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Dr. V Ryan, France  
vryan@iiser.org

Dr. Pankaj Kumar Singh  
Department of Animal Nutrition

Dr. D Wamai, USA  
johnmiller@iiser.org

Dr. Daniel Osakwe, Spain  
daniel.osakwe@iiser.org

Dr. G.M. Nasira  
nasiragm99@yahoo.com
Annauniversity of Technology, India

Dr.J.Khalatbari  
farzaneh_moijaba@yahoo.com

Dr. (Prof.) Shaikh Abdul Hannan  
M.Sc.(CS),M.Phil,Ph.D.  
Vivekanand College (LPP), Aurangabad.  
abdulhannan05@gmail.com

Dr. Ayman Batisha  
Consultant Civil Engineer, Cairo, Egypt

Dr. Abdel Salam Hamdy Makhlouf  
Humboldt Award Fellow  
Head and Founder of Surface Engineering Department, CMRDI, Egypt

Dr. Nitin W. Ingole  
Department of Civil Engineering  
Prof Ram Meghe Institute of Technology and Research

Dr. Ashwani Kumar Dubey (Ph.D.,

Harcourt Butler Technological Institute

Dr. John Miller, France  
johnmiller@iiser.org

Dr. Amalendu Bhunia  
Associate Professor, Dept. of Commerce,  
University of Kalyani, India

Dr. Alafuro Reggie, France  
alafuro.reggie@iiser.org

Dr. Jeffrey Adunni, France  
ejeffrey.adunni@iiser.org

K.G. Arts & Science College

Dr. M Chang, Hongkong

Dr G. Russell  
Department of Physics, Netherlands

Dr. K. Shailendhra, India  
ck_shailendhra@cb.amrita.edu

Dr. Cornelis M. Los, UK  
cmllos@iiser.org

Dr. Susanta Mitra  
susantamit@gmail.com  
Meghnad Saha Institute of Technology

Dr. K.Rameshkumar  
krkumar@hindustanuniv.ac.in

Dr. Bharat Raj Singh  
Associate Director & HOD-Mechanical Engg  
School of Management Sciences, Technical Campus

Dr Rajiv Yadav  
Prof & Head (Farm Machinery & Power)  
College of Agril. Engg. & Technology, Junagadh, India  
ryadav61@gmail.com

Dr. Godfred A Menezes  
Asst. Prof. & Scientist  
Sree Balaji Medical College, Chromepet

Dr. D.C. Sharma  
Mathematics IIT-Delhi, Ph. D-Agra

Dr.(Prof.) R. K. Bedi

Dr. Mirza Munir Ahmed  
PhD in Civil Engineering,  
Malaysia  
drmirzamunirahmed@gmail.com

Dr. V. V. Singh  
Professor Mathematics,  
Department Yusuf Maitama Sule University,  
Kano, Nigeria  
singh_vijayvir@yahoo.com

Dr. S.Satyanarayana  
CSE, KL University

Dr. Kanak Saxena  
Department of Computer Applications  
S.A.T.I., Vidisha (M.P.)

Dr. Amir J. Majid  
Assoc. Prof, Ajman University  
S&T  
College of Engineering, UAE

Prof. Shekhar R.  
Dept. of Computer Science  
ACED, Alliance University,  
Bangalore

Dr.(Er) Jasvir Singh
FIASc)
Executive Director
Godavari Academy of Science and Technology

Dr. Praveen Agarwal
Ass. Prof. of Mathematics & Head of Department
Anand International College of Engineering

Dr. Tanmaya Badapanda
CV Raman College of Engineering

Dr. Pratap V. Naikwade
Head, Department of Botany
ASP College, Devrukh

Dr. Kamaljit I. Lakhtaria
Mobile Computing, Wireless Networking

Dr. V. Rajesh
Dept. of Engineering Mathematics
GITAM University Hyderabad Campus

Dr. M. Arif Kamal
Dept. of Architecture
Zakir Hussain College of Engg. & Technology, Aligarh

Dr. Zulkilli Rangkuti
UIN Syarif Hidayatullah, Jakarta

Dr. Tarig Osman Khider
University of Bahri Khartoum- Sudan
College of Applied and Industrial Sciences

Dr. Shafqat Alauddin
Shibli National College, Azamgarh
Asst. Prof. in P. G. Department of Chemistry

MIT College of Engineering
Dept. of Electronics Technology
Guru Nanak Dev University

Dr. K.V.L.N. Acharyulu
Ass. Prof. Department of Mathematics
Bapatla Engineering college

Dr. V. Rajesh
Dept. of Engineering Mathematics
GITAM University Hyderabad Campus

Dr. Tanmaya Badapanda
Asst. Professor, Department of Physics
CV Raman College of Engineering, Jania

Dr. Nidhi Bhatt
Assistant Prof. English
Disha College, Raipur (C.G.)

Dr. T.K. Subramaniam, India
Prof., Physics

Dr. S K Srivastava
Dept. of Physics
Amity Institute of Applied Sciences, India

Dr. Shivani Mishra
Director In-charge, Dept. of Social Work
Sardar Patel University, Vallabh Vidyanagar

Dr. Adnan Al-Rabea
Department of Information Technology
Balqa' Applied University, Salt (Jordan)

Dr. Sanjay Kumar Gupta
Dept. of community medicine
Peoples College of Medical sciences and Research,

Dr. Umesh Kakde
Asst. Prof. & Head, Department of Botany
Ismail Yusuf College

Dr. R. Irene Hepzibah
A.V.C. College of Engineering

Dr. Khaleed HMT
HOD, AEC, Bhatkal, Karnataka

Dr. Umesh Kumar Mishra
Hydrogeological Studies

Dr. Yarub Al-Douri
Assoc. Prof., Institute of Nano Electronic Engineering
University Malaysia Perlis

Dr. Ajay Malik
Block Forest Officer
Haryana State Forest Department, India

Dr. L. Ammayappan
Senior Scientist, NIRJAFT West Bengal

Dr. Dhiresh Kulshrestha
Associate Professor & Dept. of Economics
Central University of Haryana

Dr. Kapil Kumar Bansal
Head (Research & Publication)
SRM University, NCR Campus
Bhanpur

Dr. Shafiquil Abidin
Assc. Prof. - DCSE (Northern India Engineering College)  
(G G S I P University), New Delhi (India)

Dr. S. Sumathi
Electronics

Dr. Arun. K. J
Asst. Professor in Physics  
Sree Kerala Varma College

Dr Abhijit Nayak
HOD Physics, GGSIPU (India)

Dr. S. Sasikumar
Jayaram College of engg and tech  
Trichy

Dr. Sudhir Kumar Srivastava
Electrical Engineering  
Department  
M.M.M Engineering College, India

Dr. Mohammed Ali Hussain
Principal & Professor, DCSE  
Sri Sai Madhavi Inst. of Science & Technology

Dr. Anupam Khanna
Asst. Prof., Mathematics department  
Maharishi Markandeshwar University

Dr. P. J. Hisalkar
Assoc. Prof., Dept. of Clinical Biochemistry  
JMF's ACPM Medical College & Hospital

Prof. Asha S. Ambhaikar
asha31.a@rediffmail.com

Prof. S. Rameshbabu
Mechanical Vibrations

Dr. Harpreet Sandhu
Gurukul Vidyapeeth, Banur

Dr. Sameer Shrivastava
Computer Science, Associate Professor

Dr. K Mitra
Electronics, Associate Professor

Dr. V. Selvan
Department of Mathematics  
RKM Vivekananda College, Chennai

Dr Abhijit Nayak
HOD Physics, BPIT Rohini

Dr. Khushhali Menaria Pandey
Department of Bioinformatics  
MANIT, Bhopal

Dr. Dheeraj Gupta
Assoc. Prof., Graphic Era  
University, Dehradun

Dr. Sudhir Kumar Srivastava
Assoc. Prof., Electrical Engineering Department  
M.M.M Engineering College, Gorakhpur

Dr. Asim Kumar Sen
Principal at St. Francis Institute of Tech.  
Borivli, University of Mumbai

Prof. VUDA Sreenivasarao
HOD, St. Mary’s DCS

Fardad Koohyar
IA University
Prof. Ranjib Biswas  
Head & Associate Professor  
Mechanical Engineering Department

Prof. Anuj Kumar Gupta  
Dept. of Computer Science & Engineering,  
RIMT Institute of Engineering & Technology

Prof. Isaac Adetunde  
University of Mines and Technology  
Dept. of Mathematics, Tarkwa, Ghana

Prof. Dhahri Amel  
Department of Physics  
Gafsa University-Faculty of Sciences

Prof. Ashish Kumar Sharma (M.Sc, M.Phil)  
Asst. Prof. Dept. of Mathematics  
Manav Bharti University, Solan (H.P), India

Prof. Shashikant Patil  
Asst. Prof. Electronics & Telecommunication Engineering  
MIPSTME, SVKM's NMIMS, MUMBAI

Prof. R.N. Tiwari  
Depl. of Geology  
Govt. P.G. Science College, Rewa (M.P.)

Prof. A.M. Bisen  
MATS School of Engineering & Technology  
MATS University, Raipur (C.G.)

SKP Engineering College, India  
Faculty of Science, Babol Branch, Babol, Iran

Prof. Bindeshwar Singh  
Department of Electrical Engineering

Prof. Suresh Babu D  
Vel Tech Mutli Tech

Dean Prashant Singh Yadav  
Vedant Institute of Management Technology, Garhmukteshwar

Prof. Mohammad Faisal  
Asst. Prof. Dept. of Computer Science & App.  
Integral University

Prof. H L N Murthy  
Asst. Prof. Bharati Vidyapeeth University  
Institute of Management & Research, New Delhi

Asst. Prof. B. Naresh Kumar Reddy  
Lak Reddy Bali Reddy College of Engineering

Suraya Mubeen  
Asst. Professor in KL University

Prof. Amit Chauhan  
Department of Computer Science  
Phonics Group of Institutions, Roorkee

Prof. Bharat Bhushan Agarwal  
C.E.T., I.F.T.M., India

Assoc. Prof. Deepali Virmani  
( CSE/IT ) Institute of Technology

Dr. Sameer D Jain  
President, DSWAI  
Maharashtra University of Health Sciences [M.U.H.S]

Prof. Athar Ravish Khan  
Muzaffar Khan  
Assoc. Prof. Dept. of Electronics & Telecom.  
JDIET, Yavatmal

Prof. Manoj Kumar Shukla  
Asst. Prof. Computer Science & Engineering  
Faculty of Engineering & Technology- SDGI

Prof. P Thareja  
Principal Programme Coordinator (ME (TQEM))  
PCE University of Technology

Fuad Mammadov  
Assoc. Prof., PhD on Technical Sciences
IMPLICATIONS OF RISING DEBTS STOCK ON SUSTAINABLE ECONOMIC GROWTH IN NIGERIA (1986-2016)

AGU, BERTRAM ONYEBUCHI, PhD
E-MAIL: dragubertram@gmail.com
DEPARTMENT OF BANKING AND FINANCE
ENUGU STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY, ESUT, ENUGU NIGERIA

NWANKWO, SIMON N.P.
E-MAIL: nwankwo_simon@yahoo.com
DEPARTMENT OF ACCOUNTANCY AND BANKING
GODFREY OKOYE UNIVERSITY, ENUGU, NIGERIA

Abstract: This study examined the implications of rising debts stock on sustainable economic growth in Nigeria for the period 1986 to 2016. The Augmented Dickey Fuller (ADF) test was conducted for Unit Root Test. Engle Granger and Johansen Co-integration Test was also conducted to ascertain if there is a long-run relationship among the variables. This study found that Debts stock had a positive and significant effect on gross domestic product (GDP) and exchange rate but this effect in the short-run has a bigger effect when compared to the long-run. Debts stock has a negative and significant effect on inflation rate in Nigeria within the period under study. This is consistent with our a priori expectation as it is evident that debts stock has always influenced Gross Domestic Product, Exchange rate and inflation rate. There should be serious effort on the part of Nigerian government to diversify its economy especially into agriculture and Information and Communication Technology (ICT) sector. Policy makers and regulatory authorities should adopt appropriate exchange rate regime for the Country to achieve meaningful economic growth and development. Above all the recent clamour for restructuring of Nigeria should be respected to enhance sustainable economic growth of the regions and Nigeria as a whole.

Key words: Debt stocks, Domestic debt, Inflation Rate, External Debt Stocks and Exchange Rate

Introduction:
No man is an island to himself and no government is an island to itself. Borrowing is never a crime but what seems to be a crime is the continuous borrowings with the inability to pay back/service the borrowed fund/ debt. Therefore, it is generally expected that developing countries facing scarcity of fund/capital can acquire external debt to supplement domestic savings and finance productive activities. Debt both external and domestic could be used to stimulate the economy but whenever a nation accumulates substantial debt, a reasonable proportion of public expenditure and foreign exchange earnings will be absorbed by debt servicing and repayment with heavy opportunity cost. (Albert, Brain and Palitha, 2005 in Ude, Ugwu and Onwuka, 2016)
Foreign borrowing is a strategy of increasing the productive capacity of the economy over time and focusing at rising level of national income and poverty reduction vis a vis economic growth (Todaro, 1977).

The management of Nigerians external debt has been a major macroeconomic problem especially since the early 1980s. For many years now according to Noko (2016) the country’s debt has been growing in spite of the efforts being made by the government to manage and minimize it crushing efforts on the Nation’s economy. Such efforts range from the various refinancing and restructuring agreements to debt conversion programme and the deliberate allocation of substantial resources towards servicing the debt.

Muhammad and Fayyaz (2015) observe that external debts affect the economy in both ways explaining that where efficient use of external debt can bring economic prosperity to a nation, their inefficiency use can cause damages as well. External debt become burden to Nigeria because contracted loans were not optimally deployed which made return on investment not adequate to meet maturing obligations and also hindering economic growth (Erhieovwe and Onovwoakpoma, 2013 in Amaefule, 2017).

**Statement of the problem:**

Debts according to Bowden in Anyanwukoro (2004) are classified into productive debt and consumption debt. They see productive debt as self-liquidating debt while consumption debt is a credit facility obtained to pay for goods and services and expenses on current expenditure that will be gradually used up without making any direct income. Production debt in other hand pays itself off and can create additional income for the borrower. In productive debt, the more you borrow and invest the better off you will become in years ahead. For instance, if the government borrows money to finance a steel production plant, refineries or factories etc, these assets will generate the income to be used in repaying the debt. It is therefore, a productive debt. A productive debt provides more free income and financial freedom as time goes on if all things being equal (Anidiobu, Agu, and Ezinwa, 2016).

However, Amaefule (2017) observes that the Nigerian’s total debts stock to foreign and local creditors now stood at N19.63tn. This is N1.8tn increase from the N17.36tn recorded at the end of December, 2016 (DMO, 2016). As at March 31, 2015, the country’s total debts stock stood at N12.06tn. This means that the debts stock level increased by N7.1tn in two years. Segmenting
the national debt, the DMO put the Federal Government’s domestic debt at N11.97tn. Two years ago, as of March 31, 2015, the component of the debt burden stood at N8.51tn. This means that within a period of two years, the Federal Government has borrowed a total of N3.46tn from domestic creditors. This shows that the domestic debts stock of the federal Government has increased by 40.71 percent. Domestic debt servicing for 2nd quarter of 2017 stood at N253.3 billion i.e. April to June 2017 (DMO, 2017).

In the same period according to Amaefule (2017) the country’s external debt (for the federal and state government) rose from $9.46bn to $13.81bn. This means that within the two years period, the country’s external debt rose by $4.36bn or 45.98 percent. As at June 2017, the Nigeria’s external debt stock stood at $11,194.65 billion (DMO, 2017)

The external debt component, however, has been affected by exchange rate variations as the last two years have witnessed noticeable changes in foreign exchange rates. These borrowed money are never invested in a productive venture to enable it liquidate itself.

According to DMO (2017) the official exchange rate of N197 to $1 was used in determining the foreign debt for March 31, 2015. The domestic debt component of states stood at N2.96tn as of March 31, 2017, up from the figure of N1.69bn at the same time for March 31, 2015. This means that within the period of two years, the domestic debt of the states rose by N1.27tn or 75.15 percent. Amidst drying revenue from oil and gas, the government has in the last two years increasingly depended on borrowing for consumption which becomes a regular source of drain to the borrower’s income. To this end, the aim of this study was to examine the implications of External Debts Stock on sustainable economic growth in Nigeria.

Objective of the Study:

The broad objective of this study is to examine the implications of External Debt Stocks on sustainable economic growth in Nigeria. Specific objectives are to;

- Ascertain the impact of External Debt stocks on Gross Domestic Product in Nigeria
- Establish the influence of External Debt stocks on Exchange Rate in Nigeria.
- Examine the relationship between External Debts stock and Inflation Rate in Nigeria

Research Hypothesis

The study was guided by the following null hypotheses:

- H0: External Debt stocks does not have positive and significant impact on GDP in Nigeria
- H0: External Debt stocks does not have significant influence on Exchange Rate in Nigeria
• H$_0$. External Debt stocks does not have significant relationship with inflation Rate in Nigeria

REVIEW OF RELATED LITERATURE

CONCEPTUAL FRAMEWORK

Concept of Debt
Debt may be defined as the resources or money in use in a country, which may or may not be generated by the residents. Debt may also be described as finance obtained beyond the boundary of a country and does not in any way belong to the populace (Adepoju, Salau & Obayelu, 2007). Put in other words, debt is money, service or property owed and/or represented by a financial instrument or other formal equivalent. The authors further describe debt as what a person legally owes to another or an obligation that is enforceable by legal action to make payment of money.

External Debts stock
Ogbonna and Appah (2016) define external debt stocks as that portion of a country’s debt that was borrowed from foreign lenders including commercial banks, government or international financial institutions. On the other hand, debt management is the gamut of institutional and technical arrangement in organizing the liabilities of a country so that the debt service burden is kept within sustainable level. The technical aspect is concerned with the determination of the amount (level) of debt the economy can sustain and that the conditions of borrowing are on favourable terms and are consistent with the future debt servicing capacity. While, the institutional aspect includes the administrative, organizational, legislative, accounting and monitoring aspect of managing both the new borrowings and old stock of debt. In both aspects, more attention is given to reducing the debt service burden or keeping it stable (Hamid, Ashraf and Chaudhry, 2008).

External Debt Management:

External debt management refers to the establishment of the conditions of issue and redemption of foreign loans. It follows that debt itself is not evil but lack of optimal utilization of externally derived fund should be associated with proper debt management and servicing problem (Mutallab, 1984). Bhatia (2008), Musgrave and Musgrave (2004) posited that external debt management refers to as the establishment of the conditions of issue and redemption of public securities. It entails the process of administering the external public debt that is providing for the
payment of interest and arranging the refinancing of maturing bonds/debt. It involves a conscious and carefully planned schedule to the acquisition, deployment purpose or to support the balance of payments.

According to Okereke (2002), external debt management is the combination of policies that will allow for repayment of the debts or bring about its sufficient reduction. It also involves how is administered or handled to avoid adverse economic effect. It also involves loan negotiation, monitoring of both government direct debt and non-governmental debt; controlling the debt (including the measurement of the debt serving capacity, risk management-exchange, interest rate and commodity price risk) debt management system. Debt management policy is also intertwined with overall macroeconomic and financial policies. In fact, beyond good macroeconomic policy, the effective management of external debt comprises three specific interrelated processes: selecting the appropriate financing, deciding how much to borrow and keeping complete up-to-date records on debt. The major objective of external debt management policy is to achieve the benefit of external finance without creating difficult problems of macroeconomic and balance of payments stability (Klein, 1994, in Ogbonna and Appah, 2016).

Economic growth

Economic growth is an increase in the total real output of goods and services in an economy over time. Economic growth is usually measured in terms of an increase in gross domestic product (gdp) over time, or an increase in GDP per head of population to reflect its impact on living standards over time. The contribution of economic growth to wealth creation, and the fact that it provides the government with extra resources to provide social amenities (without having to raise taxation), most governments accord a high priority to the promotion of economic growth in formulating their economic policies.

The ability of an economy to produce more goods and services on a sustained basis depends on many factors including an increase in the quantity and quality of the labour force, capital stock and natural resources (the basic factor inputs available to it); the efficient use of these resources so as to attain a high level of productivity; the introduction of new innovative techniques and methods of production and new products. The latter two factors are especially important in the context of a world economy where a country's economic growth rate is materially affected by international trade influences. Finally, a country's own level of demand needs to be sufficiently buoyant both to ensure the full utilization of its existing resources and to encourage producers to
invest in new plant and research and development to enlarge the supply capabilities of the economy over the longer term. Governments can stimulate the growth process by increasing current spending in the economy through taxation cuts and by increasing the money supply and reducing interest rates. Additionally, it can operate on the supply-side of the economy by promoting enterprise initiatives and providing resources for improving productivity and research. (Collins Dictionary of Business, 2005)

Economic growth could also be defined as a positive change in the level of production of goods and services by a country over a certain period of time. Nominal growth is defined as economic growth including inflation, while real growth is nominal growth minus inflation. Economic growth is usually brought about by technological innovation and positive external forces (http://www.investorwords.com/5540/economic_growth.html#ixzz4u65N6Kxy, 2017)

**Exchange Rate**

An exchange rate is the rate at which one currency will be exchanged for another. It is also regarded as the value of one country's currency in relation to another currency. For example, an interbank exchange rate of 114 Japanese yen to the United States dollar means that ¥114 will be exchanged for each US$1 or that US$1 will be exchanged for each ¥114. In this case it is said that the price of a dollar in relation to yen is ¥114, or equivalently that the price of a yen in relation to dollars is ¥1/114.

Exchange rates are determined in the foreign exchange market, which is open to a wide range of different types of buyers and sellers, and where currency trading is continuous: 24 hours a day except weekends, i.e. trading from 20:15 GMT on Sunday until 22:00 GMT Friday. The spot exchange rate refers to the current exchange rate. The forward exchange rate refers to an exchange rate that is quoted and traded today but for delivery and payment on a specific future date.

In the retail currency exchange market, different buying and selling rates will be quoted by money dealers. Most trades are to or from the local currency. The buying rate is the rate at which money dealers will buy foreign currency, and the selling rate is the rate at which they will sell that currency. The quoted rates will incorporate an allowance for a dealer's margin (or profit) in trading, or else the margin may be recovered in the form of a commission or in some other way. Different rates may also be quoted for cash, a documentary form or electronically. The higher
rate on documentary transactions has been justified as compensating for the additional time and cost of clearing the document. On the other hand, cash is available for resale immediately, but brings security, storage, and transportation costs, and the cost of tying up capital in a stock of banknotes (bills) (http://www.investorwords.com/5540/economic_growth.html#ixzz4u65N6KxU, 2017)

**Inflation Rate**

The inflation rate measures changes in the average price level based on a price index. The most commonly known index is the consumer price index. This index measures average retail prices that consumers pay. A high or increasing CPI indicates the existence of inflation. Higher prices tend to reduce overall consumer spending, which in turn leads to a decrease in GDP. While inflation itself is not negative, rapidly increasing rates of inflation signal the possibility of poor macroeconomic health.

**Theoretical Framework**

There are several theories by various economists and schools of thought as regards external debts stock and economic growth in Nigeria. This study is built around the two main theories, Dual Gap Theory and the Debt Overhang Theory.

**The dual gap theory** of Chenery (1966) postulates that economic growth depends on investment and that investment is a function of savings. Less-developed nations do not have sufficient savings (due to low per capita income) to match up with the necessary investment to ensure economic growth, they therefore resort to external finance to fit the saving investment gap. The dual gap theory is deduced from a national income accounting identity which postulates that excess investment expenditure (savings-Investment gap) is equivalent to the surplus of imports over exports (foreign exchange gap) (Mbah and Amaassoma, 2014).

**The debt overhang theory** of Krugman (1988), posits that huge borrowing leads to high indebtedness, debt traps and slow down of economic growth. According to him, accumulated debt stock results higher tax (tax disincentive) on future output and thus crowds out private investment. This means that due to large debt stock, potential investors would be discouraged on the expectation that government may finance its debt service obligation by imposing high taxes and this would further retard the growth of the nation. The importance of the debt overhang theory more or less cannot be over emphasized. According to Audu (2004) in Ayadi & Ayadi (2008) “The debt service burden has militated against Nigerian’s rapid economic development
and worsened the social problems. Service delivery by key institutions designed to mitigate the living conditions of vulnerable groups were hampered by decaying infrastructure due to poor funding. By cutting down expenditure on social and economic infrastructure, the government appears to have also constrained private sector investment and growth through lost externalities. This has reduced total investment, since public investment is a significant proportion of the total investment in the country.

**Empirical Review:**
A number of research works have been carried out reviewing the effect of External Debt on the economy.

Malik, Hayat, and Hayat (2010) explored the relationship between external debt and economic growth in Pakistan for the period of 1972 – 2005, using time series econometric technique. Their result shows that external debt is negatively and significantly related to economic growth. The evidence suggests that increase in external debt will lead to decline in economic growth. Previous study by Hameed et al. (2008) on Pakistan analyzed the long run and short run relationships between external debt and economic growth. Annual time series data from 1970 to 2003 was obtained to examine the dynamic effect of GDP, debt service, capital stock and labour force on her economic growth. The study concludes that debt servicing burden has a negative effect on the productivity of labor and capital, thereby adversely affecting economic growth.

Kasidi and Said (2013) investigated the impact of external debt and economic growth in Tanzania using time series of 1990-2010. The study revealed that there is significant impact of the external debt and debt service on GDP growth. Whereas total external debt stock has a positive effect of about 0.36939, debt service payment has a negative effect of about 28.517.

Atique and Malik (2012) examined the impact of domestic and external debt on the economic growth of Pakistan separately over a period of 1980-2010 using ordinary Least Square approach (OLS) to co-integration. The result showed significant inverse relationship in both, that is, inverse relationship between domestic debt and economic growth, and external debt and economic growth.

Subhanam and Azeeq (2012) studied the effect of external debt on the economic growth of Nigeria using gross domestic product as the endogenous variable measuring economic growth as a function of ratio of external debt to export, inflation and exchange rate proxy as the exogenous variable. Data were gathered covering 1970-2010. Analysis of data was done using the econometric technique of ordinary least square. The result showed that external debt has
contributed positively to Nigeria economy. A similar research was done by Iya, Gabdo, and Aminu (2013) with the same result. Ogege and Ekpudu (2010) examined the impact of debt burden on the Nigerian economy using time series data from 1970-2007. Ordinary least square (OLS) was used to test the relationship between debt burden and growth of the Nigeria economy. The result showed a negative relationship between debt stocks of internal and external; and gross domestic product, meaning that an increase in debt stock will lead to a reduction on the growth rate of Nigerian economy.

Similarly, Momodu (2012) examined the correlation between debt servicing and economic growth in Nigeria. The study sought to find a relationship between the Gross Domestic product (GDP) and Gross Fixed Capital Formation of Current Market Prices (GFCF) using Ordinary Least Square multiple regression method. The study revealed that debt payment to Nigerian creditors has significantly impacted on the GDP and GFCF. Furthermore, Ezebasili, Isu, and Mojekwu, (2011) studied the relationship between Nigeria’s external debt and economic growth between 1975-2006, with an error correction approach. Error correction estimate revealed that external debt has negative relationship with economic growth in Nigeria.

In a similar study, Bamidele and Joseph (2013) examined the effect of financial crisis and external debt management on the economic growth of Nigeria using GDP as endogenous variable while exogenous variables measuring economic growth were Foreign Direct Investment, external debt, external reserve, inflation, and exchange rate proxies. Annual time series of 1980-2010 were used. OLS, Augmented Dickey Fuller (ADF) unit root tests and the Granger causality test were employed in analysis. The result showed a positive relationship between FDI and economic growth while inverse relationship existed between external debt and economic growth. Akram (2010) in the study of the impact of public debt on economic growth and investment in Pakistan developed a hybrid model that explicitly incorporates the role of public debt in growth equations. He adopted the Autoregressive distributed lag (ARDL) technique in estimating the model and the result revealed that both domestic and external debt have negative relationship with per capita GDP and investment, confirming the existence of "Debt overhang effect" which crowds out private investment.

3.0 Methodology

The study adopted an *ex-post facto* and descriptive research method. *Ex-post facto* is mostly used in a study where it is not possible or acceptable to manipulate the characteristics of the variables
under study. The use of descriptive statistics is necessary as the data set is entirely quantitative and requires the use of analytical and statistical techniques. The method of estimation includes Ordinary Least Square (OLS), Augmented Dickey Fuller (ADF) test for the unit root test in order to attain stationarity. The Engle-Granger and Johansen’s Co integration was conducted to ascertain if there is a long run relationship among the variables. The Parsimonious Error Correction modeling was adopted to correct for shocks and innovations, decomposing them into short run and long run impacts.

3.1 Nature and Sources of Data
The data for the work is annualized time series consist of mainly secondary data. The study covers 1986 to 2016. The data are accessed from the Central Bank of Nigeria statistical Bulletin various issues and Debt Management Office. The choice of the period 1986 to 2016 was informed by the availability of data in the form detailed enough to allow for robust analyses

3.2 Model Specification
The model of this study is based on the Classical Linear Regression Model of Brooks (2014). Debt stock is the endogenous/ dependent variable while the exogenous/ independent/ explanatory variables are interest rate, exchange rate and inflation rate. The model is shown as follows;

\[ Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_n X_n + \varepsilon \]  \hspace{1cm} 3.1

Where;
\[ Y = \text{Dependent variable} \]
\[ X_1, X_2, X_3, \ldots, X_n = \text{the explanatory or independent variables} \]
\[ \beta_1, \beta_2, \beta_3, \ldots, \beta_n = \text{the coefficient of the parameter estimate or the slope} \]
\[ \varepsilon = \text{Error or disturbance term} \]

In relating this to the study,
\[ \text{EDS} = f'(GDP, EXCR, INFR) \]  \hspace{1cm} 3.2

Relating it in econometric form and the variables log linearised, it will appear thus;

\[ \text{lnEDS} = \beta_0 + \beta_1 \text{lnGDP} + \beta_2 \text{LEXCR} + \beta_3 \text{LINFR} \]  \hspace{1cm} 3.3

Where:
\[ \text{EDS} = \text{External Debts Stock} \]
\[ \text{GDP} = \text{Gross Domestic Product} \]
\[ \text{LEXCR} = \text{Exchange Rate} \]
LINFR = Inflation Rate

$B_0$ = intercept (Constant term)

$B_1 - B_3$ = coefficient of each exogenous variables

$U_t$ = stochastic/ disturbance/Error term

A priori expectation: It is expected that $\beta_1 - \beta_3 > 0$

### 4.0 Presentation of data, analysis, findings and Conclusion

#### 4.1 Presentation of data

Table 4.1 shows the External Debt Stocks (EDS), GDP, Exchange Rate and Inflation Rate in Nigeria (1986-2016)

<table>
<thead>
<tr>
<th>Year</th>
<th>EDS</th>
<th>GDP</th>
<th>EXCR</th>
<th>INFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>1.89</td>
<td>0.285763</td>
<td>0.06419</td>
<td>0.1959288</td>
</tr>
<tr>
<td>1987</td>
<td>-0.69</td>
<td>0.592608</td>
<td>0.081298</td>
<td>0.3119968</td>
</tr>
<tr>
<td>1988</td>
<td>7.58</td>
<td>0.20649</td>
<td>0.078261</td>
<td>0.2623544</td>
</tr>
<tr>
<td>1989</td>
<td>7.15</td>
<td>0.385038</td>
<td>0.105938</td>
<td>0.266532</td>
</tr>
<tr>
<td>1990</td>
<td>11.36</td>
<td>0.494011</td>
<td>0.080184</td>
<td>0.2742738</td>
</tr>
<tr>
<td>1991</td>
<td>0.61</td>
<td>0.272589</td>
<td>0.081852</td>
<td>0.2822893</td>
</tr>
<tr>
<td>1992</td>
<td>2.63</td>
<td>0.887147</td>
<td>0.112501</td>
<td>0.4614309</td>
</tr>
<tr>
<td>1993</td>
<td>1.56</td>
<td>1.343729</td>
<td>0.306635</td>
<td>0.6741655</td>
</tr>
<tr>
<td>1994</td>
<td>0.78</td>
<td>1.486195</td>
<td>0.120705</td>
<td>1.3464209</td>
</tr>
<tr>
<td>1995</td>
<td>2.15</td>
<td>-0.00573</td>
<td>0.1078</td>
<td>1.0421959</td>
</tr>
<tr>
<td>1996</td>
<td>4.13</td>
<td>-0.09851</td>
<td>0.056893</td>
<td>0.45232</td>
</tr>
<tr>
<td>1997</td>
<td>2.89</td>
<td>0.266145</td>
<td>0.041596</td>
<td>0.4096674</td>
</tr>
<tr>
<td>1998</td>
<td>2.82</td>
<td>0.080359</td>
<td>0.046696</td>
<td>0.4260064</td>
</tr>
<tr>
<td>1999</td>
<td>1.19</td>
<td>-0.17945</td>
<td>0.148471</td>
<td>0.27271</td>
</tr>
<tr>
<td>2000</td>
<td>4.89</td>
<td>0.538629</td>
<td>0.120309</td>
<td>0.3002112</td>
</tr>
<tr>
<td>2001</td>
<td>4.72</td>
<td>0.286259</td>
<td>0.091017</td>
<td>0.2746778</td>
</tr>
<tr>
<td>2002</td>
<td>4.63</td>
<td>0.303113</td>
<td>0.099434</td>
<td>0.318129</td>
</tr>
<tr>
<td>2003</td>
<td>9.57</td>
<td>0.163608</td>
<td>0.120773</td>
<td>0.47215</td>
</tr>
<tr>
<td>2004</td>
<td>6.58</td>
<td>0.149079</td>
<td>0.121895</td>
<td>0.4179258</td>
</tr>
<tr>
<td>2005</td>
<td>6.51</td>
<td>0.34162</td>
<td>0.108687</td>
<td>0.04412232</td>
</tr>
</tbody>
</table>
Table 4.2 shows the summary of OLS Result

<table>
<thead>
<tr>
<th>Endogenous variable</th>
<th>Exogenous Variables</th>
<th>R2</th>
<th>Adj. R2</th>
<th>F-Stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEDS</td>
<td>C</td>
<td>GDP</td>
<td>EXCR</td>
<td>INFR</td>
</tr>
<tr>
<td></td>
<td>2.950372</td>
<td>0.876129</td>
<td>0.105435</td>
<td>-0.130776</td>
</tr>
<tr>
<td></td>
<td>(0.0140)</td>
<td>(0.0000)</td>
<td>(0.5735)</td>
<td>(0.2485)</td>
</tr>
</tbody>
</table>

Note: Probability values are stated in parentheses and * means significance at 5% level of significance

Source: Author’s computation.

From table 4.2, the result of the intercept or constant parameter has a positive relationship with DS and it is statistically significant. GDP has a significant positive relationship with EDS while EXCR is not statistically significant but demonstrates a negative relationship with EDS. INFR is not statistically significant and demonstrates a negative relationship with EDS. The coefficient of multiple determinations (R2) with a value of 0.966973 implies that approximately 97% of total variations in EDS are explained by GDP, EXCR and INFR while the remaining 3% is accounted for by factors not specified in the Model. F-statistics value of 263.5010 shows that the model is...
significant i.e. it sufficiently captures the implications of rising debt stock on economic growth
and this is further justified by the probability value of 0.000000.

4.2.1 Augmented Dickey Fuller (ADF) Unit Root Test

Time series data are assumed to be non stationary and this implies that the results obtained from
the OLS method may be misleading. In this vein, it is cognizant that stationarity test should be
conducted. The stationarity test is carried out using the Augmented Dickey-Fuller (ADF) Unit
root test. The stationarity of data is essential for the Johansen co-integration test. The decision
rule for the ADF unit test states that the ADF Test statistic value must be greater than the Critical
Value i.e. 5% at absolute term for stationarity to be established at level and if otherwise,
difference occurs using the same decision rule. The table below shows the result of the
stationarity test in summary and the order of integration

**Unit Root Test:**

<table>
<thead>
<tr>
<th>S/N</th>
<th>Variables</th>
<th>ADF t-stat</th>
<th>5% critical value</th>
<th>Order of Integration</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(EDS)</td>
<td>-8.307644</td>
<td>-2.307644</td>
<td>1(1)</td>
<td>With intercept</td>
</tr>
<tr>
<td>2</td>
<td>GDP</td>
<td>-3.253225</td>
<td>-2.957110</td>
<td>1(1)</td>
<td>With intercept</td>
</tr>
<tr>
<td>3</td>
<td>EXCR</td>
<td>-5.363889</td>
<td>-2.957110</td>
<td>1(1)</td>
<td>With intercept</td>
</tr>
<tr>
<td>4</td>
<td>INFR</td>
<td>-3.457620</td>
<td>-2.960411</td>
<td>1(1)</td>
<td>With intercept</td>
</tr>
</tbody>
</table>

Source: E-view 9 output, 2017

Table 4.3 shows the presentation of ADF Unit root test of stationality of the time series variables.
The result shows that all the variables were stationary at first level 1(1), where the absolute
values of the t-test exceeded the 5% values.

**Table 4.4:**

<table>
<thead>
<tr>
<th>Series:</th>
<th>EDS, GDP, EXR, INFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lags interval (in first differences): 1 to 1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypothesized</th>
<th>Trace</th>
<th>0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Eigen value</td>
<td>Statistic</td>
</tr>
<tr>
<td>None*</td>
<td>0.702716</td>
<td>88.87634</td>
</tr>
<tr>
<td>At most 1*</td>
<td>0.541468</td>
<td>51.27122</td>
</tr>
<tr>
<td>A most 2</td>
<td>0.353137</td>
<td>27.09972</td>
</tr>
<tr>
<td>At most 3</td>
<td>0.237142</td>
<td>13.59546</td>
</tr>
</tbody>
</table>

Trace test indicates 2 co-integrating eqn. (s) at 0.05 level of significance.

Table 4.3 was used to estimate the Johansen co-integration to establish a long run relationship of
the variables. The result indicates the presence of two (2) co-integrating equations at 5% level of
significance. The trace statistic values of 88.87 and 51.27 exceed the 5% critical values of 69.81
and 47.85 which show that co-integration exists.

4.3 Error correlation model

Table 4.5: Result of Error Correlation Modeling (ECM)

Dependent Variables: (EDS)

Method: Least Squares

Date: 20/09/2017

Sample (adjusted): 1986 2016

Included observations: 30 after adjustments

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.061247</td>
<td>0.533758</td>
<td>-0.114747</td>
<td>0.9095</td>
</tr>
<tr>
<td>D(GDP)</td>
<td>-2.380328</td>
<td>1.534956</td>
<td>-1.550747</td>
<td>0.1331</td>
</tr>
<tr>
<td>D(EXCR)</td>
<td>-1.681851</td>
<td>4.326397</td>
<td>-0.388742</td>
<td>0.7006</td>
</tr>
<tr>
<td>D(INFR)</td>
<td>0.112023</td>
<td>2.522207</td>
<td>0.044145</td>
<td>0.9649</td>
</tr>
<tr>
<td>ECM(-1)</td>
<td>-0.840410</td>
<td>0.192910</td>
<td>-4.356477</td>
<td>0.0002</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.437049</td>
<td>Mean dependent var</td>
<td>-0.028437</td>
<td></td>
</tr>
<tr>
<td>Adjusted R-square</td>
<td>0.328789</td>
<td>S.D. dependent var</td>
<td>3.675407</td>
<td></td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>3.011167</td>
<td>Akaike info criterior</td>
<td>5.209893</td>
<td></td>
</tr>
<tr>
<td>Sum squared resid</td>
<td>235.7452</td>
<td>Schwarz criterion</td>
<td>5.484718</td>
<td></td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-77.35829</td>
<td>Hannan-Quinn criter</td>
<td>5.300990</td>
<td></td>
</tr>
<tr>
<td>F statistic</td>
<td>4.037041</td>
<td>Durbin-Watson stat</td>
<td>2-023053</td>
<td></td>
</tr>
</tbody>
</table>
| Prob(F-static) | 0.007623

Table 4.5 presents the result of the error correction model analysis. The F-statistic indicates that all the explanatory variables are jointly significant in determining the dependent variables, with