHGR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.552619	0.0027
Test critical values:	1% level	-3.886751	
	5% level	-3.052169	
	10% level	-2.666593	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HTHGR,2)
Method: Least Squares
Date: 11/16/18 Time: 11:41
Sample (adjusted): 2001 2017
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HTHGR(-1))	-1.165093	0.255917	-4.552619	0.0004
C	-0.148210	1.033321	-0.143431	0.8879

R-squared	0.580142	Mean dependent var	0.088700
Adjusted R-squared	0.552151	S.D. dependent var	6.358322
S.E. of regression	4.255085	Akaike info criterion	5.844237
Sum squared resid	271.5862	Schwarz criterion	5.942263
Log likelihood	-47.67602	Hannan-Quinn criter.	5.853981
F-statistic	20.72634	Durbin-Watson stat	2.072320
Prob(F-statistic)	0.000381		

EDUGR I(0)

Null Hypothesis: D(EDUGR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.735791	0.0000
Test critical values:	1% level	-3.886751	

	5% level	-3.052169
	10% level	-2.666593

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 17

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EDUGR,2)
Method: Least Squares
Date: 11/16/18 Time: 11:42
Sample (adjusted): 2001 2017
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EDUGR(-1))	-1.672627	0.191468	-8.735791	0.0000
C	-0.151868	1.916205	-0.079255	0.9379

R-squared	0.835732	Mean dependent var	-0.120189
Adjusted R-squared	0.824781	S.D. dependent var	18.87446
S.E. of regression	7.900703	Akaike info criterion	7.081912
Sum squared resid	936.3167	Schwarz criterion	7.179937
Log likelihood	-58.19625	Hannan-Quinn criter.	7.091656
F-statistic	76.31404	Durbin-Watson stat	2.293163
Prob(F-statistic)	0.000000		

UTLGR I(I)

Null Hypothesis: UTLGR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.229031	0.0047
Test critical values:	1% level	-3.857386	
	5% level	-3.040391	
	10% level	-2.660551	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UTLGR)
Method: Least Squares
Date: 11/16/18 Time: 11:44
Sample (adjusted): 2000 2017
Included observations: 18 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

UTLGR(-1)	-1.053773	0.249176	-4.229031	0.0006
C	27.41883	19.53086	1.403872	0.1795

R-squared	0.527811	Mean dependent var	0.558296
Adjusted R-squared	0.498299	S.D. dependent var	110.6275
S.E. of regression	78.35840	Akaike info criterion	11.66490
Sum squared resid	98240.61	Schwarz criterion	11.76383
Log likelihood	-102.9841	Hannan-Quinn criter.	11.67854
F-statistic	17.88470	Durbin-Watson stat	2.009624
Prob(F-statistic)	0.000639		

LONG RUN RESULT POST SAP

ARDL Bounds Test
Date: 11/16/18 Time: 11:55
Sample: 2001 2017
Included observations: 17
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	8.376552	7

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.03	3.13
5%	2.32	3.5
2.5%	2.6	3.84
1%	2.96	4.26

SHORT-RUN RESULT POST SAP

Dependent Variable: DLOG (GDPGR,1)
Method: ARDL
Date: 10/29/18 Time: 11:59
Sample (adjusted): 2002 2017
Included observations: 16 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (0 lag, automatic): GFCGR HDI TRANSGR COMMGR HTHGR EDUGR UTLGR ECM(-1)
Fixed regressors: C

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
DLOG(GFCGR,1)	0.008823	0.017772	0.496452	0.6245
DLOG(HDI,1)	-0.436276	0.691941	-0.630511	0.5349

DLOG(TRANSGR,1)	-0.010461	0.008389	-1.246935	0.2255
DLOG(COMMGR,1)	0.001677	0.011184	0.149942	0.8822
DLOG(HTHGR,1)	-0.018959	0.030386	-0.623929	0.5391
DLOG(EDUGR,1)	-0.000719	0.001793	-0.456804	0.6523
LOG(UTLGR)	0.000313	0.000556	0.562570	0.5794
ECMSAP(-1)	-18.342305	6.000341	-3.053848	0.0575
C	-0.333140	0.208143	-1.600534	0.1237
LOG((GDPGR(-1))	0.632766	0.962194	0.658668	0.5169

R-squared	0.633217	Mean dependent var	14.28144
Adjusted R-squared	0.583041	S.D. dependent var	31.06415
S.E. of regression	29.74639	Akaike info criterion	9.92463
Sum squared resid	5309.086	Schwarz criterion	10.37533
Log likelihood	-69.13971	Hannan-Quinn criter.	10.11190
F-statistic	1.150936	Durbin-Watson stat	1.894911
Prob(F-statistic)	0.007923		

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

UNIT ROOT TEST FOR THE ENTIRE PERIOD
GDPGR I(0)

Null Hypothesis: GDPGR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.945333	0.0000
Test critical values:	1% level	-3.577723	
	5% level	-2.925169	
	10% level	-2.600658	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDPGR)
Method: Least Squares
Date: 11/16/18 Time: 12:12
Sample (adjusted): 1971 2017
Included observations: 47 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPGR(-1)	-1.038224	0.149485	-6.945333	0.0000
C	35.80943	9.699313	3.691955	0.0006

R-squared	0.517362	Mean dependent var	-1.020611
Adjusted R-squared	0.506637	S.D. dependent var	79.26737
S.E. of regression	55.67724	Akaike info criterion	10.91864
Sum squared resid	139498.0	Schwarz criterion	10.99737
Log likelihood	-254.5881	Hannan-Quinn criter.	10.94827
F-statistic	48.23765	Durbin-Watson stat	1.988269

Prob(F-statistic)	0.000000

GFCGR I(0)

Null Hypothesis: GFCGR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.761319	0.0000
Test critical values:	1% level	-3.577723	
	5% level	-2.925169	
	10% level	-2.600658	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GFCGR)
Method: Least Squares
Date: 11/16/18 Time: 12:21
Sample (adjusted): 1971 2017
Included observations: 47 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GFCGR(-1)	-1.008072	0.149094	-6.761319	0.0000
C	25.25546	7.710775	3.275346	0.0020

R-squared	0.503943	Mean dependent var	-0.015965
Adjusted R-squared	0.492920	S.D. dependent var	64.93065
S.E. of regression	46.23683	Akaike info criterion	10.54705
Sum squared resid	96203.01	Schwarz criterion	10.62578
Log likelihood	-245.8557	Hannan-Quinn criter.	10.57668
F-statistic	45.71544	Durbin-Watson stat	1.916306
Prob(F-statistic)	0.000000		

HDI I(I)

Null Hypothesis: D(HDI) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.623757	0.0092
Test critical values:	1% level	-3.592462	
	5% level	-2.931404	
	10% level	-2.603944	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HDI,2)
Method: Least Squares
Date: 11/16/18 Time: 12:25
Sample (adjusted): 1975 2017
Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HDI(-1))	-1.177060	0.324818	-3.623757	0.0008
D(HDI(-1),2)	0.177275	0.279628	0.633967	0.5299
C	1.592386	1.642986	0.969202	0.3386

R-squared	0.509091	Mean dependent var	0.038474
Adjusted R-squared	0.457417	S.D. dependent var	14.16289
S.E. of regression	10.43242	Akaike info criterion	7.636658
Sum squared resid	4135.746	Schwarz criterion	7.841449
Log likelihood	-159.1882	Hannan-Quinn criter.	7.712179
F-statistic	9.851869	Durbin-Watson stat	2.002351
Prob(F-statistic)	0.000014		

TRANSGR I(0)

Null Hypothesis: TRANSGR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.465626	0.0000
Test critical values:	1% level	-3.577723	
	5% level	-2.925169	
	10% level	-2.600658	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TRANSGR)
Method: Least Squares
Date: 11/16/18 Time: 12:36
Sample (adjusted): 1971 2017
Included observations: 47 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TRANSGR(-1)	-0.962650	0.148887	-6.465626	0.0000
C	26.09343	19.51454	1.337128	0.1879

R-squared	0.481593	Mean dependent var	-1.304412
Adjusted R-squared	0.470072	S.D. dependent var	179.3952
S.E. of regression	130.5928	Akaike info criterion	12.62367
Sum squared resid	767451.2	Schwarz criterion	12.70240
Log likelihood	-294.6562	Hannan-Quinn criter.	12.65329
F-statistic	41.80432	Durbin-Watson stat	1.990424

Prob(F-statistic)	0.000000

COMMGR I(0)

Null Hypothesis: COMMGR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.060629	0.0000
Test critical values:	1% level	-3.577723	
	5% level	-2.925169	
	10% level	-2.600658	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(COMMGR)
Method: Least Squares
Date: 11/16/18 Time: 12:38
Sample (adjusted): 1971 2017
Included observations: 47 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COMMGR(-1)	-1.051561	0.148933	-7.060629	0.0000
C	44.68604	29.95100	1.491971	0.1427

R-squared	0.525579	Mean dependent var	-1.412217
Adjusted R-squared	0.515036	S.D. dependent var	287.7624
S.E. of regression	200.3958	Akaike info criterion	13.48009
Sum squared resid	1807132.	Schwarz criterion	13.55882
Log likelihood	-314.7821	Hannan-Quinn criter.	13.50971
F-statistic	49.85247	Durbin-Watson stat	1.999891
Prob(F-statistic)	0.000000		

HTHGR I(I)

Null Hypothesis: D(HTHGR) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 9 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.792461	0.0000
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HTHGR,2)
Method: Least Squares
Date: 11/16/18 Time: 12:40
Sample (adjusted): 1981 2017
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HTHGR(-1))	-4.355781	0.444810	-9.792461	0.0000
D(HTHGR(-1),2)	2.850826	0.427364	6.670718	0.0000
C	-31.46282	4.653911	-6.760510	0.0000
@TREND("1970")	0.844796	0.149213	5.661669	0.0000

R-squared	0.989006	Mean dependent var	-8.250162
Adjusted R-squared	0.984168	S.D. dependent var	75.55066
S.E. of regression	9.506095	Akaike info criterion	7.598350
Sum squared resid	2259.146	Schwarz criterion	8.120810
Log likelihood	-128.5695	Hannan-Quinn criter.	7.782542
F-statistic	204.4470	Durbin-Watson stat	0.339176
Prob(F-statistic)	0.000000		

EDUGR I(I)

Null Hypothesis: D(EDUGR) has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.631049	0.0000
Test critical values:	1% level	-3.605593	
	5% level	-2.936942	
	10% level	-2.606857	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EDUGR,2)
Method: Least Squares
Date: 11/16/18 Time: 12:42
Sample (adjusted): 1978 2017
Included observations: 40 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EDUGR(-1))	-1.280425	0.148351	-8.631049	0.0000
D(EDUGR(-1),2)	-0.179954	0.128916	-1.395906	0.1724
C	0.000596	1.218043	0.000489	0.9996

R-squared	0.982874	Mean dependent var	5.430128
Adjusted R-squared	0.979128	S.D. dependent var	48.89021
S.E. of regression	7.063287	Akaike info criterion	6.924555
Sum squared resid	1596.481	Schwarz criterion	7.262331

Log likelihood	-130.4911	Hannan-Quinn criter.	7.046684
F-statistic	262.3581	Durbin-Watson stat	2.466820
Prob(F-statistic)	0.000000		

UTLGR I(0)

Null Hypothesis: UTLGR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.229138	0.0000
Test critical values:	1% level	-3.577723	
	5% level	-2.925169	
	10% level	-2.600658	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UTLGR)
Method: Least Squares
Date: 11/16/18 Time: 12:44
Sample (adjusted): 1971 2017
Included observations: 47 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UTLGR(-1)	-0.923543	0.148262	-6.229138	0.0000
C	21.50710	12.72780	1.689774	0.0980

R-squared	0.463021	Mean dependent var	-1.121270
Adjusted R-squared	0.451088	S.D. dependent var	112.8756
S.E. of regression	83.62794	Akaike info criterion	11.73225
Sum squared resid	314713.4	Schwarz criterion	11.81098
Log likelihood	-273.7080	Hannan-Quinn criter.	11.76188
F-statistic	38.80216	Durbin-Watson stat	1.918137
Prob(F-statistic)	0.000000		

LONG –RUN RESULT FOR THE ENTIRE PERIOD

ARDL Bounds Test
Date: 11/16/18 Time: 12:55
Sample: 1971 2017
Included observations: 46
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	5.683170	7

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.03	3.13
5%	2.32	3.5
2.5%	2.6	3.84
1%	2.96	4.26

SHORT-RUN RESULT FOR THE ENTIRE PERIOD

Dependent Variable: LOG(GDPGR)
Method: ARDL
Date: 10/29/18 Time: 13:01
Sample (adjusted): 1972 2017
Included observations: 46 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (0 lag, automatic): GFCGR D(HDI,1) TRANSGR COMMGR D(HTHGR,1) D(EDUGR,1) UTLGR ECM01(-1)
Fixed regressors: C

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOG((GDPGR(-1))	0.019381	0.160168	-0.121002	0.9043
LOG(GFCGR)	0.183028	0.195952	0.934047	0.3562
DLOG(HDI,1)	0.036832	0.447728	-0.082264	0.9349
LOG(TRANSGR)	-0.086898	0.477654	0.181927	0.8566
LOG(COMMGR)	0.081565	0.292883	-0.278490	0.7821
DLOG(HTHGR,1)	-0.343580	0.300338	-1.143978	0.2598
DLOG(EDUGR,1)	-0.128673	0.161151	0.798459	0.4296
LOG(UTLGR)	0.028482	0.111852	-0.254637	0.8004
ECM01(-1)	-58.814457	22.88350	2.570764	0.0245
C	6.537092	31.87586	0.205080	0.8387

R-squared	0.725013	Mean dependent var	34.45345
Adjusted R-squared	0.593734	S.D. dependent var	55.10872
S.E. of regression	58.25505	Akaike info criterion	11.10786
Sum squared resid	122171.4	Schwarz criterion	11.46214
Log likelihood	-246.6156	Hannan-Quinn criter.	11.24118
F-statistic	5.571497	Durbin-Watson stat	1.980199
Prob(F-statistic)	0.000071		

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

SHORT RUN ANALYSIS ON NORWAY

Dependent Variable: GDPGR
Method: Least Squares
Date: 06/07/19 Time: 16:25
Sample: 1970 2017
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	103.481149	21.653450	4.789075	0.0000
GDPGR(-1)	5.175288	2.364146	2.192783	0.0342
TRANSGR	79.365560	21.876880	3.638259	0.0088
COMMGR	17.540540	5.678562	3.091336	0.0281
HTHGR	14.808457	6.017891	2.472707	0.0389
EDUGR	21.563796	6.202843	3.482002	0.0123
UTLGR	16.901903	6.202843	2.669354	0.0049
ECM01(-1)	-11.177470	3.865659	2.902116	0.0025

R-squared	0.899580	Mean dependent var	8.278521
Adjusted R-squared	0.571143	S.D. dependent var	10.43985
S.E. of regression	10.06164	Akaike info criterion	7.571805
Sum squared resid	4251.934	Schwarz criterion	7.805705
Log likelihood	-175.7233	Hannan-Quinn criter.	7.660196
F-statistic	4.719967	Durbin-Watson stat	1.812854
Prob(F-statistic)	0.000075		

SHORT RUN ANALYSIS ON UNITED KINGDOM

Dependent Variable: GDPGR
Method: Least Squares
Date: 06/07/19 Time: 16:25
Sample: 1970 2017
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	81.416499	22.459450	3.619075	0.0000
GDPGR(-1)	14.405288	5.724146	2.602783	0.0152
TRANSGR	57.826556	23.186880	2.498259	0.0028
COMMGR	14.460540	4.558562	3.121336	0.0311
HTHGR	11.205457	5.012891	2.342707	0.0221
EDUGR	18.663796	7.647291	2.482002	0.0323
UTLGR	10.250001	4.329172	2.324167	0.0051
ECM01(-1)	-8.827470	4.239659	2.102112	0.0030

R-squared	0.749580	Mean dependent var	8.278521
Adjusted R-squared	0.521143	S.D. dependent var	10.43985
S.E. of regression	10.06164	Akaike info criterion	7.571805
Sum squared resid	4251.934	Schwarz criterion	7.805705
Log likelihood	-175.7233	Hannan-Quinn criter.	7.660196
F-statistic	3.019967	Durbin-Watson stat	1.923454
Prob(F-statistic)	0.000043		

SHORT RUN ANALYSIS USING GOVERNMENT SPENDING ON AGRIC AND PETROLUEM SECTORS

Dependent Variable: GDPGR
Method: Least Squares
Date: 06/07/19 Time: 17:11
Sample: 1970 2017
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AGRICGR	24.111648	6.194298	3.883428	0.0317
PETGR	27.535361	5.072107	5.424508	0.0024
C	10.13919	6.428177	1.577304	0.1217

R-squared	0.899557	Mean dependent var	34.75218
Adjusted R-squared	0.581760	S.D. dependent var	54.55858
S.E. of regression	35.28384	Akaike info criterion	10.02519
Sum squared resid	56022.74	Schwarz criterion	10.14214
Log likelihood	-237.6045	Hannan-Quinn criter.	10.06938
F-statistic	33.68782	Durbin-Watson stat	2.012788
Prob(F-statistic)	0.000000		

SHORT RUN ANALYSIS ON THE RECURSIVE MODEL

Dependent Variable: GDPGR
Method: Least Squares
Date: 06/07/19 Time: 17:15
Sample: 1970 2017
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AGRICGR	15.411676	4.234348	3.756687	0.0563
PETGR	12.049078	5.074406	2.379461	0.0030
TRANSGR	1.010003	0.055737	1.973604	0.0550
HTHGR	-0.162575	0.135644	-1.198539	0.2374
EDUGR	-0.034819	0.085890	-0.405392	0.6872
C	4.933630	7.730635	0.638192	0.5268

R-squared	0.637081	Mean dependent var	34.75218
Adjusted R-squared	0.593876	S.D. dependent var	54.55858
S.E. of regression	34.76901	Akaike info criterion	10.05180
Sum squared resid	50773.13	Schwarz criterion	10.28570
Log likelihood	-235.2432	Hannan-Quinn criter.	10.14019
F-statistic	14.74564	Durbin-Watson stat	2.112275
Prob(F-statistic)	0.000000		

SHORT RUN ANALYSIS ON THE RECURSIVE MODEL

Dependent Variable: EDUGR
Method: Least Squares
Date: 06/07/19 Time: 17:17
Sample: 1970 2017

Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AGRICGR	-0.165243	0.355665	-0.464604	0.6445
PETGR	7.180802	3.131993	2.369780	0.0476
C	16.92963	11.76685	1.438756	0.1571

R-squared	0.240033	Mean dependent var	20.90774
Adjusted R-squared	-0.002632	S.D. dependent var	64.50265
S.E. of regression	64.58748	Akaike info criterion	11.23438
Sum squared resid	187719.4	Schwarz criterion	11.35133
Log likelihood	-266.6251	Hannan-Quinn criter.	11.27858
F-statistic	0.938315	Durbin-Watson stat	1.908149
Prob(F-statistic)	0.398807		

SHORT RUN ANALYSIS ON THE RECURSIVE MODEL

Dependent Variable: HTHGR
Method: Least Squares
Date: 06/07/19 Time: 17:19
Sample: 1970 2017
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AGRICGR	-0.262741	0.243214	-1.080285	0.2858
PETGR	-0.076544	0.090261	-0.848030	0.4009
C	22.57943	8.046534	2.806106	0.0074

R-squared	0.258209	Mean dependent var	14.43517
Adjusted R-squared	0.016351	S.D. dependent var	44.53248
S.E. of regression	44.16690	Akaike info criterion	10.47429
Sum squared resid	87782.17	Schwarz criterion	10.59124
Log likelihood	-248.3830	Hannan-Quinn criter.	10.51849
F-statistic	1.390647	Durbin-Watson stat	1.818720
Prob(F-statistic)	0.259405		

SHORT RUN ANALYSIS ON THE RECURSIVE MODEL

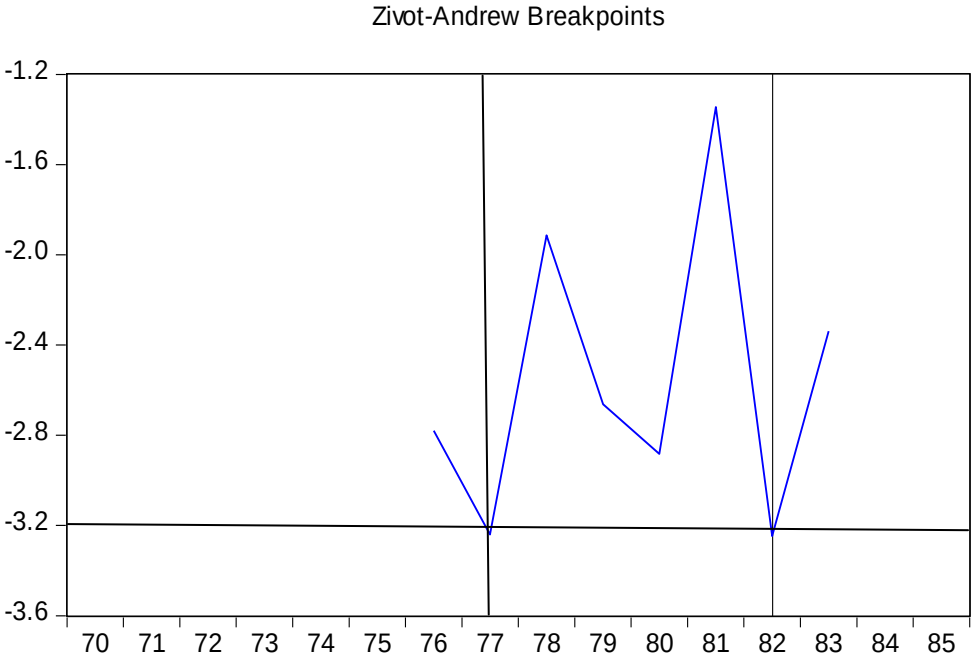
Dependent Variable: TRANSGR
Method: Least Squares
Date: 06/07/19 Time: 17:20
Sample: 1970 2017
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AGRICGR	-0.922628	0.566661	-1.628216	0.0780
PETGR	-0.180595	0.210297	-0.858762	0.3950
C	86.056121	18.74748	4.590016	0.0000

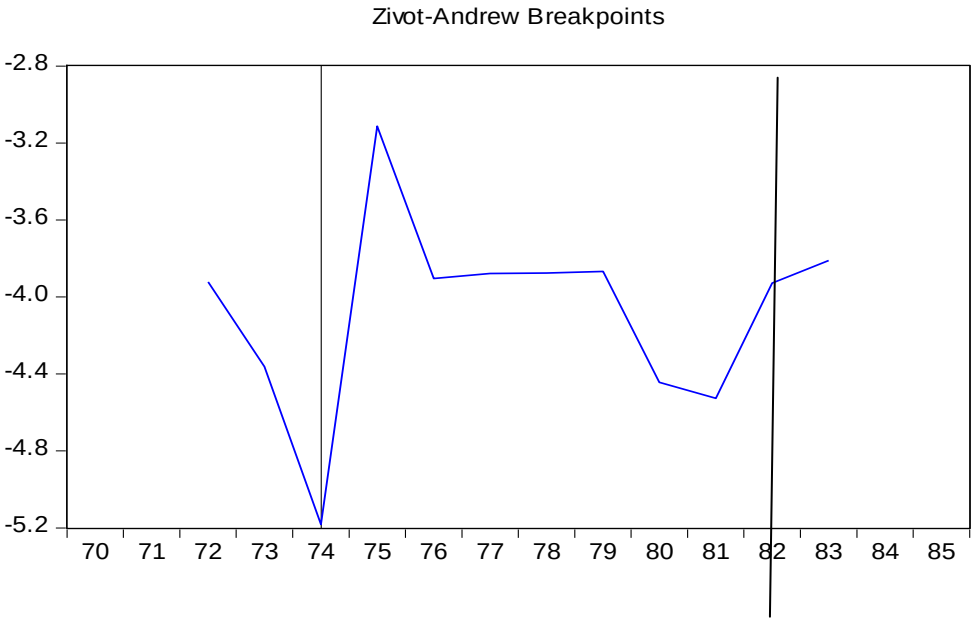
R-squared	0.381104	Mean dependent var	27.94843

Adjusted R-squared	0.353598	S.D. dependent var	127.9910
S.E. of regression	102.9037	Akaike info criterion	12.16593
Sum squared resid	476512.5	Schwarz criterion	12.28288
Log likelihood	-288.9822	Hannan-Quinn criter.	12.21012
F-statistic	13.85506	Durbin-Watson stat	1.758749
Prob(F-statistic)	0.000020		

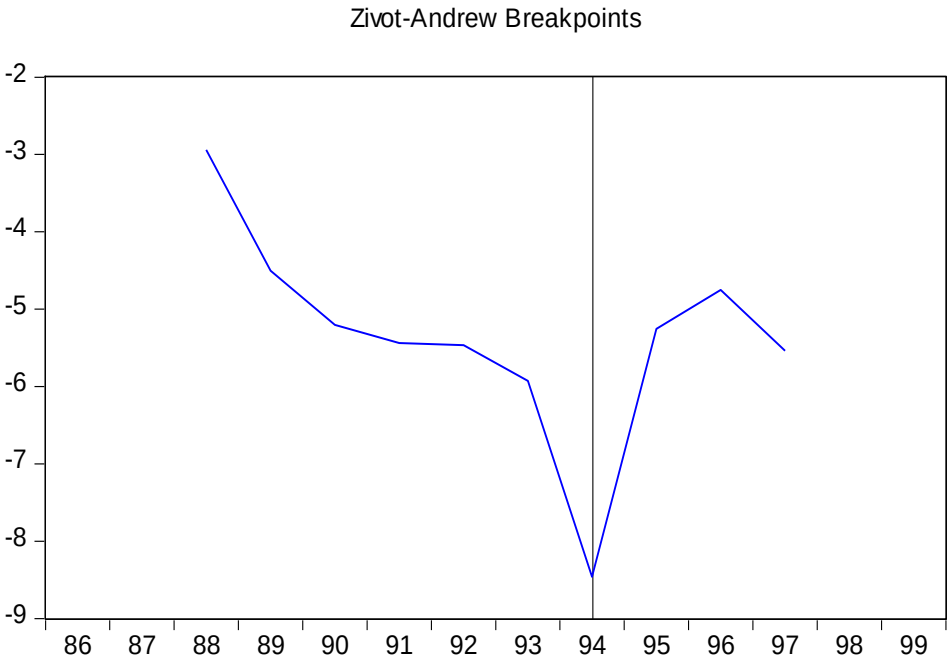
Zivot-Andrew AGGREGATE SPENDING FOR PRE-SAP PERIOD



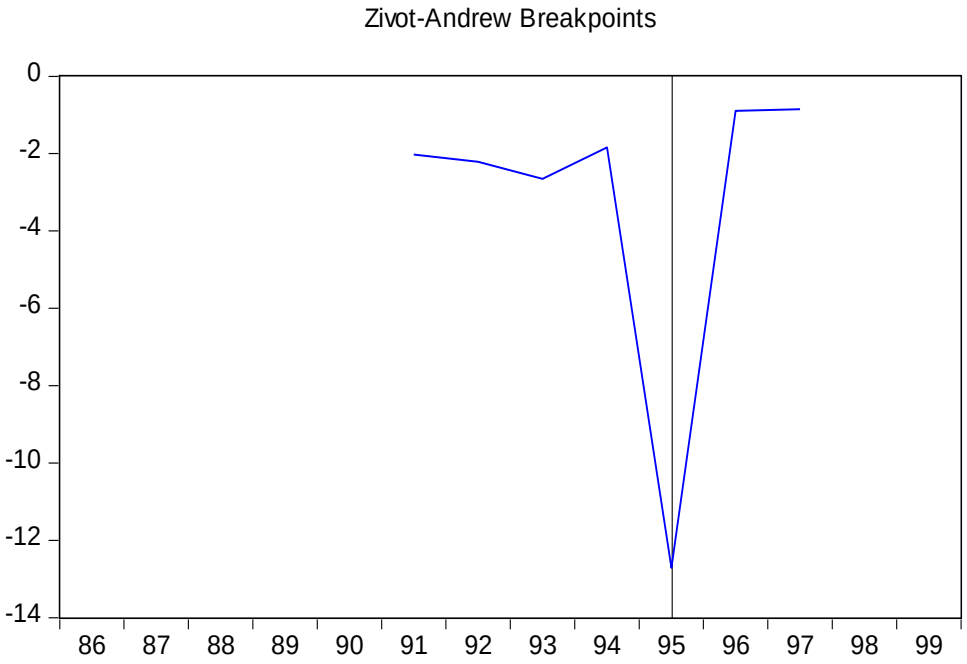
Zivot-Andrew GDP FOR PRE-SAP PERIOD



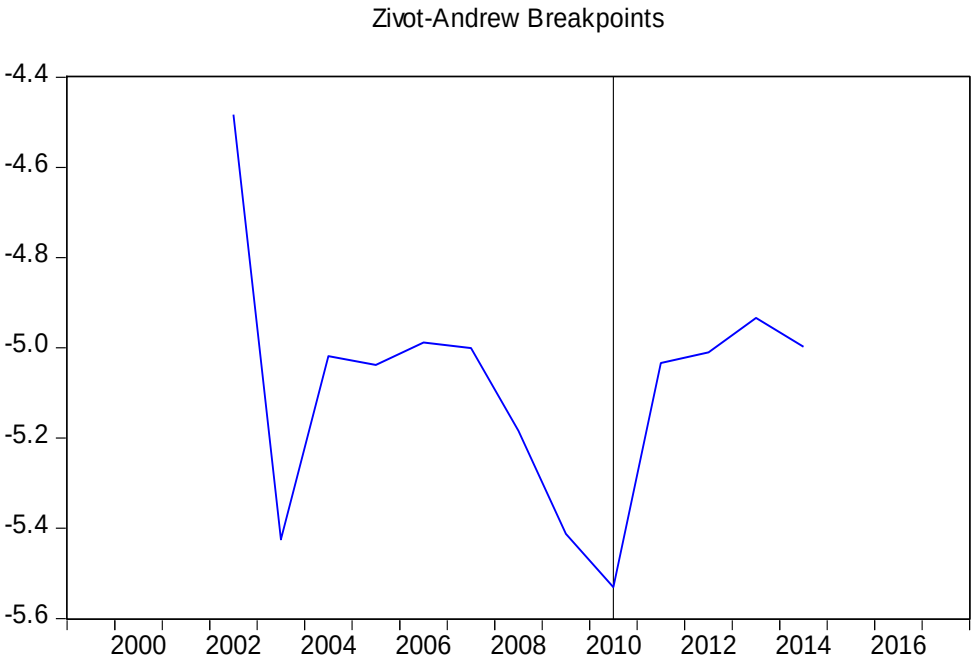
Zivot-Andrew AGGREGATE SPENDING FOR SAP PERIOD



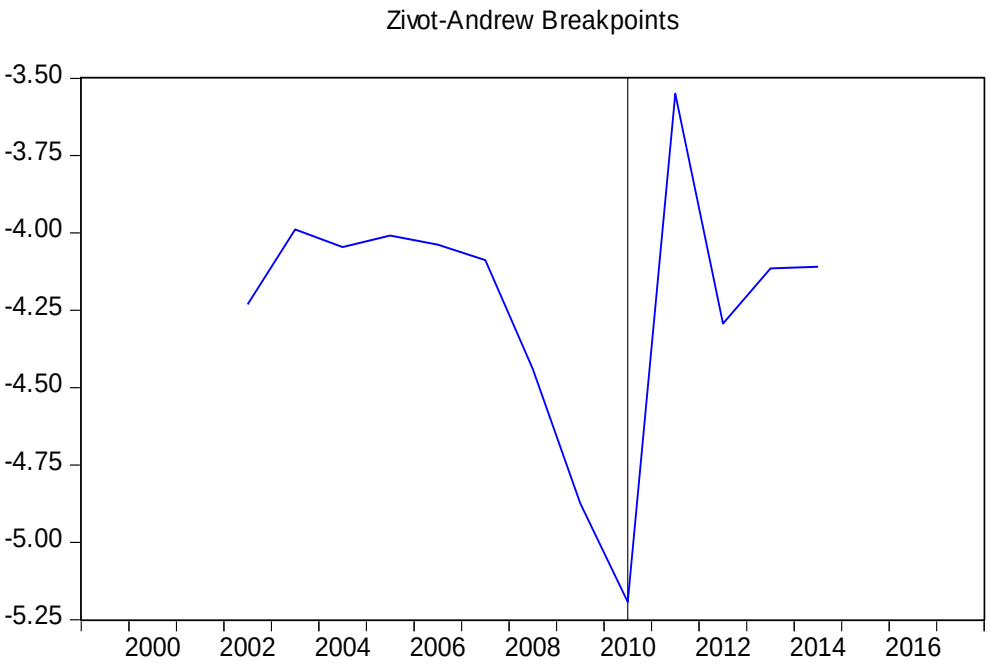
Zivot-Andrew GDP FOR SAP PERIOD



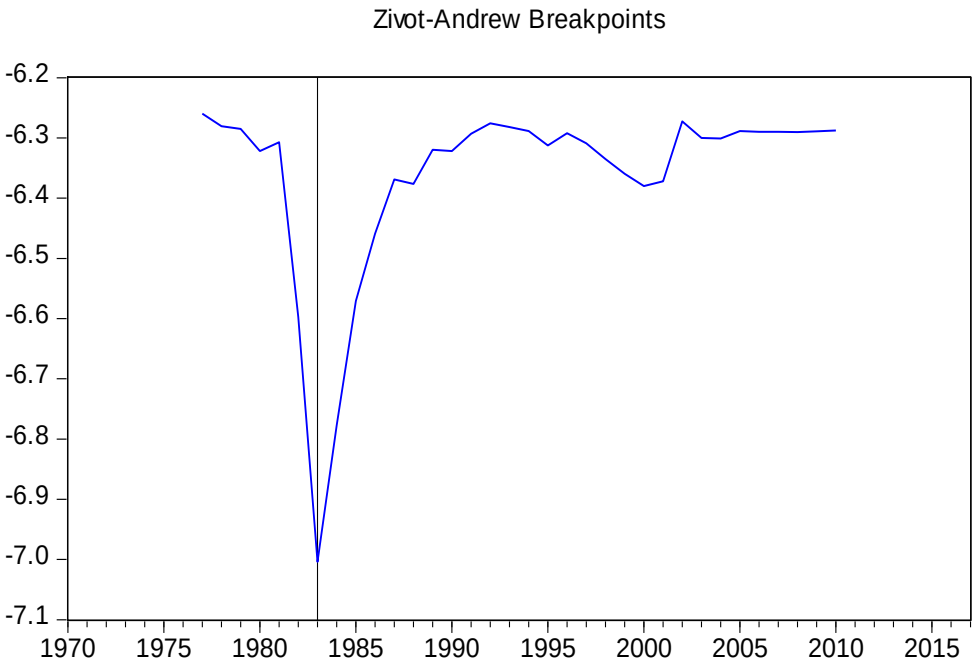
Zivot-Andrew AGGREGATE SPENDING FOR POST-SAP PERIOD



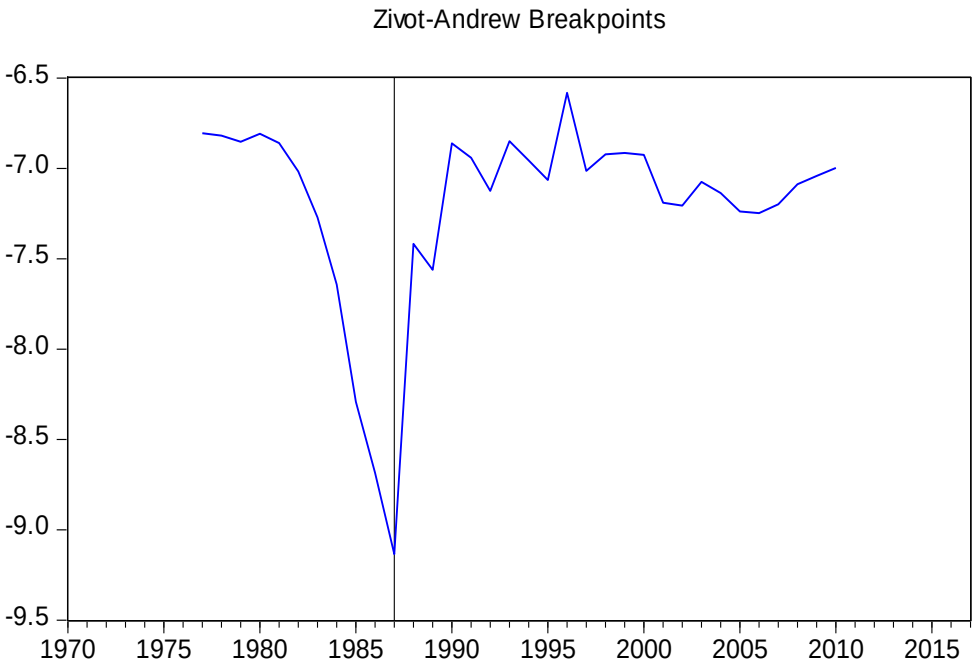
Zivot-Andrew GDP FOR POST-SAP PERIOD



Zivot-Andrew AGGREGATE SPENDING FOR ENTIRE PERIOD



Zivot-Andrew GDP FOR ENTIRE PERIOD



GRANGER CAUSALITY TEST FOR THE ENTIRE PERIOD

Pairwise Granger Causality Tests
Date: 11/16/18 Time: 13:22
Sample: 1970 2017
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
GFCGR does not Granger Cause GDPGR	46	0.12045	0.8868
GDPGR does not Granger Cause GFCGR		0.43671	0.6491
HDI does not Granger Cause GDPGR	46	0.48691	0.6180
GDPGR does not Granger Cause HDI		0.32722	0.7228
TRANSGR does not Granger Cause GDPGR	46	0.98742	0.3812
GDPGR does not Granger Cause TRANSGR		0.50982	0.6044
COMMGR does not Granger Cause GDPGR	46	0.90319	0.4132
GDPGR does not Granger Cause COMMGR		0.63233	0.5365
HTHGR does not Granger Cause GDPGR	46	1.21859	0.3061
GDPGR does not Granger Cause HTHGR		0.70982	0.4977
EDUGR does not Granger Cause GDPGR	46	0.22305	0.8010
GDPGR does not Granger Cause EDUGR		0.00513	0.9949
UTLGR does not Granger Cause GDPGR	46	0.39733	0.6747
GDPGR does not Granger Cause UTLGR		0.70442	0.5003

HETEROSKEDASTICITY TEST FOR THE ENTIRE PERIOD

Heteroskedasticity Test: White

F-statistic	0.207991	Prob. F(38,5)	0.9983
Obs*R-squared	26.95056	Prob. Chi-Square(38)	0.9095
Scaled explained SS	1.430379	Prob. Chi-Square(38)	1.0000

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 11/21/18 Time: 14:28
Sample: 1974 2017
Included observations: 44

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-993.3047	2930.382	-0.338968	0.7484
GDPGR(-1)^2	-0.008682	0.017965	-0.483276	0.6493
GDPGR(-2)^2	0.002997	0.021383	0.140156	0.8940
HDI^2	0.956245	4.117570	0.232235	0.8256
HDI(-1)^2	-1.302198	6.418326	-0.202888	0.8472
TRANSGR^2	-2.323902	4.458974	-0.521174	0.6245
TRANSGR(-1)^2	-4.899493	6.837661	-0.716545	0.5057

COMMGR^2	0.277884	1.719299	0.161626	0.8779
COMMGR(-1)^2	2.926641	3.845860	0.760985	0.4810
HTHGR^2	-0.809219	1.571640	-0.514888	0.6286
HTHGR(-1)^2	24.61861	31.14599	0.790426	0.4651
EDUGR^2	0.140709	0.167130	0.841914	0.4382
EDUGR(-1)^2	0.441436	0.552754	0.798613	0.4607
UTLGR^2	-0.019037	0.092696	-0.205366	0.8454
UTLGR(-1)^2	-0.162005	0.211069	-0.767544	0.4774
UTLGR(-2)^2	-0.078098	0.097612	-0.800087	0.4600

R-squared	0.612513	Mean dependent var	209.5561
Adjusted R-squared	-2.332391	S.D. dependent var	607.7596
S.E. of regression	1109.455	Akaike info criterion	16.45910
Sum squared resid	6154455.	Schwarz criterion	18.04054
Log likelihood	-323.1002	Hannan-Quinn criter.	17.04558
F-statistic	0.207991	Durbin-Watson stat	1.963100
Prob(F-statistic)	0.998326		

Ramsey RESET Test For Adequecy Of The Model For The Entire Period

Ramsey RESET Test
Equation: UNTITLED
Specification: GDPGR GDPGR(-1) GFCGR GFCGR(-1) HDI HDI(-1) TRANSGR TRANSGR(-1) COMMGR COMMGR(-1) HTHGR HTHGR(-1) EDUGR EDUGR(-1) UTLGR UTLGR(-1) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.336137	4	0.7537
F-statistic	0.112988	(1, 4)	0.7537

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	253.2955	1	253.2955
Restricted SSR	9220.470	5	1844.094
Unrestricted SSR	8967.174	4	2241.794

Unrestricted Test Equation:
Dependent Variable: GDPGR
Method: ARDL
Date: 11/21/18 Time: 14:30
Sample: 1974 2017
Included observations: 44
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic):
Fixed regressors: C

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDPGR(-1)	-0.266032	0.398229	-0.668039	0.5407
GFCGR	0.530634	1.060793	0.500224	0.6432
GFCGR(-1)	0.583029	0.906529	0.643144	0.5551

HDI	24.41554	37.86066	0.644879	0.5541
HDI(-1)	-62.70127	83.11799	-0.754365	0.4926
TRANSGR	7.651030	8.178986	0.935450	0.4025
TRANSGR(-1)	-0.909745	3.808864	-0.238850	0.8230
COMMGR	-2.429772	3.074947	-0.790183	0.4736
COMMGR(-1)	1.181720	1.962566	0.602130	0.5796
HTHGR	-12.32336	14.51062	-0.849265	0.4436
HTHGR(-1)	1.161491	4.681543	0.248100	0.8163
EDUGR	2.315405	4.279402	0.541058	0.6172
EDUGR(-1)	1.551658	1.962040	0.790839	0.4733
UTLGR	-0.701101	0.988821	-0.709028	0.5174
UTLGR(-1)	-0.219371	0.589415	-0.372185	0.7286
C	186.8226	264.8731	0.705329	0.5195
FITTED^2	0.001132	0.003368	0.336137	0.7537

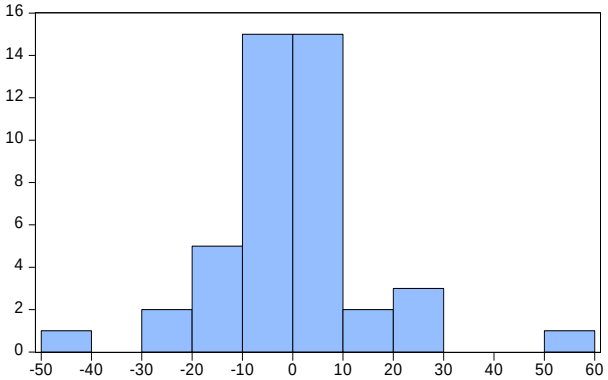
R-squared	0.935334	Mean dependent var	35.57340
Adjusted R-squared	0.304846	S.D. dependent var	56.78808
S.E. of regression	47.34758	Akaike info criterion	9.973195
Sum squared resid	8967.174	Schwarz criterion	11.59519
Log likelihood	-179.4103	Hannan-Quinn criter.	10.57471
F-statistic	1.483507	Durbin-Watson stat	2.886847
Prob(F-statistic)	0.386024		

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

CORRELATION TEST FOR THE ENTIRE PERIOD

	GDPGR	GFCGR	HDI	TRANSGR	COMMGR	HTHGR	EDUGR	UTLGR
GDPGR	1.000000	0.120973	-0.089535	-0.161426	-0.143750	-0.209757	0.096732	0.016021
GFCGR	0.120973	1.000000	0.088270	0.144577	0.143163	0.150263	0.230338	0.088945
HDI	-0.089535	0.088270	1.000000	0.090164	0.092391	0.028103	-0.415216	-0.293670
TRANSGR	-0.161426	0.144577	0.090164	1.000000	0.781009	0.462284	0.141228	-0.114791
COMMGR	-0.143750	0.143163	0.092391	0.781009	1.000000	0.341905	0.111225	-0.108961
HTHGR	-0.209757	0.150263	0.028103	0.462284	0.341905	1.000000	0.309246	0.060110
EDUGR	0.096732	0.230338	-0.415216	0.141228	0.111225	0.309246	1.000000	0.303512
UTLGR	0.016021	0.088945	-0.293670	-0.114791	-0.108961	0.060110	0.303512	1.000000

NORMALITY TEST FOR THE ENTIRE PERIOD



Series: Residuals
Sample 1974 2017
Observations 44

Mean	3.59e-13
Median	-0.067703
Maximum	58.59699
Minimum	-46.68700
Std. Dev.	14.64341
Skewness	0.803387
Kurtosis	9.220131
Jarque-Bera	75.66487
Probability	0.000000