IMPACT OF DOMESTIC DEBT ON ECONOMIC GR0WTH IN NIGERIA

BY

FAIZA MUNTAKA
SPS/I6/MEC/00017

BEING A DISSERTATION SUBMITTED TO THE DEPARTMENT OF ECONOMICS, FACULTY OF SOCIAL SCIENCES, BAYERO UNIVERSITY, KANO IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTERS (M. Sc) DEGREE IN ECONOMICS

AUGUST, 2019

DECLARATION

I, Faiza Muntaka, declare that this research work is my own and all the sources that I used or quoted have been duly acknowledged by means of references under the supervision of Prof. Shehu Usman Aliyu Rano. I also testify that this Dissertation has not, either in whole or part, been submitted for a degree or certificate at another university.

Faiza Muntaka
SPS/16/MEC/00017

Date

CERTIFICATION

I Faiza Muntaka certify that this research work was conducted, written and complied by me, I also certify that to the best of my knowledge this Dissertation has never been presented wholly or partially for the award of any degree or for publication elsewhere.

Faiza Muntaka — Date
SPS/16/MEC/00017

Prof. Shehu Usman Aliyu Rano — Date
(Supervisor)

APPROVAL PAGE

This research work has been examined and found to have met the requirement for the award of the degree of Masters of Science in Economics (M.Sc.) at the Department of Economics, Bayero University Kano, Nigeria.

Prof. Shehu Usman Aliyu Rano (Supervisor)	Date
Dr.Aminu Wambai (Msc. PG Coordinator)	Date
Dr. Ibrahim Mohammed Adamu (Internal Examiner)	Date
Professor Yayaha Zakari (External Examiner)	Date
Professor Badayi M. Sani (Head of Department)	Date
Professor Umaru Pate (Dean School of Post Graduate Studies)	Date

DEDICATION

This project is dedicated to Almighty Allah, the most Beneficent and the most Merciful.

ACKNOWLEDGEMENTS

All praises are due to Allah (S.W.T.) the lord of the universe who has given us the wisdom, knowledge, courage, determination, endurance and ability to carry out this research.

However, I would like to sincerely appreciate the scholarly guidance of the project supervisor Prof. Shehu Usman Aliyu Rano for taking his time to supervise this project work despite his tight schedules and commitments, under his supervision I have acquired a lot of knowledge. May Allah (S.W.T) reward him abundantly. I look forward to be under his guidance in the future.

I wish to acknowledge the Vice Chancellor of Bayero University Kano Prof. Yahuza Bello and management of Bayero University Kano for giving another opportunity to advance my studies at the post graduate level in this prestigious university. I will like to acknowledge the faculty of social and management sciences and the department of economics, Bayero University Kano for giving me this privilege to undertake my master's degree programme.

I also wish to show my sincere appreciation to my lecturers who impacted knowledge on me during my masters programme, specifically Prof. Badayi M. Sani, Professor Mustapha Mukhtar, Prof. Ibrahim Sheka, Dr.Amina Ismail, Dr. M. Tsauni, Dr. Aminu Wambai, and Mallam Ali Abdulkarim , may Allah (S.W.T) bless them abundantly.

Special thanks are owed to my family; words alone cannot express how grateful I am, especially to my parents and my siblings for all the sacrifices they have made on my behalf. I love you all.

My deep appreciation goes to Mr. Babatunde Ogunlaja who had taxed himself dearly to see this programme starts and end successfully. I say thank you for being a father, a teacher and a friend as well. May almighty Allah bless you and your family immensely?

Also I cannot forget my Mentor Professor M.M. Usman for your word of advice and support in all spheres of life. May Allah continue to uplift you and your family, Amin.

I wish to register my immense gratitude to some colleagues and friends of mine who turned into members of extended family that supported me during this programme, Musa Mohammed Auwal, Peace Simnawa Samuel, Amira Galadima. May Allah bless and protect you all.

Finally my thanks go to those whose names are not mentioned, may Allah reward you all.

TABLE OF CONTENTS

CHAPTERTHREE

METHODOLOGY

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSIONS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

This study empirically tests the relationship between domestic debt and economic growth in Nigeria. The study employs Autoregressive Distributed Lagged (ARDL) model to examine the effect of domestic debt on economic growth in Nigeria, while Vector Error Correction (VECM) model was used to assess the impact of domestic debt on private investment. Also, Vector Auto regression (VAR) technique was used to identify whether domestic debt affects macroeconomic variables in Nigeria. The study sampled six (6) macroeconomic variables that were selected based on apriori of empirical expectations. The study made use of quarterly data series from 1999Q_1 – 2017Q_4 sourced from Central Bank of Nigeria Statistical (CBN) Bulletin and Debt Management Office (DMO) statistical Bulletin. The study reveals that domestic debt exerts a negative impact on economic growth. The study further shows that domestic debt shock affects macroeconomic variables. Also, domestic debt in Nigeria inflicts a negative impact on private investment. Futhermore, an increase in domestic debt will lead to a reduction in economic growth and private investment. Likely an increase in domestic debt will induces some macroeconomic variables such as interest rate and inflation. The study therefore recommends that, government should adopt economic policies that enhance investment and economic growth such channelling the borrowed fund into productive ventures and capital projects.

Keywords: Domestic debt, Economic Growth, Macroeconomic variables, Private Investment.

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

To finance government expenditure, government needs resources for public expenditure. While taxes generally provide the bulk of rescue; public borrowings bridge the resources gap between receipt and expenditure, Godfrey and Cyrus (2012). In other words, borrowing or debt arises as a result of government intervention in the economy and also the increases in the magnitude and variety of government activities which necessitate government borrowing in order to achieve the developmental objectives of the country. It is the objective of every sovereign nation to improve the standard of living of its citizenry and to promote her economic wellbeing, (Ozurumba and Kanu, 2014). The justification of government borrowing has its foundation in the neoclassical growth models which prescribes the need for capital scarce countries to borrow in order to increase their capital accumulation and steady state level of output per capital. Therefore, Nigeria being one of the less developed countries (LDCs) is experiencing low domestic saving and investment. This means that Nigeria as a nation lacks capital and basic key industries that will enable the country to accelerate the rate of its economic development. Consequently, the country borrows and imports capital goods component, raw materials and technical know-how, (Jhingan, 2010). In addition, cited in (Ibrahim, Olarewaju, Oluwatosu and Adebayo, 2016),(Pattilo and Luca, 2002) added that countries encountering financial challenges that are needed to provide goods services for its citizens will acquire debt either internal or external to supplement domestic savings.

Debt is an outstanding credit obligation. It refers to payment which must be but has not yet been paid to somebody. According to (Ajayi, 1989), when Government of a country borrows, the debt is a public debt. Hence, public debts are either domestic or foreign debt. In terms of domestic debt, government borrows from individual organizations and financial institutions such as commercial banks, development banks, mortgage banks and insurance companies. On

the other hand, when government borrows in terms of foreign debt, it borrows from foreign countries, multinational financial institutions like international bank for reconstruction (IRDB) known as World Bank, International Monetary Fund (IMF), foreign private organization and foreign state enterprise like British airways. As opined by Debt Management Office (DMO) of Nigeria, Domestic debt refers to debt borrowed by the federal government via treasury bills, Federal Government of Nigeria (FGN) Bond or treasury Bonds. In other words, domestic debt is debt owed to residents within a country. Specifically in Nigeria, the sources of domestic public debt are the central bank of Nigeria, commercial Banks, merchant Banks and the non-Bank public (Ozurumba and Kanu, 2014).

The beginning of the existing markets for government borrowing in Nigeria is financial reforms introduced by the colonial Government in 1958. These reforms saw to the creation of the central bank of Nigeria (CBN) and the creation of marketable public securities to finance fiscal deficit. According to paragraph 35 of the central bank of Nigeria (CBN) ordinance 1958 "the bank shall be entrusted with the issue and management of federal government loans in Nigeria upon such term and conditions as may be agreed with the federal government and the bank" (Adofu and Abula, 2010). In August 2000, the Debt Management Office (DMO) was created. It was established in order to enhance the efficiency of not only domestic debt Management but also the effectiveness of monetary policy, (Ukwu, et al, 2016).

Nigeria's domestic debt profile has been rising astronomically which as opined by (Iweala, 2011) if not controlled could create some unfavorable consequences such as crowding out private sector investment, poor GDP growth. e.t.c. For Instance, the 2017 National Budget approved by National assembly contains a total deficit of N2.3 trillion. The government filled the gap by borrowing $ 3.5 billion (about N 1 trillion) in foreign loans and Euros and $ 4

billion (About N1.2 trillion) from the domestic debt market. This shows that the budget deficit was majorly financed by the domestic debt (Akabueze, 2017).

According to (Igbodika, et al, 2014) domestic debt reduces macroeconomic risk; the absorption of the domestic financial resources by the government brings some questions like inefficient credit to private sector and poor financial development. Whatever the purpose, the government should find a way of managing debt so that the level of debt is not counter-productive.

Nigeria has borrowed large amount domestic ally often at highly concessional interest rates with the hope to accelerate development through higher investment, and foster economic growth. However, poverty situations are still staggering at the back door admit excess debt although the former was the initial intention. It is therefore obvious that Nigeria indebtedness has gone beyond reasonable limits needed to achieve desired goals and engender debt free or fewer burdens that will enhance economic growth with a resultant improvement in poverty level (Sanusi, 2003).

However, statistics from debt management office have shown that domestic debt has been taking an upward pattern. According to the DMO, in the first quarter of 2011, Nigeria's domestic debt stood at N 5.966 billion which ascended to N6.152 billion as at the end of June 2012. It further increased to N6.493 billion and was at N7.118 billion at the end of 2013. Likely, N7.421 billion was recorded as at the end of first quarter of 2014, representing 3.3 percent increase during the first half of the year. The increase in the domestic debt profile was attributed to the bond issuance by DMO, which amounted to over N200 billion and progressively cumulated to about N385 billion, (DMO, 2018). The figure continued to increase. The figures released by Nigerian debt management office (DMO) showed that Nigeria's domestic debt stock stood at about N11.971 billion as at march 2017, N12.495 billion as at 30 September 2017 and N12.589 billion as at the end of December 2017,(DMO

2017). The increase in domestic debt profile from March 2017 to December 2017 was attributed to the issuance of N10.69 billion Green Bond to fund infrastructure project that tackle climate change, N100 billion Sukuk to finance 25 Road projects across the country and FGN saving Bond.

In Nigeria, as in other developing economies of the world the issues associated with debt servicing, tax increase aimed at defraying additional cost as result of debt calls for concern especially against the background that both domestic and external debt are incurred without considering whether such loans have positive internal rate of return as high as the cost of borrowing and subsequently misappropriated by corrupt politicians in power. Hence denying the populace the expected gain that should accrue if these monies were invested in productive ventures and as a result making it impossible for these volumes of debt to contribute to national development. Rapidly increasing debt service obligations constitute an obstacle to the implementation of new development oriented projects since a proportion of revenue for this is set aside for servicing debts.

Unlike domestic debt, external debt is more difficult to service and repay, intellectual discourse has focused largely on external debt thereby neglecting domestic debt entirely or mentioning it briefly. But this is only true when the domestic debt stock is moderate and not when it is large and growing like in Nigeria's scenario. Moreover, the implications of growing domestic debt for the growth of the economy ought to constitute issues of concern as well as academic and intellectual discourse especially as the rapid increase in the stock of Nigeria's domestic debt has been attributed to the need to finance rising profile of government expenditure, accommodating, budget deficit and implement monetary policies, (Obiwuru, Okwu & Ekezie, 2013).

Due to the rising domestic debt profile the DMO released the debt management strategy 2016 to 2019 as at year 2016. The strategy was to rebalance the debt portfolio from more of

domestic now to more of foreign. This is mainly because of the debt servicing cost (DMO, 2017).

The World Bank advised Nigeria through its senior economist, Gloria Joseph Raji on 17th of October 2017. She ascertains that "Before year 2017, Nigerian's debt portfolio was about 80% domestic to 20% external. However the debt servicing cost of domestic debts are really high. Treasury bill is an average of 18%, the FGN bonds is from 16%. Hence, the Government is trying to rebalance its portfolio with foreign debt, which has much lower interest rate than domestic debt. This is the main reason why the government went for Eurobond with a total $1billion in the first quarter of year 2017. They also did Diaspora bond of $300 million. Looking at the yield of those bonds are much less than 10%. Thus it is because the government is aware that there is a sustainable issue and that is why they are trying to correct it by taking more foreign debt." www.dailypost.ng.

However, this assertion was highlighted by (Henry Boyo, 2017), stating that Nigeria must be very caution of the attraction of cheaper foreign loans, for example, a $1 billion loans at 7% would require N150 billion + 7% to service and repay when Naira exchanged for N150 = $1. Therefore Government would however require N300 billion + 7% to service and repay the same loan when Naira exchange rate is at N300 = $1. He added that, so long as the persistent inexplicable surplus naira liquidity challenge subsist, and CBN's forex auction system remains skewed against the naira, it is not a matter of if, but when the naira tumble beyond N500=$1;when this ultimately happens, government would need over N450 billion + 7 % to service and repay the same $1 billion loan. Ultimately, the foreign debt creditors would return once again, just as before debt exit in 2006 with another noose around Nigerian's neck.

Domestic debt may have positive effects on growth in the short run but in the long run it debt services repayment regime exceeds the ability to pay with some probability, it will lead to debt overhang and at a point the interest become higher than the principal and the effect

becomes negative. At this point crowding out investment and private sector constraints will arise due to capital shortages, (Peter, Denis & Chukwedo, 2013).

1.2 Statement of Research Problem

Literature on the link between debt and economic growth are conflicting. There is no consensus among the literatures as regards to the link between debt and economic growth. The theoretical literatures have argued that debt has a positive impact on growth while others pointed that it has an indirect negative effect on economic growth. For instance, according to the neoclassical growth theory, debt has a positive effect on economic growth. This is because the amount borrowed if used optimally it is anticipated to increase investment. This means that as long as countries use the borrowed funds for productive investment and do not suffer from macro-economic incentives or sizeable adverse shocks, growth should increase and allow for timely debt repayment, (Patillo, Poirson & Rica, 2002). On the other hand, debt has an indirect effect on investment. The transmission mechanism through which debts affect growth is its reduction on the resources available for investment by debt servicing, (Wheeler, 1999). In addition, the relationship between domestic debt and economic growth in Nigeria is yet to take a major relevance in empirical literature. There are relative number of studies on the empirical relationship between domestic debt and economic growth in Nigeria. Studies conducted by Adofu andAbula (2010), and Onyeiwu (2012) concluded that domestic debt and domestic debt servicing have negatively affected economic growth. However, studies conducted by Ahmad, Sheik and Tariq (2012), Okwu, Obiwuru, Obiakor, and Oluwalaiyu (2016) among others concluded that domestic debt enhance economic growth

Theoretically, debt tends to crowd out private investment, Voss (2003) and Ganelli (2003) pointed that an increase in government debt will lead to an increase in interest rate to bring the market into equilibrium there by crowding out private investment.

A recent review of Nigeria's domestic profile proves that it is has been on the increase. For instance, the federal government outstanding domestic debt stock as at December 2015 was N8.836 billion compare to N7,904 billion as at the end of December 2014. The increase of N932.98 billion or 11% was attributed to the net issuances of domestic debt used to part finance the 2015 appropriated budget deficit and refinancing of matured securities. By the end of December 2016, domestic debt has reached a wholesome amount of N11.058 billion. This represents a 20% increase over the same period. Meanwhile, the federal government introduced 3 new products in domestic market in the first quarter of 2017 to promote financial infusion and finance specific capital project. This contributed to an increase in the outstanding debt stock reaching to the total sum of N12.589 billion as at the December 2017, representing an increase of 12.6% over the level as at end of December 2016 (DMO, 2017). Unfortunately, even with the continuous leaning on domestic debt by Nigeria, Nigeria's economy is still defined by low per capital income, high unemployment rate, dwindling economy in adequate basic humanities and poor infrastructural development and falling growth rates of GDP, (Ozurumba & Kanu, 2014).The increase in domestic debt is having a reflect on the domestic debt to GDP as it corresponds with an upward trend through the years. As the year 2002, Domestic debt to GDP ratio has moved from 13.38% in 2000 to 14.96%. The ratio fell to 9.44% in 2006 and increased to 13.02% in 2009. The upward trend continued which reached 15.03% by 2011. Meanwhile, by the end of 2013 and 2014, the ratio moved slightly to 16.12% and 17% respectively. CBN Statistical Bulletin (2014) cited in Ben and Onogbosele (2016).

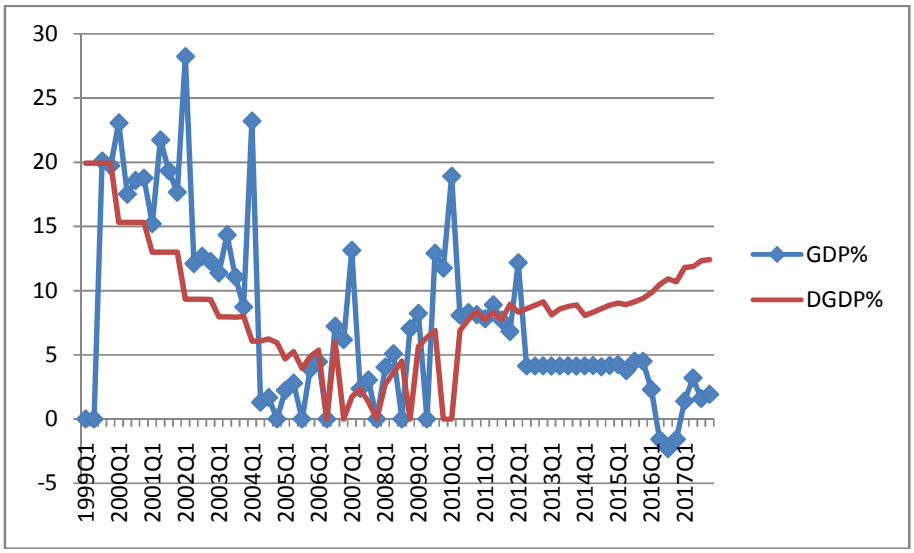


Figure 1.1 GDP growth rate to domestic debt to GDP ratio

As the country's domestic debt continues to take an upward trend, its economic growth was growing at a slow pace to even an extent of plunging into recession in second quarter of 2016. According to the National Bureau of Statistic NBS, (2017), Gross Domestic Product Growth rate of the economy grew by 0.82% in 2017. Although the 0.82% growth in GDP is an improvement over the contraction of -1.58% which the economy recorded in 2016 during the period of recession in the economy. The economy further consolidates its recovery from recession with GDP growing by 1.92% in the fourth quarter of 2017, as against 1.4 percent in the third quarter. NBS (2017) added that, the year 2017 recorded a real annual growth rate of 0.3 percent higher than -1.585 recorded in 2016.

There are several literature on domestic debt and economic growth, however, literature such as; Uzoh (2014), Ugwu (2017) among others. These studies with that of Ugwu (2017) as the most recent study did not cover to the period of 2017. This indicates that, these literatures did not capture the current economic situation of Nigeria, whereby the Nigerian economic had witness slow and low economic growth rate and other macroeconomic instability. The issuance of domestic debt instruments, domestic debt services are carried out on monthly basis. Likewise, most of the reviewed literature on this study like, Ugwu (2017) among others

discuss the effect of crowding out effect of domestic borrowing but did not take into consideration the variable private investment in their model of analysis to show how domestic borrowing crowds out private investment. On the other hand, Uzoh (2014) examined the relationship between domestic debts on only investment and did not take into consideration its effect on the growth of the economy.

Therefore, it is against this background that this study will seek to fill the loopholes identified in the previous literatures. Thus, this study aim at filling this gap by employing quarterly data for the period of $1999Q_1$ to $2017Q_4$ to evaluate how domestic debt affect investment as well as economic growth. However, there are different types of empirical method that have been employed to examine the impact of Nigeria's domestic debt on economic growth. This study employed the vector auto regressive (VAR) and Vector Error Correction Model (VECM) as well as the Autoregressive Distributed Lagged (ARDL) model to capture the objectives of the study and fill in the gaps identified.

1.3 Research Questions

The purpose of this research is to assess the impact of Nigeria's domestic debt on economic growth; hence, the following research questions are being drawn.

i) Does domestic debt affects economic growth in Nigeria?

ii) What effects does domestic debt have on private investment?

iii) Does domestic debt affect other macroeconomic variables?

1.4 Objectives of the Study

The broad objective of this research work is to assess the relationship between domestic debt and economic growth in Nigeria using a time series data spanning over the period of $1999Q_1$ – $2017Q_4$. This broad objective can be subdivided into the following smaller objectives;

i) To assess how domestic debt affects economic growth in Nigeria.

ii) To examine the effects of domestic debt on private investment

iii) To access how domestic debt affect macroeconomic variables in Nigeria.

1.5 Research Hypotheses

In view of the foregoing study, with respect to domestic debt and economic growth in Nigeria the following null hypothesis will be tested.

H_o: Domestic debt does not affect economic growth in Nigeria.

H_o: Nigeria's domestic debt does not have effect on private investment.

H_o: Nigeria's domestic debt does not affect macroeconomic variables.

1.6 Significance of the Study

The burden of domestic debt has been a matter of great concern to the government of Nigeria and the nation as a whole which has resulted in embarking upon drastic action like dividing the nation's scarce resources in servicing of debts annually. This action has lead to disinvestment in the economy, and has results to a fall in the domestic saving and the overall rate of growth.

However, intellectual discourse has focused largely on external debt thereby neglecting domestic debt entirely or mentioning it briefly. But this is only true when the domestic debt stock is moderate and not when it is large and growing like in Nigeria's scenario. Moreover, the implications of growing domestic debt for the growth of the economy ought to constitute issues of concern as well as academic and intellectual discourse especially as the rapid increase in the stock of Nigeria's domestic debt has been attributed to the need to finance rising profile of government expenditure, accommodating, budget deficit and implement monetary policies.

Several studies have been conducted on the issue of domestic debt and economic growth. Thus, one of the basic significance of this study is that, if a similar conclusion is reached as regards to other literature, it would further strengthen the existing theories on the view of domestic debt and its impact on economic growth that would be useful to explore the issues

of the attainment of macroeconomic stability and sustainable growth, and come up with results that would help in the policy building up of the Nigerian economy. This study will also be important and beneficial to stakeholders of an organization to know the essence of the structure of domestic debt and its impact on Nigerian economic growth.

This study will also contribute to the growing debate of the claims by managers, researchers, policy makers on whether the growth in the deficit funding of the Nigerian economy especially through domestic debts is ornamental or not and without actual unexpected negative impacts on the growth level (measured by Real Gross Domestic Product) of Nigerian economy.

Hence, this study will examine the effect of domestic debt on economic growth in Nigeria. To also examine if domestic debt affects private investment in Nigeria and also macroeconomic variables.

1.7 Scope of the Study

The study focuses on investigating the impact of domestic debt and economic growth in Nigeria. A quarterly data spanning from $1999Q_1$ to $2017Q_4$ was used in this study. This period is chosen as a result of availability of data of the choice of variables such as domestic debt to GDP, Gross Domestic Product, private investment, primary balance to GDP, interest rate, and inflation rate and also to cover current economic situations.

1.8 Organization of the Study

The rest of this study is structured into four chapters. Chapter 2 introduces the conceptual literature, theoretical literature, empirical studies and theoretical framework of this study. Chapter 3 describes the data and methodology. Chapter 4 presents and discusses the result of the analysis. Chapter 5 provides the conclusion, policy implications, and recommendation of the study.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter presents the review of relevant literature; conceptual, empirical and theoretical. In conceptual literature, a major concept of domestic debt was broken down. The theoretical discusses relevant theory upon which the study is based on. While the empirical is based on the studies conducted using various methodologies.

2.1 Conceptual Literature

2.1.1 Domestic Debt

Domestic debts are debts instrument issued by the federal Government and denominated in Local Currency. Domestic debts Instrument issued consist of treasury bills, federal government development stocks and treasury bonds (Onyeiwu, 2012).Treasury bills and development stocks are marketable and negotiable while treasury bonds are non-marketable but held by the CBN, (Adofu & Abula, 2010; Onyeiwu, 2012).

In other words, Domestic debt is a fundamental tool used by the government in both developed and less developed countries to finance internal and external gaps that is government can acquire domestic debt from different sources i.e, Central bank, Commercial banks and Non-bank commercial institutions, (Muhammad, Muhammad & Khadija, 2012).

2.1.2 Reasons for Domestic Debt

Government Issue debt for two reasons, the first reason is about conducting monetary policy in which government bonds facilitate the pricing of corporate bonds and equities by providing a bench mark yield curve (Anyanwu, 2016). The second reason is about balancing government budgets. There are several reasons of public domestic debt. First, it is used to finance budget deficit; second, it is used to implement monetary policy through open market by instruments of domestic debt (Muhammad, et al, 2010).

According Ojo and Awodele (2013), no system has sufficient resources to meet ever increasing socio-economic needs to demand pressure. Therefore declining revenue from mono-economy oil dominance economy result in growing and large fiscal deficits and needs for domestic debt accumulation. As such, domestic debt is one of the most prominent means of public finance especially in economic facing budget deficit problems due to government revenue not compensating the expenditure. This instrument which is used by the government, in accordance with the fiscal policy, is also one of the fundamental indicators of macroeconomic stability which depends on the factors such as growth, employment and investment (Eda and Pelin, 2016).

Countries do borrow for two broad categories: Macroeconomics reasons (higher investment, higher consumption, education and health) or to finance transitory balance of payments deficits (to lower nominal interest rates abroad, lack of domestic long-term credit, or to circumvent hard budget constraints). This implies that economy indulges in debt to boost economic growth and reduce poverty (Soludo, 2003) cited in (Egbetunde, 2012).

According to Ola and Adeyemo (1998), while explaining the reasons for increasing public debt on the part of the Nigerian Government came up with the following reasons.

- Government borrowed to finance emergency, such as natural disasters and economic depression.
- Government borrowed to finance importance capital projects, such as water dams, agricultural development projects, river basin development project, and river basin development projects.
- Government borrowed to finance current expenditure in anticipation of reasonable revenue collection.

2.1.3 Instruments of Domestic debt in Nigeria

- **Nigeria Treasury Bills**

These are debt instruments used by the federal government to borrow funds for short periods of about three months pending the collection of its revenues.Treasury bills were first introduced in UK in the days of Walter Bagehot 1877, and at then they were termed as commercial bills. In Nigeria, Treasury bill come into in effect on the base of the Treasury bill act of 1959, No.11 which came into effect on the 19th of March, 1959 and the first public issues of treasury bills in Nigeria was made on April 7, 1960. The success achieved encouraged further issues of this monetary instrument. Presently, the allotments of treasury bills are issued by an auction–based system and in multiples of N1000.00 per tender. Usually, subscriptions are sold through an authorized dealer (Ozurumba and Kanu, 2014).

- **Nigeria Treasury Certificate**

According to Ozurumba and Kanu (2014), treasury certificates are medium term government securities which have a maturity of between one to two years. It serves as bridge between treasury bills (short term instrument) and long term government stocks. Treasury certificates were introduced in Nigeria in 1968 and are similar to treasury bills in all respects except that the tenure is different. Both instruments are eligible for rediscount at the secondary market.

Treasury certificate is one of Nigeria domestic debt instruments that have played a major role in the development of money market in Nigeria. The instrument was of a very great assistant to the government in meeting its financial needs, especially during the civil war years and the reconstruction period of the 1970s. Due to excess liquidity in the system occasioned by the Oil Boom, further issues were suspended in 1975. Later in 1976, the treasury certificates were again introduced mainly because of pressure on government finances.

- **Federal Government of Nigeria Bonds**

According to DMO, Bonds are debt securities (liabilities) of the Federal Government of Nigeria (FGN) issued by the Debt Management Office (DMO) for and on behalf of the Federal Government. The FGN has an obligation to pay the bond holder the principal and agreed interest as and when due.

When the FGN Bond are bought, it is then in a form of lending to the FGN for a specified period of time. Thus, the FGN Bonds are considered as the safest of all investments in domestic debt market because it is backed by the "full faith and credit of the Federal Government" and as such it is classified as a risk free debt. There is absolute certainty that interest rate and principal will be paid as and when due hence, they are free of detail risk.

The minimum subscription of FGN Bond is N10, 000.00 + multiple of N1, 000 thereafter. Most FGN Bonds have fixed interest rates which are paid semi-annually. The Tenor of a FGN Bond is for a minimum of two years. DMO (2017, May 18). FGN Bonds. Retrieved from www.dmo.gov.ng/fgn-bond.

- **Federal Government of Nigeria Sovereign Sukuk**

Sukuk is an investment certificate that represents the ownership of interest of the holder in an asset on pool of assets. The certificate entitles the holder to receive income from the use of the asset. The FGN Sukuk is issued by the FGN Roads Sukuk Company PLC. On behalf of the Federal Government of Nigeria, hence it is backed by the full faith and credit of the Federal Government of Nigeria. Unlike the FGN Bonds, when the FGN Sukuk is bought, it represents the purchase of the buyer's interest in an asset. The FGN Sukuk has a minimum subscription of N10, 000 (i.e. 10 units @ N1, 000/unit) and in the multiple of N1, 000 (1 unit) thereafter, Also the FGN Sukuk has the tenor of 7 years. DMO (2018, April 9). Sovereign Sukuk. Retrieved from www.dmo.gov.ng/fgn-bonds/sovereign-sukuk.

- **Development Stock**

According to Nzotta (2004), they are fairly long term instrument issued by the CBN on behalf of the Federal Government. They are fixed rates of return and definite maturity. In an attempt to improve the liquidity and profitability of Banks the Central Banks classified government development stock of less than 3 years to maturity as eligible liquid asset for the purpose of computing the liquidity of banks. This move further broadened the scope of activities on money market.

2.1.4 Nigerian Domestic Debt Profile

The Nigerian domestic debt at inception in 1960 was N0.023 billion which grew to N1.111 billion in 1970. Then as at 1980, the level of domestic debt increases from N1.111 billion to the total amount of N8.23 billion (Asogwa, 2005). As at the year 1986, total domestic debt was N28.4 billion which rose to N36.7 billion in 1987, showing an increase of 8.3 billion between the two periods.

Similarly in 1987, domestic debt stood at N47.03 billion and astronomically increased to N84.09 billion in 1990. This shows that there is an increase of N37.06 billion between the two periods. It is worth to note that, the increase in domestic debt between 1988 and 1990 is more than that of the period between 1986 and 1987 by N28.73 billion. This substantial increase was due to the fact that more money was needed by the government to finance its deficit budget.

Since 1990, Nigeria's domestic debt has continued to take upward trend, which amounted to N477.7 billion in 1995. Though the trend moved a little downward in 1996 to N343.6 billion and continued to rise in 1997. By the year 2000, domestic debt had skyrocketed to N898.2 billion. This shows that between the years 1996 and year 2000 there is an increase of N554.6 billion. The high rate of domestic debt had continued to persist which amounts to N1.016 billion in 2001, N16.6 billion in 2002, and N1.329 billion in 2003 and N1.37 billion in 2004. This upward pattern continues to take place till 2008 where the Domestic debt stock fell

significantly to N2.32 billion in 2002 from N4.13 billion in 2007. Hence upward movement continued with the large amount of N7.9 billion as at the end of December 2014 (CBN, 2014).

Nigerian domestic debt continued to take an increase dimension with the amount of N8.836 billion and N11.058 billion as at 2015 and 2016 respectively. As at the second quarter of 2016, a new domestic debt instrument was introduced, this is the FGN savings Bond. Then by the third quarter of 2017 the FGN Sukuk also came to board and then the Green Bond. All these instruments contributed to the persistent and consistent increase in the domestic debt amounting to N12.589 billion (DMO, 2017).

2.1.5 Debt to Gross Domestic Product (GDP) Ratio

The debt to GDP ratio compares a country's sovereign debt to the total economic output for the year. Its output is measured by gross domestic product. This ratio is a useful tool for investors, leaders, and economists. It allows them to gauge a country's ability to pay off its debt. Hence, a high ratio means a country isn't producing enough to pay off its debt. Whereas a low ratio means there is plenty of economic output to make the payments. For example, in the case of Germany and Greece, Germany's debt amounts to $2.7 trillion, while that of Greece stands at $514 billion. From these figures, it shows that Greece has a lower debt than Germany. But when we come to find out their GDP figure, the scenario is different. Germany's GDP is $3.8 trillion, much more than Greece's $281 billion. Calculating the debt to GDP ratio which is (its Debt/GDP), that of Germany is lower than that of Greece. The debt to GDP ratio of Germany is a comfortable 72% while that of Greece is 182 % that is the reason while Germany had to bail out Greece and not the other way round. Amadeo, K (2018, April 26) Debt-to-GDP Ratio, Its Formula, and How to Use it [The Balance]. Retrieved May 26, 2018, from https://www.thebalance.com/debt-to-gdp-ratio-how-to-calculate-and-use-it.

Coming down to my case study Nigeria, Asogwa (2005) opined that Nigeria Debt to GDP ratio is on the high side when compared to other countries in the Sub-Saharan Africa. Since the early 1960s, the ratio of domestic debt to Gross Domestic Product has been taking an upward pattern with a sharp increase in 1980s and a slight decline in the 1990s.

By 1964, the level of domestic debt was 5.5% of GDP. After a decade (by 1974) this ratio went up slightly to 6.9% of GDP. Although in the 1990s, it declined slightly. It has since year 2000 moved upward (Asogwa, 2005)

By the year 2002, Domestic debt to GDP ratio has moved from 13.38% in 2000 to 14.96%. The ratio fell to 9.44% in 2006 and increased to 13.02% in 2009. The upward trend continued which reached 15.03% by 2011. Meanwhile, by the end of 2013 and 2014, the ratio moved slightly to 16.12% and 17% respectively. CBN Statistical Bulletin (2014) cited in Onogbosele and Ben (2016).

2.1.6 Effect of Domestic Debt

Internal debt which also refers to as domestic debt has become a burden to many African Countries. Nigeria as one of them has the burden of domestic debt since the collapse of the international oil prices in 1981. Domestic debt is characterized with the burden of deepened crowding out and retarded government on social services since most part of government revenue is used to service the debt. Hence, this could hinder the attainment of macroeconomic stability and sustainable growth in Nigeria due to excessive dependence by the federal government on borrowing from the banking system in order to finance is large and unsuitable fiscal deficit, (Ajayi, 1989; cited in Ibrahim et al, 2016).

Sanusi (2003) made more clarification that borrowing from central bank of Nigerian amount to injection of high powered money into the system which has serious adverse implication on price and exchange rate stability. It crowds out the private sector from the credits sector market, thereby stalling investment and output growth.

Muhammad, et al is of the view that domestic debt may enhance productivity and economic growth through development related project but only if it is properly and efficiently utilized. Doing a counter of this, it creates problems for the economy.

Domestic debts itself comes along with some inflationary risk. Muhammad, et al (2012) verified the above statement, showing that, if government borrows direct from central bank, it has no direct cost but carries a serious risk of inflation due to excess aggregate demand caused by an increase in money supply. This is alike to printing money.

On the other hand, when the government decides to borrow directly from the commercial bank, there would be no inflation risk in that case, this is because when the commercial bank lends out to the governments, it cash and deposit with the central bank decreased. This consequence leads to withdrawal of public purchasing power simultaneously, thereby causing government debt to be non-inflationary.

Lastly, domestic debt sourced from Non-Bank financial institution (NBFIS) has an inflationary result. This is because if NBFIs invest by purchasing the government securities and face a shortage of liquidity, they have no option but to turn to central bank. Ultimately this will lead to inflation.

From theoretical base, the process of crowding out arises when government borrows heavily from domestic market, there would be shortages of loan able funds which drives interest rates up leading to reduction of price borrowing and hence limiting private investment, Also argued by free market, that government intervention in the economy should be mined as state activities compete with private sector for scarce funds in the economy there by driving price up (inflation). Hence, this will ultimately leads to crowding out of private sector investments by public projects, (Onyeiwu, 2012).

Christensen (2004) cited in Adofu and Abula (2010) employ a cross country survey of the role of domestic debt markets in these countries are generally small, highly short term and

often have a narrow investor base. Christensen (2004) discovers that domestic interest rate payment present a significant burden to the budget, despite much smaller domestic debt than foreign indebtedness. He did not stop at that, he further revealed that the use of domestic debt is also found to have significant crowding out effect on private investment.

Stiglitz (2000) and Essien et al (2016) also share the same view stating that government borrowing can crowd out investment which will reduce future output and wages. Then when wages and output are affected, the citizens will be made vulnerable.

Buchanan (1999) suggests that incurrence of domestic debt result in the postponement of the tax liability from current to future generations. This shift from current to future taxation could imply a shifting of tax burden from current to future generation.

Domestic debt could literally affect level of employment negatively. Eroke (2011) profound that increased public domestic debt particularly the failure of government and some multi-national company to meet their financial obligations of funding capital projects his lead to over 100,000 job losses within a short period of tie at least a year.

Essien, et al (2016) view that excessive domestic borrowing could crowd out private sector investment as a government competes with the private sector for available funds. The former governor of central bank, Sanusi (2003) at the 7th monetary policy forum organized by CBN made the statement that 'it bears repeating that one major problem that has hindered the attainment of macroeconomic stability and sustainable growth has been the excessive reliance by the Federal Government on Borrowing from the banking system, particularly, the CBN to finance its large and unsustainable fiscal deficits. He further mentioned that such borrowing from CBN amounts to the section of high powered money into the system, which as a serious achieves implications on price and exchange rate stability.

Despite of Nigeria's over dependence of domestic debt, her economy is still low of per capital income, high unemployment rates, dwindling economy inadequate basic amenities

and poor infrastructural development and falling growth rates of GDP, Ben and Onogbosele (2016).

According to Adofu and Abula (2010), Nigerian's domestic debt had skyrocketed over the decades with the effect that her domestic debt consumes a larger chunk of her domestic debt Product (GDP) thereby tending to decline in total output of goods and services.

2.1.7 Economic Growth

According to Jinghan (2010), Economic growth is defined as the process whereby the per capita income of a country increases over a long period of time. It is measured by the increase in the amount of goods and services produced in a country at particular period of time. Economic growth is perceived as the increase overtime in a country's real output of goods and services.

Lipsey (1986) defined economic growth as the positive trend in the nation's total output over long period of time. This implies a sustained increase in Gross Domestic Product (GDP) for a long time. In addition, Schiller (1999) is of the opinion that economic growth is an increase in output (real GDP), an expansion in product possibility curve. Dolan and Lindsey (1991) shared the same opinion as that of Schiller (1999) who sees economic growth as most frequently expressed in terms of increase in Gross Domestic Product (GDP), a measure of the economy is total output of goods and services. This means that GDP as a measure of economic growth, like any other economic quantitative must be expressed in real term, that is, it must be adjusted for the effects of inflation as for it to provide a meaningful measure of growth overtime.

However, for the purpose of this study, economic growth of Nigeria means an increase in the country's Real Gross Domestic Product over a period of time, usually one fiscal year.

2.1.8 Inflation

Inflation may be defined as a sustained upward trend in the general level of prices and not the price of only one or two goods. G.Akcley (1959) defined inflation as a persistent and appreciable rise in the general level or average of prices. In other words, inflation is a state of rising prices, but not high prices. Similarly, Samuelson and Nordhaus (2011), Inflation is a rise in the general level of prices.

2.1.9 Interest Rate

Interest can be define as the return or yield on equity or opportunity cost of deferring current consumption in the future Uchendu (1993). This definition clearly shows that interest is a concept which can mean different things depending from the perspective it is viewed. Interest rate can be therefore being seen as a nebulous concept, a position affirmed by the availability of different types of this rate. Some which are the saving rate, discount rate, lending rate and Treasury bill rate. Apart from this, interest rate can be categorized as nominal or real. This categorization is credited to Irving Fisher. He tries to accommodate the moderating influence of inflation on interest rate. Nominal interest rate is the observed rate of interest incorporating monetary effects while real interest rate is arrived at by considering the implication of inflation on nominal interest rate Uchendu (1993) and Essia (2008).

2.2.0 Private Investment

In recent years, private investment has been accorded renewed emphasis and important place as engine of economic growth and development. Private investment is generally conceptualized in terms of physical capital formation. It comprises investment in physical capital, usually undertaken by firms and individuals to accumulate, overtime, real capital goods, which will yield a future flow of goods and services. The real capital goods is classified into business fixed capital goods like new machinery and equipment, new factories and offices, other durable goods, investing in new techniques and product with the aim of

improving the quality and quantity of firm's output; and working capital such as cash, stock of raw materials and inventories Soludo (1998).

2.2 Theoretical Literature

2.2.1 Crowding Out Effect

Crowding out generally refers to the economic effects of fiscal actions. If an increase in government demand, financed by either taxes or debt issuance to the public fails to stimulate total economic activity, the private sector is said to have been 'crowded out' by the Government action (Carlson and Spencer, 1957). Crowding-out thesis maintains that debt accumulation is negatively correlated with growth in that resources to service the debt reduce the amount available for investment purposes. Thus both the debt over-hang thesis and the crowding-out thesis suggest a strong negative effect of debt on investment and growth. An indebted country is most likely to face credit constraint which is the same as facing higher real interest rates which discourage investment. Rising interest rate and inflation worsen the macroeconomic environment and hurts investment. Cohen (1993) and Clements et al (2003) corroborate the aforementioned impact of debt, as they observe that the negative effects of debt on growth works not only through its impact but the stock of debt is likely to "crowd-out" public investment. This is so because service payments and repayments on accumulated debt soak up resources and reduce public investment. The damaging impact of debt servicing on investment is attributable to the reduction of government expenditure resulting from debt-induced liquidity constraints (Taylor, 1993). Moha (1999) asserts that mounting debt accumulation depresses investment through both a "disincentive effect" and "crowding-out effect". All things being equal, higher debt service can raise the government's interest bill, reducing public savings. This in turn may either raise interest rate or crowd-out credit available for domestic investment and dampening economic growth. Higher debt service payments can also have adverse effects on the composition of public spending by squeezing

the amount of resources available for infrastructure and human capital with negative effects on growth (Arias, 2002).

However, Economists view the aggregate effect of government borrowing on interest rates from three perspectives, Bahmani-Oskooee (1999). The three perspectives include: The Ricardian equivalence theorem, the Keynesian Model and the neoclassical school of thought. These perceptions will be explained below.

2.2.2 The Ricardian Equivalence Theorem

This theory was developed by David Ricardo in the 19th century but was revised by Harvard professor Robert Barro into an elaborate version of the same concept. Ricardian equivalence is an economic theory that suggests that when a government tries to stimulate an economy by increasing debt- financed government spending, demand remains unchanged. This is due to the fact that the public saves its excess money to pay for expected future tax increases that will be used to pay off debt.

Ricardian equivalence theorem as propose by Barro (1974) advocates neutrality whereby increase in the deficit financed by fiscal spending will be matched with a future increase in taxes leaving interest rates and private investment unchanged. The view assumes that asset holders completely discount future tax liabilities implied in the deficit, which implies that budget deficits are irrelevant for financial decisions.

In other words, a deficit induced by a lump-sum tax cut today followed by a lump-sum tax increase in the future will fully offset by an increase in private savings, as tax payers recognize that the tax is merely postponed, not cancelled, the offsetting increase in private savings means that the deficit would have no effect on national saving, interest rates, exchange rates, future domestic production at future national income Gale and Orszag (2004).

2.2.3 The Neoclassical School of Thought

This school of thought advocates crowding out and they believed that the determination of prices, outputs and income distributions in market is through supply and demand, often mediated through a maximization of utility by income-constrained individuals and of profits by cost-constrained firms employing available information and factors of production, in accordance with rational choice theory (Autonietta 1987, p. 323).

The Neoclassical theory further asserts that debt has a direct effect on economic growth. This is because the amount borrowed, if used optimally, is anticipated to increase investment. This means that as long as countries use the borrowed funds for productive investment and do not suffer from macro-economic incentives or sizeable adverse shocks, growth should increase and allow for timely debt repayment (Patillo, Poirson and Rica, 2002).

On the other, debt has an indirect effect on investment. The transmission mechanism through which debts affect growth is its reduction on the resources available for investment by debt servicing (Wheeler, 1999).

This school of thought also encompasses the theory of interest rates which explains that the balancing of savings and investments is achieved by the interest rate mechanism. Thus, the fluctuation in the rate of interest arises from variations either in the demand for loans or in the supply of loans. Hence, an increase in government debt, interest rates have to increase to bring the market into equilibrium, hence, dampening private investment, Voss (2002) and Ganelli (2003).

In conclusion, Premchand (1984) asserted that financing a budget deficit by borrowing from the public implies an increase in supply of government bonds and in order to improve the attractiveness of these bonds, the government offers them at a lower price which leads to higher interest rates discourages the issue of private bonds and private spending. In turn, this results in the crowding out of private investments.

2.2.4 The Keynesian Model

The Keynesians in contracts with the Neoclassical supports crowding in. They believe that private sector decisions sometimes lead to inefficient macro-economic outcomes and require active policy responses by the public sector, in particular, fiscal policy actions by the government in order to stabilize output over the business cycle (Blinder, 2008).

According to Aschauer (1989) and Beldaci, et al, (2004) unemployment in the economy and interest rate sensitivity of investment is low. Therefore expansionary fiscal policy will lead to little or no increase in interest rate and instead increase in output and income. Hence, there is crowding in rather than crowding out.

Banumol and Blinders (1979) gave more explanation to the above statement in their book 'Economic principle and Policy'. They stated that, in times of Economic slack, crowding-in effect take place. Deficit spending presumably quickens the pace of economic activity. That, at least, is its purpose. As the economy expands, businesses find it profitable to add to their capacity so as to meet the greater consumer demands. They asserted that, because of this induced investment, any increase in Government Spending (G) tends to increase investment, rather than decrease it as the crowding out hypothesis predicts.

In summary, the basis of crowding out hypothesis is sound; unless the economy produces enough additional saving more government borrowing will force out some private borrowers, who are discouraged by the higher interest rates. Although crowding out is rarely strong enough to cancel out the entire expansionary thrust of government spending. Serve net stimulus to the economy remains.

On the other hand, if deficit spending induces substantial GDP growth, then the crowding-in effect will lead to more saving perhaps so much more that private industry can borrow more than it did previously despite the increase in government borrowing. Hence the crowding

effect is likely to dominate in the short run, especially when the economy has a great deal of stock.

2.2.5 The Debt Over-Hang Theory

The debt over-hang theory, Krugman (1989) provides a new dimension to the debt crisis. The basis of the theory is that if debt exceeds the country's ability to pay with some probability in the future, expected debt servicing is most likely going to be an increasing function of the output of the debtor county. According to the theory, high debt acts as an anticipated foreign tax, reducing the incentive to save and invest and promoting capital flight, (Serven and Sahmano, 1989). Pattillo, et al (2002) show that the debt over-hang thesis implies that "large debt accumulation would lower growth through reduced investment". It maintains that debt accumulation stimulates investment initially, while past debt accumulation impacts negatively on investment and growth. The debt over-hang thesis suggests a possible Laffer curve for the effect of debt on investment, where at the peak (maximum point) of the curve is the point where large debt stocks begin to act as a steep marginal tax on investment and this is the point where debt begins to have negative marginal impact on growth.

The implication of the debt over-hang thesis is that government will have less incentive to implement difficult reforms such as trade liberalization and fiscal restraint. Thus, the channel for debt over-hang thesis is not only through the volume of investment but also through a poorer macroeconomic environment which is likely to affect the efficiency or quality of investment.

Krugman (1989) sees debt over-hang as a situation in which the expected repayment on foreign debt falls short of the contractual value of the debt and showed that there is a limit at which accumulated debt stimulates investment and growth. Borensztein (1990) argues that the debt over-hang is a situation in which the debtor country benefits very little from the return on any additional investment because of the debt service obligation. International

Monetary Fund (IMF) (1989) view debt over-hang hypothesis (DOH) as a situation where investment is discouraged if the debt burden is so large that the debtor country is unable to meet her payment obligations in normal way and involuntary lending takes place. Thus, the DOH describes a situation in which debt accumulation is not merely large, but one in which "the existence of debt accumulation distorts the relevant margins considered for production and investment decisions. Therefore, debt over-hang is a situation in which the debt stock of a country exceeds the country's capacity to repay such debts in the immediate future.

2.3 Empirical Literature Review

Relative amount of studies have empirically investigated the relationship between domestic debt and economic growth. Although majority of the writing were on public debt and economic growth or external debt and economic growth. Investigations on the association between domestic debt and economic growth have been carried out on under developed and developed countries. These studies were carried out using time series analysis such as ordinary method (OLS), co-integration techniques, VAR model, VECM model, ARDL and granger causality as well as panel models of different kinds. The results from these studies did not provide a clear consensus on the debate of the relationship between domestic debt and economic growth. Therefore those studies have revealed conflicting result on domestic debt-economic growth relationship.

2.3.1 Domestic Debt to Economic Growth

Ugwu (2017) made an investigation on the effect of domestic debt payment on economic growth in Nigeria (2000-2016). The Author employed Quantitative design using ordinary least square (OLS) method of multiple regression analysis. Thus, this findings indicated that domestic debt outstanding has significant relationship, between interest rate and debt servicing on Gross Domestic product in Nigeria, on the other hand the coefficient of determination indicates that about 85 percent of the debt variables (DDO, INT ad IDS in

Nigeria). This implies that a good portion of gross domestic product can be explained by changes in domestic debt variables. The researcher recommended that government should maintain a bank deposit ration below 40% and resort to increase use of tax revenue to finance its project. The regulatory authorities should provide enabling environment and policies for private sector investors with improved infrastructure.

However, Okwu, Obiwuru, Obiakor and Oluwalaiye (2016), employed relevant econometrics analysis to examine the growth of domestic debt on economic growth in Nigeria, for the periods of 1980-2015. The researchers used a linear time trend analysis, descriptive statistic as well as graphic trend analysis as their empirical tools. They further employed variables of analysis interest such as real gross domestic product (RGDP) as economic growth, proxy, domestic debt stock (DDS), domestic debt servicing expenditure (DDSE) as determinant variables, Government expenditure (GEXP) and Bank lending rates (BLR) exerting moderating influence. The results of this empirical test showed the evidence of significant short and long term positive effect for domestic debt stock (DDS), negative effects for domestic debt stock expenditure (DDSE) and insignificant effect on Bank lending rate (BLR). On the other hand, the variables jointly exerted significant effect and exhibited considerably high power in explaining variations in growth of the economy during the period.

Furthermore, Anyawu (2016) studies Government domestic debt, private sector credit and economic growth in oil dependent countries. The study aimed at examining the crowding out effect of government domestic borrowing using a panel data model for 28 oil dependent countries over the period of 1990-2012. Hence, the estimation approached he used were panel unit test, panel co integration test mean group, dynamic fixed effects and pooled mean estimators. The variables employed for this research were domestic lending rate, Bank credit, non-hydrocarbon GDP per capital growth which is all dependent variable. Which also include GDP money supply, trade openness, institutional quality inflation, price of crude oil and

government size. On the other hand the independent variables were domestic debt and bank credit. From the estimation, it was found that a one percent increase in government borrowing from domestic banks significantly decrease private sector credibly by 0.22 percent and also has no significant impact on the lending rate banks charge to the private sector. The finding suggested that, government domestic borrowing has resulted in the shrinking of private credit and works through the credit channel and not the interest rate channel. It also suggested that bank credit has a positive impact in non-oil GDP per capital growth. Hence, bank does not provide adequate credit to stimulate non-oil economic growth. The growth of non-hydrocarbon activity depends mainly on government spending trough hydrocarbon revenues.

Omotosho, Bawa and Doguwa (2016) investigate the existence of threshold effect in the relationship between public debt and economic growth in Nigeria using quarterly data from year 2005 to 2015. The researchers found out an inverted U-shape relationship between public debt types and economic growth also, for total public debt as percentage to GDP, model result identified 73.70 percent, while the estimated inflexion points for external and domestic debt were 49.4, and 30.9 percent respectively. Hence this implied that debt accommodation in the excess of the estimated threshold levels could hurt economic growth. In conclusion, the study found empirical support for external debt accumulation opportunities.

Ibrahim, Olarewaju, Oluwatomisin and Adebayo (2016) empirically analyzed the effect of domestic debt on Nigerian economic growth between 1981 to 2012. While specifying their model, the researcher followed up Adofu and Abula (2016) and Onyeiwu (2012) in order to have a clear picture of DOS Hence, they developed an analytical framework in the form of a regression analysis which specifies a functional relationship between GDP (a proxy for economic growth) and other explanatory variables such as domestic debt, private sector credit, interest rate and budget deficit. The study discovered a positive relationship between

domestic debt and economic growth. This implied that, increasing domestic debt up to a certain level would increase economic growth, provided proceeds from domestic debts are channeled into productive sectors of the economy.

From the foregoing analysis, the researcher recommended that the government should institute efforts to channel domestic debt revenue to productive activities in the economy so that debt does not rise to become unsustainable.

Essien, Ngozi, Micheal and Onomonu (2016) also examine the impact of public sector borrowings on price interest rates and output in Nigeria form it utilized a vector auto regress frame work, the granger causality test, impulse response and variance decomposition of various innovation were unemployed to study the impact . Real GDP, prime lending rate, composite consumer price index, and external debt stock domestic debt stock were variables employed for the study. However, the study found that shock to external debt stock increase prime lending rate, but with a long. Also, the level of external and domestic debt in the period of this study has no significant impact on the general price level and output.

Likewise, Ben and Onogbosele (2016) empirically analyze the impact of domestic debt and economic growth of Nigeria for the period of 1985-2014. They used annual time series data on variables such as Gross Domestic Product, treasury bonds, development stocks federal government of Nigeria binds and interest rate. They employed Augmented Dickey fuller unit root test and vector auto regression method of analysis. The findings of the multivariable vector Auto regression model reveled that domestic debt plays an important role in the growth process of the Nigerian economy judging from the high R^2 (0.983616) and statistically significant F-value (102.0618) of the Gross Domestic Product regression. Also, the variance decomposition analysis revealed that federal government of Nigeria Bond exert more pressure on the growth rate of gross domestic product in Nigeria. This was followed by shocks received from treasury bonds, while development stocks and interest rate contributed

the least to shocks in gross domestic product. In conclusion, the study recommended that government should resort to acquiring funds majority through federal government of Nigeria Bonds stance the federal government of Nigeria bonds have a highly significant impact o economic growth.

Balikcioglu and Iyidogan (2015) analyze domestic debt asymmetry in Turkey by regime switching models. The study examined the structure of domestic debt process in turkey economy over the period 1998-2015. The econometric technique they employed was STAR (smooth transition autoregressive) model. They began with the investigating the linearity of the domestic debt series, then took the examination f non-linearity. Then the analysis of the transition characteristics of domestic debt series by mean of STAR followed up. The study came to a conclusion that domestic debt in turkey has an asymmetric and non-liner structure during 1998-2015 periods. They also conclude that debt series of turkey economy in the considered period is non-linear. The results of the LSTAT model showed the transition between regimes is smooth which could be interpreted as an evidence of sustainability.

Babu, Kiprop, Kalio and Gisore (2015), empirically explored the effect of domestic debt as a share of gross domestic product (GDP), n economic growth in the east Africa community (EAC) over the period of 1990-2010. The study was basically based on the socio growth model augmented for debt investigates the presence of unit of in the panel series. Levin- Lin-Chu test was employed. Also, the Hausman specification test was used to select the panel fixed effect model, which was corrected for heteroscadasticity. Basic regression equation was used to estimate the relationship between domestic debt and economic growth. The result showed that domestic debt has a positive significant effect on per capital GDP growth rate in the EAC. The suggested that there should be promotion of sustainable levels of domestic borrowing to enhance growth.

Likewise, Igbodika, Jessie and Andabani (2014) examine the empirical relationship between domestic debt and the performance of the Nigeria economy using data spanning (1987-2014). Secondary data were used and hypothesis was formulated and tested using ordinary least square (OLS) model. The study revealed that interest rate has increase significant relationship with gross domestic debt product in Nigeria. There is a positive significant relationship between domestic debt and gross domestic product in Nigeria. From their findings the co-efficient of determination indicates that about 68% of the variation in gross domestic product can be explained by the changes in domestic debt variables, (DMD, INT, and INPR) in Nigeria, this mainly implies that, a good trend in Nigeria is explained by domestic debt variables. The researchers concluded the paper by giving a recommendation that government should maintain a debt bank deposit ratio below 35% and resort to increase use of tax revenue to finance its project as it our believe that tax revenue is far from the optimum.

Similarly Ozurumba and Kanu (2014) use multiple regression technique to study the impact of different types of domestic debt on economic growth of Nigeria from year 1980 to 2011. The outcome of the study indicated that in the short run, FGN Bond proved to have a positive significant relationship with economic growth, while development stock maintained a significant negative relationship. The result of the granger causality test revealed that, while there is unidirectional relationship between economic growth and FGN bonds on one hand, there exist a bidirectional relationship between treasury bills and economic growth on the other hand.

Likewise, Aminu, Ahmadu and Salihu (2013) set out to a relationship between economic growth, external debt and domestic debt in Nigeria. They investigated the impact of external debt and domestic debt on economic growth in Nigeria between 1970-2010. They employed econometric techniques such as ordinary least square in order to establish simple relationship between the variables. Then Augmented Dickey Fuller Techniques in testing the Unit root

property of the series and also granger causality test of causation between GDP external debt and domestic debt. The study revealed that, a good performance of an economy in terms of per capital growth may be attributed to the level of domestic debt and not on the level of domestic debt and not on the level of external debt in the country. Hence external debt is seen as inimical to the economic progress of the country. Thus, the researchers recommended that government should rely more on domestic debt in stimulating growth rather than external debt.

Likely Peter, Denis and Chukwuedo (2013) analyze the importance of domestic debt on economic growth in Nigeria. The study aim to investigate the relationship between government domestic debt and economic growth, including policy that is likely to improve private sector investment and break growth resistance problem. To achieve the research objectives the researchers obtained an annual data from 1980 to 2011. They also employed the error correction model procedure. Following an examination of properties of the time series, they used unit root and co-integration test. The result of the empirical investigation showed that domestic debt and credit have a significant and direct relationship with GDP, while debt servicing has increase relationship with GDP and also government expenditure has a direct but not significant relationship with GDP. The finding arrived to conclusion that domestic debt should be invested in productive sector of the economy and more specifically in the real sector and further productivity gain will be achieved in the improvement on capital project expenditure.

Alternatively, in Kenya, Godfrey and Mutuku (2013) study domestic debt and economic growth nexus in Kenya. The study investigated the effect of domestic debt and economic growth in Kenya. The issue was examined empirically using advanced econometric technique and quarterly time series data spanning 2000 to 2010. They employed Jacque Bera (JB) to investigate the properties of the time series in the aspect of normality and Augmented Dickey

Fuller (ADF) test to check the aspect of unit root test. On the other hand Engle-Granger Residual based and Johannes VAR based configuration test were used to investigate the long-run relationship between the variables. Due to evidence of co-integration, error correction model has been used to capture short rum dynamics. Hence the results showed that domestic debt expansion for the period of study has a positive and significant effect on economic growth. In view of this, the researchers make a recommend d action that the Kenya government should encourage sustainable domestic borrowing provided the funds are utilized in productive economics avenues.

Obademi Emanuel (2012) empirically analyzed the impact of public debt on economic growth in Nigeria from 1975-2005. An analysis of the long run relationship and impact of debt from the perspective of the value impact and proportional impact was done. The value impact variables used were external debt value, domestic debt value, total debt value and budget deficit finance figures. Econometric technique such as OLS in an augmented Cobb Douglas model co-integration tech and error correction mechanism were used to accomplish the objectives of the study. Hence, the study concluded that, though in the short run the impact of borrowed funds on the Nigerian economy is positive, while the impact of debt in t he long rum depressed economic growth as a result o f in competent debt management.

In another study, Onyeiwu (2012) investigates the relationship between domestic debt economic growths in Nigeria; he also employed the ordinary least square method (OLS), and error correction. Harmonious models are used to analyses quarterly data between 1994 and 2003. The result of their findings shows that the domestic debt holding of government is far above a healthy threshold of 35 percent of bank deposit as the average over the periods of study is 114.98 percent of bank deposit presenting evidence of crowding out of private investments. The study also affirms that the level of debt has negative effect on economic growth. They advised that government should maintain a debt bank deposit ratio below 35

percent and resort to increase use of tax revenue to finance its project. Also they pointed out to avoid crowding out, government should divest itself of all projects the private sector can handle while providing enabling environment for private sector investors such s tax holidays, subsidies, guarantee and most importantly improved infrastructure.

Adofu and Abula (2010) examine the empirical relationship between domestic debt and economic growth in Nigeria. They use the time series data from 1986 to 2005 to explore the relationship between domestic debt and economic growth in Nigeria. Their result showed that domestic debt has affected the growth of economy negatively. They also made recommendation that of discouraging government domestic borrowing and also an increase of revenue base through its tax reform programme. Although they carried out a robust statistical analysis by including variables related to domestic debt to their model, such as interest rate and domestic credit. While on the other hand they failed to show the evidence of crowding out of private investment and also use a better analytical tools of estimation.

2.3.2 Domestic Debt and Private Investment

This section reviews related past studies on the relationship between domestic debt and private investment.

Uzoh (2014) set out to investigate on issues pertaining to the structure and composition of domestic debt and its impact on private investment in Nigeria. Multiple regression models were employed as econometric using secondary data technique from 1970 to 2012. however based on his objectives of his study, he employed the following variables, exchange rate, inflation rate, debt servicing, national savings, real gross domestic product, never the less domestic private investment and foreign private investment. The study found that domestic debt is inverse significant impact on domestic private investment in Nigeria. The result also showed that domestic debt has inverse significant impact on foreign private investment in Nigeria with exchange rate and debt servicing having positive effect on foreign private

investment in Nigeria. He also achieve that, domestic debt should always be checked because if it goes unchecked it crowed out private investment in Nigeria.

Robert (2014) analyses the impact of public domestic debt on private investment levels in Kenya over the period 1967-2007. The study employed Johasen Co-intergration and long-run estimation. The results indicated that high levels of domestic borrowing have negatively impacted on private investment. The results also showed that the impact of public investment on private investment was not as significant as public domestic debt, GDP and interest rate variable suggesting that public investment has not been complementary on private investment. Interest rates have negatively impacted on private investments, while with regard to GDP; economic growth has induced more private investments

Apere (2014) examines the impact of public debt (external and domestic) on private investment in Nigeria over the period 1981 – 2012. With the aid of instrumental variable technique of estimation and bootstrapping technique for the computation of normal based standard errors for the turning points. The study finds out that the impact of domestic debt on private investment in Nigeria is linear and positive; and (ii) the impact of external debt on private investment in Nigeria is U-shaped.

2.3.3 Domestic Debt and Macroeconomic Variables (Interest rate, Inflation and Budget Deficit)

This section studies on the relationship between domestic debt and macroeconomic instability. Although there are a few literature on their relationship especially in Nigeria.

Perveen and Munir (2017) examine the impact of total, internal and external government debt on nominal interest rate in Pakistan. The study used loan able fund theory as theoretical model and ARDL bond testing approach for cointegration and granger causality test to estimate the results. The results of the study found negative relation between total government debt, external and nominal interest rate in the long run, while study found no

evidence of long run relation between internal government and nominal interest rate. The study recommends reforms should be made to lessen the burden of government debt and to stabilize the interest rate.

Skorobogatova (2016) explore macroeconomic instability; it causes and consequences for the economy of Ukraine. The study made a timely identification of macroeconomic instability factors. Also investigate the steps to prevent their negative consequences. Using graphical analysis of statistical data they examine the relationship between GDP, inflation, nominal wages, revenues, budget deficit and total debt. The study concluded that macroeconomic instability affects the economy negatively.

Das (2016) examines effect of government debt on macro-economic activity in Bulgaria. The study also examined the short term and long term impact of government debt on macroeconomic activity in Bulgaria. With the aid of Johansen cointegration test VAR/VECM as the estimation techniques the study estimated the relationship between Real GDP, Consumption expenditure, Investment, Net export to GDP and Government debt. The results concluded that short term government debt increase stimulates real GDP. While the long term impact is considered, the stimulating effect of government debt growth on GDP is observed only unto a certain threshold, beyond which debt increase produces adverse effects on macroeconomic activity.

Ahmad, Sheik and Tariq (2012) investigated the impact of domestic debt on inflation in Pakistan for the period of 1972 to 2009. The study used OLS estimation technique. The result of this study revealed that domestic debt and domestic debt servicing enhance the price level in Pakistan the effect of the volume of domestic debt and domestic debt servicing on the price level found in Pakistan and statistically significant. The estimation also showed that floating debt in treasury bills comprise a large part of total domestic debt, which are short term securities and have a high return in the form of interest rate. Further the interest rate in the

case of cost of domestic borrowing or debt servicing is one of the major reasons for the budget deficit in Pakistan. The researchers propose policies to reduce the domestic debt, namely enhancing the tax base and lowering expenditures through structural reforms.

Warega (2012) examined the relationship between budget deficit and domestic debt for twenty years from 1991 to 201. Using multiple regression analysis, the result indicated that there was a positive relationship between budget deficit, government expenditure, government revenue and domestic debt which were critical in determining the level of domestic debt. Furthermore the study found out that relationship between inflation rates, interest rates and domestic debt was found that they were critical in determining the levels of domestic debts.

Bildirici and Ersin (2007) investigated the relationship between inflation and domestic debt by using a panel cointegration application to emerging and developed economies. The study divided the countries into 3 groups; countries with high inflation experiences with increasing cost of domestic debt, second group is countries with low inflation, high borrowing with low costs of borrowing and fiscal policies. As a result, it is not the rate of domestic cost of borrowing and active fiscal regimes that lessens the immunity of emerging economies to economic crises.

Engen and Hubbard (2004) empirically examined the effect of federal government debt and interest rate. The study found that an increase in government debt is equivalent to 1% of GDP would increase the real interest rate by about two to three basic point.

2.3.4 Empirical Literature Gap

Base on the review of relevant theoretical and empirical literature, this study have identified the following gaps

i. Literatures did not capture the current economic situation of Nigeria, whereby the Nigerian economic had witness slow and low economic growth rate and other macroeconomic instability.

ii. Likewise some of the variables such as interest rate, private sector investment among others that explain the relationship between domestic debt and economic growth also come as quarterly data. However most of the studies such as; Anyawu and Erhijakpor (2004) and Ugwu (2017) among others carried out their analysis using annual data. Hence, unlike quarterly data, the use of annual data could result to a biased analysis.

iii. Likewise, most of the reviewed literature on this study like, Ugwu (2017) among others discuss the effect of crowding out effect of domestic borrowing but did not take into consideration the variable private investment in their model of analysis to show how domestic borrowing crowds out private investment.

iv. On the other hand, Uzoh (2014) examined the relationship between domestic debts on only investment and did not take into consideration its effect on the growth of the economy.

2.4 Theoretical Framework

When it comes to the issues of debt it implies that fiscal policies are adopted in a way that inter-temporal budget constraints are satisfied. However, for this study we made use of domestic debt. Hence, the budget constraint can be obtained from the following budget identity.

$$DGDP_t - DGDP_{t-1} = r_t DGDP_{t-1} + G_t - R_t \qquad (2.1)$$

Where DGDP is the domestic debt to GDP, G is government expenditure and R is the government revenue, r is the interest on domestic debt. The debt sustainability test proposed by Bohn (1998) suggests analyzing whether the primary surplus relative to GDP is a positive function of domestic debt relative to GDP. The idea behind this test is that the government

should follow a fiscal policy that a rising debt ratio should lead to a higher primary surplus relative to GDP. Following equation can be estimated for domestic debt to show that whether the government is a taking suitable measures to confirm intertemporal budget constraint.

$$PBGDP_t=\beta_0 + \beta_1 DGDP_{t-1}+\mu_t \quad (2.2)$$

Where PBGDP is the primary budget surplus/deficit to GDP ratio, DGDP is domestic debt to GDP and μ_t is the error term.

The primary budget surplus is determined by a set of other variables, which can be included in above equation.

$$PBGDP_t=\beta_0 + \beta_1 DGDP_{t-1} + \beta_i Z_{it}+ \mu_t \quad (2.3)$$

For other determinants (Z) of budget surplus, the current study will replace the dependent variable PBGDP with Real GDP which will be used to examine the relationship between domestic debt, primary balance to economic growth. As such, PBGDP will become an independent variable. Hence the above equation will become as follows;

$$RGDP_t=\beta_0 + \beta_1 DGDP_{t-1} + \beta_2 PBGDP_{t-1+} \beta_i Z_{it}+ \mu_t \quad (2.4)$$

For other determinants (Z) of budget surplus, the current study includes the Government consumer price index (CPI) and Real Interest Rates (RIR). The study uses quarterly time series data of Nigeria over the period $1999Q_1$ to $2017Q_4$ to assess the impact of domestic debt on economic growth.

CHAPTERTHREE
METHODOLOGY

3.1 Introduction

The methodological aspect of this study is presented here and the models for specifications are also presented here. The models specifications are guided by relevant economic and econometric theories. This section has several subsections which include, model specification, measurement, definition of variables and sources of data.

This study seeks to examine the impact of domestic debt on economic growth in Nigeria for a period of $1999Q_1 – 2017\ Q_4$.

3.2 Measurement of Variables and Sources of Data

The variables that were used in this study are quarterly data series, sourced from the National Bureau of Statistics (NBS), Debt Management Office (DMO) of Nigeria, Budget Office of the Federation (BOF) and Central Bank of Nigeria (CBN) statistical Bulletin.

six (6) variables namely; Real Gross Domestic Product proxy to Economic Growth (GDP_t), Domestic debt to GDP ($DGDP_t$), Real Interest Rates (IR_t), Primary Balance to GDP ($PBGDP_t$), Consumer Price Index proxy to Inflation (CPI_t), and Private Sector Investment (PI_t), covering the period of $1999Q_1$ to $2017Q_4$ was used. The description and measurement of the variables are as follows:

Real Gross Domestic Product (GDP): The Real Gross Domestic Product will be used to measure economic growth. This measure is widely used in literatures and the data for this variable is readily available. This measure was used by Peter et al (2013), Emeka, (2014), Okwu et al (2016); among the most recent literatures. The RGDP is measured using quarterly data series on constant prices (2010) in US dollars. The data was sourced from National Bureau of Statistics (NBS), Central Bank of Nigeria (CBN).

Domestic debt to GDP (DD_t): The debt to GDP ratio compares a country's sovereign debt to the total economic output for the year. Its output is measured by gross domestic product. This

ratio is a useful tool for investors, leaders, and economists. The variable is use to measuring debt sustainability. The data was sourced from National Bureau of Statistics (NBS) and Central Bank of Statistics (CBN).

Real Interest Rate (RIR_t): Real interest rate is an interest rate that has been adjusted to remove the effects of inflation to reflect the real cost of funds to the borrower and the real yield to the lender or to an investor. The real interest rate of an investment is calculated as the amount by which the nominal interest rate is higher than the inflation rate. This measure was used by Mary Ann (2014), Emeka, (2014), Okwu et al (2016); among the most recent literatures. The data will be sourced from National Bureau of Statistics (NBS), Central Bank of Statistics (CBN).

Primary Balance to GDP ($PBGDP_t$): This is defined as government net borrowing or net lending excluding interest payment on consolidated government liabilities. This measures both budget deficit and budget surplus to GDP. This variable has not been used in recent literatures, as most of the empirical studies did not explore combined debt surplus and deficit in relation to GDP. The data will be sourced from Budget Office of the Federation (BOF).

Private Sector investment (PI_t): This is the inflow of income by firms and individuals into the economy through capital formation. This variable will help in evaluating how domestic debt crowds out investment. This measure was used by Emeka, (2014), David and Etido (2016); among the most recent literatures. The data will be sourced from National Bureau of Statistics (NBS), Central Bank of Statistics (CBN).

Consumer Price Index (CPI_t): The consumer price index is proxy to inflation. The Consumer Price Index (CPI) is a measure that examines the weighted average of prices of a basket of consumer goods and services, such as transportation, food and medical care. It is calculated by taking price changes for each item in the predetermined basket of goods and averaging them. This measure is used as proxy to inflation. This measure was used by

Ojo&Awodele (2013), Emeka, (2014); among the most recent literature. The data was sourced from World Bank Development Indicator (WDI, 2017).

3.3 Model Specification

The model used in this study followed the work of Uzoh (2014), who investigated the structure and composition of domestic debt and the impact on private investment in Nigeria. This study adapted the empirical specification to capture the objectives of the study; the models will be in two forms as presented by Uzoh (2014).

The first model of this study captures the first objective of the study, while the second model will capture the second and third objective. The functional form of these models can be specified as follows:

Model One
The first model is presented as follows

Real Gross Domestic Product =*f* (Domestic debt to GDP, Primary Balance to GDP, Real Interest Rates, Consumer Price Index).

$$RGDP_t = f\ (DGDP_t, PBGDP_t, RIR_t, CPI_t) \quad (3.1)$$

The mathematical form for the first model can be expressed as;

$$RGDP_t = \beta_o + \beta_1 DGDP_t + \beta_2 PBGDP_t + \beta_3 RIR_t, + \beta_4 CPI_t \quad (3.2)$$

Model Two
The second model is presented as follows

Private Sector Investment =*f*(Domestic debt to GDP, Primary Balance to GDP, Real Interest Rate, CPI,).

$$PI_t = f\ (DGDP_t, PBGDP_t\ RIR_t, CPI_t) \quad (3.3)$$

The mathematical form for the second model can be expressed as;

$$PI_t = \beta_o + \beta_1 DGDP_t + \beta_2\ PBGDP_t\ + \beta_3 RIR_t + \beta_4 CPI_t \quad (3.4)$$

But equations above are exact or deterministic in nature. In order to allow for the inexact relationship among the variables as in the case of most economic variables, the stochastic error term "μ_t" is added to the three equations. Thus, the study expresses the econometric form of the models as:

$$RGDP_t = \beta_o + \beta_1 DGDP_t + \beta_2 PBGDP_t + \beta_3 RIR_t, + \beta_4 CPI_t + \mu_t \quad (3.5)$$

$$PI_t = \beta_o + \beta_1 DGDP_t + \beta_2 PBGDP_t + \beta_3 RIR_t + \beta_4 CPI_t + \mu \quad (3.6)$$

Where, $RGDP_t$, = is the Real Gross domestic Product proxy to Economic Growth
$DGDP_t$ = Domestic debt to GDP
RIR_t = Real Interest Rates
$PBGDP_t$ = Primary Balance to GDP
CPI_t = Consumer Price Index proxy of Inflation rate
PI_t = Private Sector Investment
μ_t= stochastic error term.

In order to properly estimate the parameters of the postulated models, we rescale some of the variables by logging them, as follow;

$$Log(RGDP_t) = \beta_o + \beta_1 DGDP_t + \beta_2 PBGDP_t + \beta_3 RIR_t, + \beta_4 CPI_t + \mu_t \quad (3.7)$$

$$Log\ (PI_t) = \beta_o + \beta_1 DGDP_t + \beta_2 PBGDP_t + \beta_3 RIR_t, + \beta_4 CPI_t + \mu_t \quad (3.8)$$

3.4 Techniques for Data Analysis

3.4.1 Unit Root Tests

The first step involves testing the order of integration of the individual series under this consideration. Researchers will develop several procedures for the test of order of integration. The most popular ones are Augmented Dickey-Fuller (ADF) test due to Dickey and Fuller (1979, 1981), and the Phillip - Perron (PP) due to Phillips (1987) and Phillips and Perron (1988).

3.4.1.1 Augmented Dickey–Fuller (ADF) Test

Augmented Dickey-Fuller test relies on rejecting a null hypothesis of unit root (the series are non-stationary) in favor of the alternative hypotheses of stationary. The ADF test is presented as follows;

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t-1} + \mathcal{E}_t \qquad (3.9)$$

Where ε_t is a pure white noise error term and where $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$, $\Delta Y_{t-2} = (Y_{t-2} - Y_{t-3})$, etc. The number of lagged difference terms to include is often determined empirically, the idea being to include enough terms so that the error term in is serially uncorrelated. In ADF we still test whether $\delta = 0$ and the ADF test follows the same asymptotic distribution as the DF statistic, so the same critical values can be used.

3.4.1.2 The Phillips–Perron (PP) Unit Root Tests

An important assumption of the DF test is that the error terms u_t is independently and identically distributed. The ADF test adjusts the DF test to take care of possible serial correlation in the error terms by adding the lagged difference terms of the regress and. Phillips and Perron use nonparametric statistical methods to take care of the serial correlation in the error terms without adding lagged difference terms.

Phillips and Perron's test statistics can be viewed as Dickey–Fuller statistics that have been made robust to serial correlation by using the Newey–West (1987) heteroskedasticity- and autocorrelation-consistent covariance matrix estimator.

Under the null hypothesis that $\rho = 0$, the PP Z_t and Z_π statistics have the same asymptotic distributions as the ADF t-statistic and normalized bias statistics. One advantage of the PP tests over the ADF tests is that the PP tests are robust to general forms of heteroskedasticity in the error term ut. Another advantage is that the user does not have to specify a lag length for the test regression.

$$s_n^2 = \frac{1}{n-k} \sum_{i=1}^{n} \mu_i^2 \qquad (3.10)$$

Where μ_i is the OLS residual, κ is the number of covariates in the regression, q is the number of Newey-West lags to use in calculating λ_n^2 and $\tilde{\delta}$ is the OLS standard error of $\tilde{p}$.

3.4.1.3 KPSS (Kwiatkowski, Phillips, Schmidt, and Shin) Test

Sometimes it is convenient to have stationarity as the null hypothesis

The test statistic is given by

$$\text{KPSS} = \frac{1}{T^2} \cdot \frac{\sum_{t=1}^{T} S_t^2}{\delta_\infty^2}, \qquad (3.11)$$

Where $S_t = \sum_{s=1}^{t} e_s$ is a partial sum; δ_∞^2 is a HAC estimator of the variance of $\hat{e}_t$ (This is an LM test for constant parameters against a RW parameter).

3.4.2 Test of Co-integration

The second step is the testing of the presence or otherwise of cointegration between the series of the same order of integration through forming a cointegration equation. The basic idea behind cointegration is that if, in the long-run, two or more series move closely together, even though the series themselves are trended, the difference between them is constant. It is possible to regard these series as defining a long-run equilibrium relationship, as the difference between them is stationary (Hurlin, and Henry, 1989). A lack of cointegration suggests that such variables have no long-run relationship: they can wander arbitrarily far away from each other (Dickey et.al, 1991).

As in the situation where a unit root test for stationarity shows that some of the variables are to be stationary at their level and some to be stationary at their first difference. This case requires to test whether the variables have a long run relation or not; i.e. conducting the co-integration test.

3.4.2.1 Autoregressive Distributed Lags (ARDL) and Bounds Cointegrating Test

To further achieve the first objective of the study and in order to capture both Short-run and long-run impact of domestic debt on economic growth, this study will employ Autoregressive

Distributed Lag (ARDL) and bound testing approach developed by Pesaran et al., (2001). The justification for the selection of this approach is base on the advantages of the ARDL for testing the existence of a co-integrating relationship either in the short-run or long-run.

Pesaran et al., (2001) developed a new Auto-Regressive Distributed Lag (ARDL) bounds testing approach for testing the existence of a co-integrating relationship.

The bound testing approach has certain econometric advantages that are preferable in comparison to other single Co-integration procedures (Engle and Granger, 1987; Johansen, 1988; Johansen and Juselius, 1990).

The econometric methodology is relieved of the burden of establishing the order of integration amongst the variables and of pre-testing for unit roots. The ARDL approach to testing for the existence of a long-run relationship between the variables in levels is applicable irrespective of whether the underlying regressors are purely *I*(0), purely *I*(1), or fractionally integrated.

Likewise, the issues of endogeneity problems and inability to test hypotheses on the estimated Co-efficient in the long-run associated with the Engle-Granger (1987) method are avoided. The long and short run parameters of the model can be estimated simultaneously. Also, it is argued in Narayan (2005), the small sample properties of the bounds testing approach is far superior to that of multivariate Co-integration. The approach, therefore, is a modification of the Auto- Regressive Distributed Lag (ARDL) framework while overcoming the inadequacies associated with the presence of a mixture of *I* (0) and *I*(1) regressors in a Johansen-type framework.

The general ARDL (p,q) model for is this study is presented as follows

$$Z_t = \mu_0 + \Psi_t + \Sigma \partial_i Z_{t-1} + \varepsilon_t,\ t = 1, 2 \ldots\ldots\ldots T \qquad (3.12)$$

i=1

Where:

μ_0 = vector of intercepts

Ψ_t= is the long-run components of the variables

Z_{t-1} = is the short-run components of the variables

ε_t= stochastic error term

The corresponding Vector Error Correction Model (VECM) for Eq. (3.12) is derived as:

$$\Delta Z_t = \mu_0 + \Psi_t + \gamma_i Z_{t-1} + \sum_{i=1}^{p} \lambda_i Z_{t-1} + \varepsilon_t \qquad (3.13)$$

Where; Δ = first difference operator,

γ and λ = vector matrices that contain the long-run multipliers and short-run dynamic coefficients of the VECM respectively.

Z_t is a vector of X_t and Y_t variables respectively.

$Y_t = (RGDP_t)$

$X_t = (DGDP_t, PBGDP_t, RIR_t, CPI_t)$ is a vector matrix of a set of regressors. As a condition, Y_t must be an I(1) variable, while X_t regressors can either be I(0) and I(1). ε_t is a stochastic error term. Assuming unrestricted intercepts and no trends,

The testing procedure of the ARDL bounds test is performed in three steps. First, OLS is applied to Eq. (3.13) to test for the existence of a co-integrating long run relationship normalized on $LOGRGDP_t$ based on the Wald test (F-statistics) for the joint significance of the lagged levels of the variables the hypothesis are:

H0: $B_1= B_2=B_3 = B_4=B_5=0$ Absence of co-integration

H1:$B_1\neq B_2\neq B_3\neq B_4\neq B_5\neq 0$. Presence of co-integration

The computed F-statistic is then compared with the non-standard critical bounds values as reported in Pesaranet al. (2001).

The lower and upper bounds critical values assumes that the regressors are purely I(0), purely I(1), respectively. If the F-statistic is above the upper critical value, the null hypothesis of no long-run relationship can be rejected irrespective of the orders of integration for the time series. Conversely, if the test statistic falls below the lower critical value the null hypothesis cannot be rejected. Finally, if the statistic falls between the lower and upper critical values,

the result is inconclusive. Once co-integration is established, the second step involves estimating the long-run model for $LOGRGDP_t$ as:

$$LOG\ (RGDP_t) = \alpha_0 + \Sigma\beta_1 LOG\ (RGDP_{t-i}) + \Sigma\beta_2 DGDP_t + \Sigma\beta_3\ PBGDP_{t-1} + \Sigma\beta_4 RIR_{t-1} + \Sigma\beta_5 CPI_{t-1} + \varepsilon_{t-1} \quad (3.14)$$

The leg length of the models underlying ARDL is selected using two criteria such as Schwarz Bayesian criterion (SBC) and Akaike information criterion (AIC).The final step involves estimating an Error Correction Model (ECM) to obtain the short-run dynamic parameters as specified below:

$$\Delta RGDP_t = \alpha_0 + \Sigma\varphi_{1i}\Delta Log\ (RGDP_{t-1}) + \Sigma\varphi_{2i}\Delta DGDP_{t-1} + \Sigma\varphi_{3i}\Delta\ PBGDP_{t-1} + \Sigma\varphi_{4i}\Delta RIR_{t-1} + \Sigma\varphi_{5i}\Delta CPI_{t-1} + \delta ecm_{t-1} + \varepsilon_{t-1} \quad (3.15)$$

$i=0$

Where:

ecm_{t-1} = the error correction mechanism lagged for one period
δ = the coefficients for measuring speed of adjustment
Log= Logarithm function
$RGDP_t$, = is the Real Gross Domestic Product (The RGDP will be used as proxy to Economic Growth)
$DGDP_t$ = Domestic debt to GDP
$PBGDP_t$ = Primary Balance to GDP
RIR_t = Real Interest Rates
CPI_t= Consumer Price Index proxy to inflation
β_1-β_5= coefficients of the variables

ARDL lag Selection

This is feature of the ARDL models that allows for more flexibility than the cointegrated VAR approaches that do not allow for different lags for different variables. It also follows that the choice of lag order for the ARDL model is crucial for long-run analysis. Lag orders have to be selected based on diagnostic tests for residual serial correlation, functional form misspecification, non-normality and heteroscedasticity (several information criteria are

available for this purpose, such as the Akiaike Information Criterion (AIK), the Schwarz Bayesian Criterion (SBC), the Hannan-Quinn Criterion (HQC) and the R^2 criterion). Pesaranet al. (2001) show that the ARDL model yields consistent estimates of long-run coefficients under asymptotic normality. This result holds for regressors that are purely I(0), I(1) or mixed. Pesaran and Shin (1999) show that the small sample properties of the bounds testing approach are better than that of the traditional Johansen cointegration approach (a large sample size is normally required for the results to be valid). This is another reason why, besides the inclusion of a possibly stationary variable and the better options to control for cross-section dependencies, the ARDL approach is chosen in this dissertation.

Diagnostics Tests

To determine the appropriateness of ARDL model, the study conducts some diagnostic tests (*e.g.*, serial correlation, heteroscedasticity and normality tests) and parameter stability test. According to Saleem and Sail (2009), Brown *et al.* (1975) presented an excellent methodology for investigating parameter stability, which is recognized as cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) tests. Pesaran and Pesaran (1997) argue that the short-run dynamics play an important role to examine the long-run parameter stability.

i **Serial Correlation:** This test is used to verify the randomness of the error term between members of the same series of observations. As a result of the numerous assumptions and problems associated with the conventional Durbin-Watson (DW) test, the Breusch-Godfrey (LM) test will be employed to verify this hypothesis.

The Breusch-Godfrey (BG) general test of autocorrelation also known as LM-test is used to verify this assumption. This test is better than the conventional Durbin-Watson test of autocorrelation in the sense that it allows for non-stochastic repressors such as the lagged values of the regress and, higher-order autoregressive schemes, and simple or higher order

moving averages of the error terms. The test assumes that the error term generated from the original regression follows the p^{th}-order autoregressive, AR (P) scheme. Then, the AR (P) scheme alongside the original regresses is run against the generated residual. For our model, we generated AR (2) for the residual

ii Heteroscedasticity: One of the important diagnostics test in the ARDL model is the heteroscedasticity test. The most important assumptions of the classical linear regression model is that the variance of each disturbance term *ui* , conditional on the chosen values of the explanatory variables, is some constant number equal to σ^2 . This is the assumption of **homoscedasticity,** or *equal* (homo) *spread* (scedasticity), that is, *equal variance*. Symbolically.

$E(\mu_i^2) = \sigma^2$ i= 1,2,…,n

iii Normality Test: One of the assumptions of the CLRM is that the error terms are normally distributed with zero mean and constant variance i.e.

$\mu_t \sim N(0,\delta^2)$

The normality test is conducted to verify whether the error terms are normally distributed. The Jacque – Bera (JB) test of normality is used to verify this assumption. This test is based on the residuals generated from OLS. Under the null hypothesis that the residuals are normally distributed, the JB statistic asymptotically follows the chi-square distribution with two (2) degrees of freedom. The test statistic given as:

$$JB = n\left[\frac{\{\frac{U_i}{6} - (U_4 - 3)2\}}{24}\right] \quad (3.16)$$

iv Specification Bias: One of the assumptions of the classical linear regression model (CLRM), is that the regression model used in the analysis is "correctly" specified: If the model is not "correctly" specified, we encounter the problem of **model specification error** or **model specification bias.**

The consequences of specification errors is one thing but finding out whether one has committed such errors is quite another, for we do not deliberately set out to commit such errors. Very often specification biases arise inadvertently, perhaps from our inability to formulate the model as precisely as possible because the underlying theory is weak or because we do not have the right kind of data to test the model.

Ramsey's RESET Test will be used for specification test**.** Ramsey has proposed a general test of specification error called RESET (regression specification error test). Here we will illustrate only the simplest version of the test.

v **Cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) tests:** The cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMsq) tests are applied to check the stability of the mode

The cumulative sum test is used to test the randomness of a sequence of zeros and ones (Data plot to convert a data set with exactly two distinct values to a sequence of zeros and ones). For this test, the zeros are converted to negative ones. The test is based on the maximum distance from zero of a random walk defined by the cumulative sum of the sequence. A large enough distance is indicative of non-randomness.

Hence, stability tests of Brown et al. (1975), which are also known as cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests based on the recursive regression residuals, may be employed to that end. These tests also incorporate the short-run dynamics to the long-run through residuals. The CUSUM and CUSUMSQ statistics are updated recursively and plotted against the break points of the model. Provided that the plots of these statistics fall inside the critical bounds of 5% significance, one assumes that the coefficients of a given regression are stable. These tests are usually implemented by means of graphical representation.

3.4.2.2 Johansen Multivariate Cointegration

There are different co-integration tests that are used by different researchers. Out of these testing instruments, the two steps Engle and Granger (1987) approach and the Johansen test (Johansen, 1988) method are some of the different instruments that are repeatedly used by different researchers.

Given a VAR model as

$$\Delta y_t = \mu + \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-1} + \mathcal{E}_t \qquad (3.17)$$

Where

$\Pi = \sum_{i=1}^{p} A_i - I$ and $\Gamma_i = -\sum_{j=i+1}^{p} A_j$

If the coefficient matrix **Π** has reduced rank $r<n$, then there exist nxr matrices **α** and **β** each with rank r such that **Π** = **αβ′** and t **β′y** is stationary. r is the number of cointegrating relationships, the elements of **α** are known as the adjustment parameters in the vector error correction model and each column of **β** is a cointegrating vector. It can be shown that for a given r, the maximum likelihood estimator of **β** defines the combination of $t-1$ **y** that yields the r largest canonical correlations of t Δ**y** with $t-1$ **y** after correcting for lagged differences and deterministic variables when present.3 Johansen proposes two different likelihood ratio tests of the significance of these canonical correlations and thereby the reduced rank of the **Π** matrix: the trace test and maximum eigenvalue test, shown in equations (3.18) and (3.19) respectively.

$$J_{trace} = -T\sum_{i=r+1}^{n} ln(1-\lambda_i) \qquad (3.18)$$

$$J_{Max} = -T\, ln(1-\lambda_{r+1}) \qquad (3.19)$$

Here T is the sample size and i

λˆ is the i:th largest canonical correlation. The trace test tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of n cointegrating vectors. The maximum eigenvalue test, on the other hand, tests the null hypothesis of r cointegrating

vectors against the alternative hypothesis of r +1 cointegrating vectors. Neither of these test statistics follows a chi square distribution in general; asymptotic critical values can be found in Johansen and Juselius (1990) and are also given by most econometric software packages. Since the critical values used for the maximum eigenvalue and trace test statistics are based on a pure unit-root assumption, they will no longer be correct when the variables in the system are near-unit-root processes. Thus, the real question is *how* sensitive Johansen's procedures are to deviations from the pure-unit root assumption.

Although Johansen's methodology is typically used in a setting where all variables in the system are I(1), having stationary variables in the system is theoretically not an issue and Johansen (1995) states that there is little need to pre-test the variables in the system to establish their order of integration. If a single variable is I(0) instead of I(1), this will reveal itself through a cointegrating vector whose space is spanned by the only stationary variable in the model.

3.4.3 Vector Auto regression Model

To capture the other relationship especially in relations to the second and third of the study objectives the unrestricted VAR model is adopted for this particular work because it has a forecasting power relative to large structural models. This technique was employed by Egbetunde (2012) to examine the nexus between public debt and economic growth in Nigeria. Likewise, Essien et al (2016) employed the VAR technique to examine the impact of public sector borrowing on price, interest and output in Nigeria. Also, Onogbosele & Ben (2016) employed VAR techniques to examine the impact of domestic debt and economic growth in Nigeria. Hence this study will employ the VAR technique to examine the contemporaneous relationship between domestic debt and economic growth among other macroeconomic variables in Nigeria.

However, one of the common virtues of VAR is that it obviates a decision as to what contemporaneous variables are exogenous, all variables are endogenous, once that distinguish between the short run dynamics and long-run causality. Also the VAR framework all the variables as potentially endogenous as explained by Sims (1980).

Hence, the VAR equations will be in two forms;

VAR for the model is presented as follows;

$$\text{LOGPI}_t = C_1 + a_{11}\text{LOGPI}_{t-1} + a_{12}\text{DGDP}_{t-1} + a_{13}\text{PBGDP}_{t-1} + a_{14}\text{RIR}_{t-1} + a_{15}\text{CPI}_{t-1} + e_{t1} - (1)$$

$$\text{DGDP}_t = C_2 + a_{21}\text{LOGPI}_{t-1} + a_{22}\text{DGDP}_{t-1} + a_{23}\text{PBGDP}_{t-1} + a_{24}\text{RIR}_{t-1} + a_{25}\text{CPI}_{t-1} + e_{t2} - (2)$$

$$\text{PBGDP}_t = C_3 + a_{31}\text{LOGPI}_{t-1} + a_{32}\text{DGDP}_{t-1} + a_{33}\text{PBGDP}_{t-1} + a_{34}\text{RIR}_{t-1} + a_{35}\text{CPI}_{t-1} + e_{t3} - (3)$$

$$\text{RIR}_t = C_4 + a_{41}\text{LOGPI}_{t-1} + a_{42}\text{DGDP}_{t-1} + a_{43}\text{PBGDP}_{t-1} + a_{44}\text{RIR}_{t-1} + a_{45}\text{CPI}_{t-1} + e_{t4} - (4)$$

$$\text{CPI}_t = C_5 + a_{51}\text{LOGPI}_{t-1} + a_{52}\text{DGDP}_{t-1} + a_{53}\text{PBGDP}_{t-1} + a_{54}\text{RIR}_{t-1} + a_{55}\text{CPI}_{t-1} + e_{t4} - (5)$$

3.4.4 Vector Error Correction Mechanism (VECM)

After testing for the co-integration relationship and co-integration is proven to exist between the variables, then the third step will require a construction of an Error Correction Mechanism (ECM) to model the short run dynamic relationship. The reason behind ECM is to indicate the speed of adjustment from the short-run equilibrium to the long-run equilibrium state. The greater the co-efficient of the parameter, the higher the speed of adjustment of the model from the short-run to long-run equilibrium. In addition to that in order to separate the short run and the long run effects, a Vector Error Correction Model (VECM), is included in the equation. This technique was employed by Peter, Denis & Chukwuedo (2013) who examine the importance of domestic debt on economic growth in Nigeria. Likewise, Godfrey & Mutuku (2013), who examined domestic debt and economic growth in Kenya, employed the VECM model. In addition, Debi & Badir (2014), employed the VECM technique to examine the effect of public debt on economic growth in India. Hence if there is an evidence of cointergration this study will employ the VECM model.

3.5 Innovation Accounting

3.5.1 Impulse Response and Variance Decomposition

Through the impulse response and variance decomposition, we can examine the short-run dynamics among the economic variables in the VAR system. Once the presence of cointegration is established, the VAR can be used for forecasting through the impulse response function and variance decomposition of forecast-error. The impulse response can be used to trace the time path of the structural shocks on the dependent variables of the VAR model. Sims (1980) Cholesky decomposition can be used to identify the impulse response function in a VAR model ensuring that shocks are uncorrelated. However, this method is not unique since it is based on the assumption of "orthogonally" which means that results may be sensitive to the Cholesky ordering scheme of variables in the system.

Variance Decomposition: The forecast-error of variance decomposition analysis allows us to infer the proportion of the movement in sequence due to its own shocks and shocks in other variables. That is how much of a change in a variable is due to its own shock and how much is due to shocks to other variables.

CHAPTER FOUR
DATA ANALYSIS AND DISCUSSIONS

4.1 Introduction

The purpose of this chapter is for presentation, evaluation and analysis of estimated results of the model postulated. The data used for the work dates from $1999Q_1$ to $2017Q_4$. The parameters estimates were subjected to various economic, statistical and econometric tests, which were used for the verification of the various working hypotheses of this research which is drawn from the specific objectives of the study. All estimations were done using E-view 10 versions. The analyses of the results was use to draw some policy implication of the findings.

4.2 Preliminary Analysis

4.2.1 Descriptive Statistics

It is necessary to examine the descriptive characteristics of the variables used in this study. The descriptive statistics of the variables is presented in table 4.1

Table 4.1 Descriptive Statistics

	RGDP	DGDP	PBGDP	PI	RIR	INF
Mean	236.5353	0.083819	0.074151	16.65953	4.603716	11.01657
Maximum	378.326	0.199138	0.109907	38.38656	23.83785	18.87365
Minimum	134.152	5.36E-11	0.046736	11.80391	-42.3102	5.382224
Std. Dev.	78.3845	0.046509	0.017319	7.303724	14.49947	3.647541
Skewness	0.421021	0.404648	0.808837	2.107401	-1.61888	0.556025
Kurtosis	2.120218	3.493534	2.816811	5.99885	6.461843	2.535925
Sum	17976.68	6.370214	5.635494	1266.124	349.8824	837.2595
Observations	76	76	76	76	76	76

Source computed by the researcher using E-views version 10 (2019)

Table 4.1 above shows the descriptive statistics of the variables. The series have a total of 76 observations with six (6) time series variables. The mean of RGDP is $236.5 with a standard deviation $78.3. The maximum and minimum values of RGDP are $378.326 and $134.152 respectively.

Meanwhile, the mean of DGDP is 0.084 with a standard deviation 0.0465. The maximum and minimum values of DGDP are 0.199138 and 5.36E-11. Also, the mean of PBGDP is 0.074

with a standard deviation 0.0173. The maximum and minimum values of PBGDP are 0.1099 and 0.0467 respectively. Furthermore, the mean of PI is ₦16.660 with a standard deviation ₦7.304. The maximum and minimum values of PI are 38.387 and 11.804 respectively. In addition, the mean of RIR is 4.6% with a standard deviation 1.5%. The maximum and minimum values of RIR are 23.84% and -42.3% respectively. Likewise, the mean of CPI is 11.2% with a standard deviation 3.7%. The maximum and minimum values of CPI are 18.9% and 5.4% respectively.

Also, all other variables are positively skewed with the exception of Real Interest Rates. Meanwhile the kurtosis of the variables showed that the variables are positively skewed. This implies that the variables are flatter to the left as compared to the normal distribution and they are of a leptokurtic distribution (i.e. flat or short-tailed).

4.2.2 Unit Root Test

The unit root test has been conducted to determine the stationary conditions of the series and also to know their order of integration. The results of the tests are given in tables 4.2. In order to be consistent and be sure three Unit Root test techniques were employed, ADF, PP and KPSS were all conducted to know the exact order of integration and the stationary process of the variables.

The results of the three unit root test in the table 4.2 below suggest that there is strong evidence that the null hypothesis of the presence of unit roots cannot be rejected in level form for all the variables. In other words, the results suggest all the series in level are non-stationary. This is not surprising, because it is noted in econometric literature that macroeconomic variables in essence are not stationary.

Table 4.2 Unit Root Tests

VARIABLES	LEVEL				1ST DIFFERENCE			
	ADF (Prob. Value)	PP (Prob. Value)	KPSS	Status	ADF (Prob. Value)	PP (Prob. Value)	KPSS	Status
RGDP	-2.293291 (0.1768)	-2.171840 (0.2182)	0.239016	Not Stationary	-9.025823 (0.0000)	-9.025400 (0.0000)	0.158337	Stationary
DGDP	-1.547216 (0.5040)	-2.773356 (0.2117)	0.301140	Not Stationary	-4.058936 (0.0020)	-13.48297 (0.0001)	0.208868	Stationary
PBGDP	-2.630039 (0.0915)	-2.630039 (0.0915)	0.366121	Not Stationary	-8.653080 (0.0000)	-8.653080 (0.0000)	0.168972	Stationary
RIR	-1.434995 (0.5604)	-1.952920 (0.3068)	0.396852	Not Stationary	-7.849532 (0.0000)	-8.569571 (0.0000)	0.052608	Stationary
CPI	-2.820072 (0.0603)	-0.738597 (0.3933)	0.219428	Not Stationary	-8.486771 (0.0000)	-8.486771 (0.0000)	0.072478	Stationary
PI	-1.950656 (0.3078)	-1.993805 (0.2890)	0.117739	Not Stationary	-8.485676 (0.0000)	-8.485676 (0.0000)	0.076908	Stationary

Source: computed by the author using E-views. Version 10 (2019)

As observed from the results obtained in table 4.2, it seemed necessary to test the stationarity of the variables at their first difference since the variables were not stationary at levels. The results of these difference series is presented in the three unit root tests in the same table 4.2 above. The results suggests after differencing the series, the null hypothesis of non-stationarity in each of the series can be rejected at 1% level of significance. Thus, the series are now integrated of order 1, that is they are I(1). These results are consistent with the general notion that most macroeconomics variables are not stationary at level, but are mostly stationary after first difference.

4.3 Presentation and Analyses of Regression Results

4.3.1 Domestic Debt on Economic Growth

The first objective of this study is analyzed using the ARDL model which is to investigate the effect of domestic debt on economic growth. The main benefit of the ARDL approach is that, it is flexible and can be applied irrespective of whether variables are purely I(0), purely I(1) or mixture of I(0) and I(1) series.

4.3.1.1 Summary of Lag Selection Criteria

In order to apply the ARDL bounds testing approach, it is important to identify an appropriate lag to calculate the F-statistics. The ARDL model is sensitive to the lag order. The AIC (Akaike information criterion) as it provides better results compared to other lag length criteria (Lütkepohl, 2006).

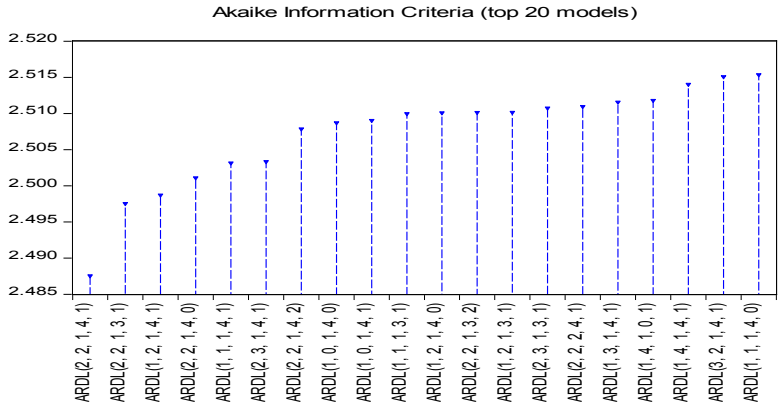


Figure4.1

Source: Generated by the Author using E-views version 10 (2019)

The figure 4.1 above provides summary of the top twenty (20) best models that have been chosen by this method. Since all the selected models cannot be readily estimated, the first best model has been selected which is ARDL (2,2,1,4,1). Hence ARDL (2,2,1,4,1) is the model used for determining the long-run relationship among Real Gross Domestic Product (RGDP), Domestic debt to GDP (DGDP), Primary Balance to GDP (PBGDP), Real Interest Rate (RIR), and consumer price index (CPI), using bound testing approach with the critical values provided by Narayan (2005) which is suitable for small sample data.

4.3.1.2 The ARDL Cointegration Analysis

The table 4.3 below presents the ARDL bounds testing approach to cointegration results.

Table 4.3 ARDL BOUNDS TEST Results

Null Hypothesis: No Long-run Relationship

Test Statistic	**Value**	**K**
F-statistic	4.019723	4
Critical Value Bounds		
Significance	**I0 Bound**	**I1 Bound**
10%	2.313	3.228
5%	2.725	3.718
1%	3.687	4.842
N=72		

Source: computed by the author using E-views. Version 10 (2019)

From the results of the ARDL bounds testing approach to cointegration are the computed F-statistic of 4.019723 since, we have small sample, and we make use of the critical values provided by Narayan (2005). The critical value for the upper bound in Narayan's table is 2.725 and for the lower bound 3.718 at 5%. The f- statistics for this bound test which is 4.019723 is greater than both 3.914 and 2.874. Therefore, the null hypothesis of no long run relationship is strongly rejected even at the 1% level of significance. As such, this finding shows that there is long-run relationship between Real Gross Domestic Product (RGDP), Domestic debt to GDP (DGDP), Primary Balance to GDP (PBGDP), Real Interest Rate (RIR), and consumer price index (CPI), over the study period of $1999Q_1$– $2017Q_4$ in the case of Nigeria.

4.3.1.3 ARDL Long Run Regression Analysis

Having established the fact the there is a long relationship between the variables using the ARDL bounds testing approach to cointegration. The next step is to estimate the Long-run relationship between the cointegrating variables. The table 4.4 below presents the Long-run estimates of variables.

Table 4.4 ARDL Long-Run Estimates

Dependent Variable: LOGRGDP				
Variables	**Coefficient**	**S.E**	**t-values**	**P-Value**
DGDP	-6.55E-06	1.46E-06	-4.493377***	0.0000
PBGDP	0.381208	0.056361	6.763710**	0.0000
RIR	0.110773	0.031140	3.557246***	0.0008
CPI	-0.116526	0.071270	-1.635000	0.1076
C	8.939430	1.039393	8.600629**	0.0000

*Note: *** Statistical significance at the 1 per cent levels,**Statistical significance at the 5 per cent levels.*
**Statistical significance at the 10 per cent levels, Source: computed by the author using E-views. Version 10 (2019)*

The result shows the impact of Domestic debt to GDP (DGDP), Primary Balance to GDP (PBGDP), Real Interest Rate (RIR), consumer price index (CPI) and on Real Gross Domestic Product (RGDP).

From the results, the sign of the coefficient of Domestic debt (DGDP) is negative and statistically significant at 5%. The coefficient of -6.55E-06 implies that over the study period

an increase in domestic debt by 1 unit will leads to approximately -6.55E-04% decreases in RGDP. Theoretically this conforms to the debt over-hang thesis, which implies that "large debt accumulation would lower growth through reduced investment". This agrees to the findings of neoclassical growth model, it maintains that debt accumulation stimulates investment initially, while past debt accumulation impacts negatively on investment and growth. This conforms to the findings of Anyawu and Erhijiakpor (2004) that domestic debt negatively affect economic growth. Also Fisher and Easterly (1990) and WB and IMF (2001) agreed that domestic borrowing leads to crowding out of private investment and hence cause a decline in economic growth.

Furthermore, the sign of the coefficient of primary balance to GDP (PBGDP) is positive and statistically significant at 5%. With the coefficient of 0.38 implies that over the study period an increase in primary balance by 1% leads to approximately lead to 38% increase in RGDP in the long-run. Theoretically, there are controversial thoughts that discussed on the relationship between budget deficit and economic growth. While Keynesian economics claimed that these two series are positively related, the Neoclassical claimed the opposite. However this finding is in consistent with the acclamations of Keynesian school of thoughts. Empirically this finding is in contrast with the finding of Ibrahim et al (2016) that a negative relationship exists between primary balance and GDP although not significant.

Also, the sign of the coefficient of real interest rates (RIR) is positive and statistically significant at 5%. With the coefficient of 0.11 implies that over the study period an increase in real interests rates by 1% leads to approximately 11% increases in RGDP in the long-run. This also conforms to the neoclassical crowding out theory, that an increase in government debt, interest rates have to increase to bring the market into equilibrium, hence, dampening private investment and ultimately economic growth, Voss (2002) and Ganelli (2003). This

finding is also in consistent with the findings of Godfrey and Cyrus (2013) Babalola et al (2015) that interest rate has a negative effect on growth.

Also, the sign of the coefficient of consumer price index (CPI) is negative and statistically insignificant at 5%. With the coefficient of -0.116526 implies that over the study period an increase in consumer price index by 1% leads to approximately lead to 12% decrease in RGDP in the long-run.

4.3.1.4 ARDL Short-Run Regression Analysis

After analyzing the long-run relationship between the variables, the study further estimates the short-run relationship between the variables. The short run results are illustrated in Table 4.5 below with delta sign showing the changes that effect on the dependent variable.

Table 4.5 ARDL Short-Run Estimates

Dependent Variable: Δ(LOGRGDP)

Variables	Coefficient (S.E)	T-Values	P-values
Δ (DGDP)	-2.98E-06 (4.98E-07)	-5.985775	0.0000
Δ(PBGDP)	0.252787 (0.039430)	6.410975	0.0000
Δ(RIR)	0.003525 (0.019821)	0.177843	0.8595
Δ(CPI)	-0.126434 (0.039501)	-3.200784	0.0022
ECT_{t-1}	-0.470302 (0.091822)	-5.121912	0.0000
R-squared	0.638854		
Adjusted R-squared	0.586430		
Durbin-Watson stat	1.532784		
F-statistic	77.68931		0.000000

*Note: *** Statistical significance at the 1 per cent levels,**Statistical significance at the 5 per cent levels. *Statistical significance at the 10 per cent levels, Source: computed by the author using E-views. Version 10 (2019)*

From the table above, the F-statistics measures the overall significance of the regression model. The F-value provides a test of the null hypothesis that the true slope coefficients are simultaneously zero. F-statistics = 77.68931 which is greater than the critical F = 2.46 and the probability value which is 0.0000 also less than 0.05 at 5% level of significance. This

indicates the model has a robust fit and it is statistically significant, that means there is a relationship between the dependent variable and the independent variables.

The R^2 measures the goodness of fit of the estimated model. The R^2 measure the proportion of total variation in the regress and explained by the regression model. From the ARDL regression result the R^2 is 0.638854 while the adjusted R^2 is 0.586430. This means that the model explain about 64% of the total variation in real GDP explained by the explanatory variables.

From the results, the sign of the coefficient of domestic debt (DGDP) is negative and statistically significant at 5%. The coefficient of -2.98E-06 implies that in a short-run an increase in domestic debt (DGDP) by 1 unit leads to approximately 0.0003% marginal decrease in RGDP when other variables are held constant. This result is in consistent with the neoclassical theory which asserts that debt has a direct effect on economic growth. This is because the amount borrowed, if used optimally, is anticipated to increase investment and ultimately economic growth and vice versa.

Also, the sign of the coefficient of primary balance to GDP (PBGDP) is positive and statistically significant at 5% the coefficient of 0.25 implies that in a short-run an increase in primary balance (PBGDP) by 1 unit leads to approximately 25% increase in RGDP when other variables are held constant. This is consistent with the previous long run result.

Likewise, the sign of the coefficient of real interest rate (RIR) is positive and statistically significant at 5% the coefficient of 0.0035 implies that in a short-run a increase in real interest rate (RR) by 1 unit leads to approximately 0.35% increase in RGDP when other variables are held constant. This is consistent with the previous long run result.

Also, the sign of the coefficient of consumer price index (CPI) is negative and statistically significant at 5% the coefficient of -0.126434 implies that in a short-run a increase in real

interest rate (RR) by 1 unit leads to approximately 12.64% increase in RGDP when other variables are held constant. This is consistent with the previous long run result.

The estimate of ε_{t-1} term is negative and significant at 1% level corroborating the proven long run association between domestic debt to GDP (DGDP), Primary Balance to GDP (PBGDP), Real Interest Rate (RIR), consumer price index (CPI) and Real Gross Domestic Product (RGDP). The estimate of ECM_{t-1} term is -0.47, which implies that the deviations from short-run towards long-run are corrected by 47% in each year and it would take almost two years and one month to reach the stable log-run equilibrium path in level of real growth model in case of Nigeria. This empirically implies that for any disequilibrium in the system, the system will automatically adjust itself back to the equilibrium after 2 years and 1 month.

4.3.1.5 Diagnostic Tests

It is appropriate to conduct a diagnostics test to examine if the estimated short-run model as met the assumptions of the Classical Linear Regression Model (CLRM). The table 4.6 below summarizes the diagnostics test carried to see if the model had met the CLRM assumptions.

Table 4.6 Diagnostics Analysis

Diagnostic test	Statistic	P-Values
X^2 Normal	100.2374	0.0000
X^2 Serial	1.122703	0.3650
X^2 ARCH	0.293390	0.9653
X^2 RESET	0.743034	0.3938

*Note: *Short-run R^2 and Adjusted R^2, **Statistical significance at the 5 per cent levels*
Source: computed by the author using E-views. Version 10.0 (2019)

The results of diagnostic tests suggest that the short run model passed the tests that are required in the classical linear regression model (CLRM) such as normality of the error term, the serial correlation and autoregressive conditional heteroskedasticity test.

The normality result shows that with the JB-statistic (X^2) of 100.2374 which is statistically significant at 5% given the probability value of 0.0000 is less than 0.05, this implies that we reject the null hypothesis of normality and therefore conclude that the error terms are not normally distributed at 5% level of significance.

Also, the result from the Breusch-Godfrey (BG) general test of autocorrelation shows that with F-statistics of 1.122703 which is statistically insignificant at 5% given the probability value of 0.3650 is greater than 0.05, this implies that we do reject the null hypothesis of no serial correlation. Hence, we conclude that there is no serial correlation associated in the model.

In addition, the Autoregressive Conditional Heteroskedasticity (ACH) test to test if the error terms are homoskedastic gave results that showed an F-statistics of 0.293390 which is statistically insignificant at 5% given that the probability values of 0.9653 if greater than 0.05. This implies that we do not reject the null hypothesis of constant variance of the error term and conclude that there is no presence of Heteroskedasticity in the model.

The test of misspecification using Ramsey RESET tests was also carried to test if the model is correctly specified. From the results gave the F-statistics of 0.743034 which is statistically insignificant at 5% given the probability value of 0.3938 is greater than 0.05, this implies that we concluded that there is no specification error. This confirms that the model is well specified. However, even though the model failed to pass the normality test, but able to pass three test hence the model is good for policy analysis.

4.3.1.6 Stability Test

The stability test is an important test to check if the ARDL model which is estimated is stable. Stability of the coefficient has done using the cumulative sum of recursive residuals test and cumulative sum of squares.

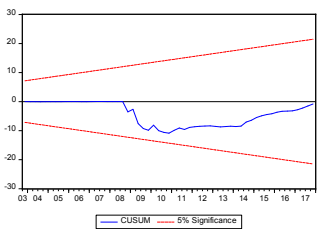


Figure 4.2

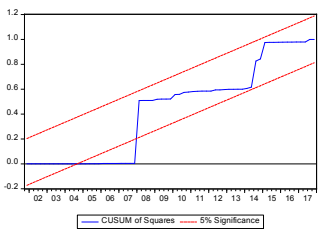


Figure 4.3

The stability of the ARDL bounds testing estimates which is investigated using the CUSUM and CUSUMsq tests gave results that are shown in Figs 4.2 and 4.3. The plots of the CUSUM

statistics are well within the critical bounds at 5%. The plots of the CUSUM of squares statistics are slightly within the critical bounds at 5%. This confirms that the ARDL estimates are reliable and consistent. The tests find coefficients to be stable since the cumulative sum (blue lines) does not go outside the area between the two critical bounds (red lines).

4.3.2 Domestic Debt on Private Investment in Nigeria

The second model of the study seeks to examine the second objective of the study, which is, to investigate the effect of domestic debt on private investment. The VECM framework was used to examine this objective of the study.

The choice of the lag length is a crucial part of empirical research based on the Vector autoregressive (VAR) model since all inferences in this model hinge on the correct model specification. The procedure requires that the choice of deterministic variables and maximum lag length (k) be such as to prevent serial correlation in the disturbance processes both within each equation of the VAR and also across equations. Table 4.8 presents the appropriate lag length for the Unrestricted Vector Auto regression Estimates.

Table 4.7: Order of Lag Selection Criteria table

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1501.841	NA	1.22e+13	44.31887	44.48207	44.38353
1	-1286.203	393.2236	4.48e+10	38.71184	39.69104*	39.09983*
2	-1270.398	26.49693	5.94e+10	38.98228	40.77747	39.69359
3	-1253.072	26.49858	7.67e+10	39.20799	41.81917	40.24262
4	-1221.323	43.88699	6.68e+10	39.00951	42.43670	40.36747
5	-1176.545	55.31442	4.13e+10*	38.42780	42.67098	40.10908
6	-1153.303	25.29262	5.09e+10	38.47951	43.53868	40.48411
7	-1139.418	13.06868	8.94e+10	38.80641	44.68157	41.13433
8	-1084.428	43.66830*	5.24e+10	37.92436*	44.61552	40.57560

** indicates lag order selected by the criterion, **LR**: sequential modified LR test statistic (each test at 5% level), **FPE**: Final prediction error, **AIC**: Akaike information criterion, **SC**: Schwarz information criterion, **HQ**: Hannan-Quinn information criterion*

Source: computed by the researcher using Eviews. Version 10.0

Based on the order selection criteria given in table 4.7, although the AIC suggest the eight (8) lags should be selected, but one lag have been selected for the estimation of the VAR model. The selected lags are based on SC and HQ test statistic and also the fact that the lags selected

have been able to satisfy the OLS assumptions of no serial correlation, and constant error variance (homoskedasticity). Moreover, the selected lags suggested by AIC wasn't able to pass residual diagnostic test.

4.3.2.1 Johansen Cointegration

The long-run relationship among variables is a crucial part of empirical research in order to estimate the VECM model. The Johansen cointegration test is conducted to test the long-run relationship between the variables and see if the variables are cointegrated and when the variable will be at equilibrium. Table 4.8 shows the summary of the Johansen Cointegration test.

Table 4.8: Johansen Cointegration Table

Trace Test			
No. Cointegration Equation	Statistic	5 % critical value	Prob
None *	76.48347	69.81889	0.0133**
At most 1	44.53832	47.85613	0.0991
At most 2	21.99186	29.79707	0.2989
At most 3	9.095253	15.49471	0.3566
At most 4	3.672735	3.841466	0.0553
Maximum Eigenvalue			
No. Cointegration Equation	Statistic	5 % critical value	Prob
None *	31.94515	33.87687	0.0835
At most 1	22.54646	27.58434	0.1937
At most 2	12.89661	21.13162	0.4618
At most 3	5.422518	14.26460	0.6878
At most 4	3.672735	3.841466	0.0553

Source computed by the researcher using E-views version 10 (2018)

From the table we can see from the probability values that are less than 0.05, which means that rejecting the null hypothesis of no cointegration among the variables. The result from the trace statistics means we accept the alternative hypothesis that there is at least one co-integrating relationship at 0.05 levels. Thus, this outcome confirms the presence of long run relationship among the variables of our model. As such we go ahead and estimate the normalized co-intergrating coefficients and VECM short-run estimates.

4.3.2.2 Cointergrating Long Run Analysis

Having established the fact the there is a long relationship between the variables using the Johansen cointegration test. The next step is to estimate the VECM long-run relationship

between the cointegrating variables. The table 4.9 below presents the VECM long-run estimates of variables.

Table 4.9 Normalized cointegrating coefficients (Long-run estimate)

Variables	DGDP	PBGDP	RIR	CPI
LOGPI(-1)	1.26E-07***	0.031536***	0.027466**	0.051801**
	(1.8E-07)	(0.00580)	(0.00425)	(0.00995)
	[10.1888]	[5.43724]	[6.46258]	[5.206131]

*Note: *** Statistical significance at the 1 per cent levels, **Statistical significance at the 5 per cent levels. *Statistical significance at the 10 per cent levels, Figures in parenthesis ( ) and brackets [ ] are standard errors and t-statistics Source: computed by the author using E-views. Version 10 (2019)*

The table 4.9 above shows the long-run estimate from the normalized cointergrating coefficients which are to be interpreted in reverse form. The results shows evidence statistically significant negative impact of domestic debt on Private Investment in Nigeria. The estimated co-efficient for domestic debt to GDP shows that a percentage increase in domestic borrowing leads to a corresponding decrease in private investment (PI) by 1.26E-05% in the long-run. This outcome is not surprising because private investors would face credit crunch with an increasing domestic debt. This is in tandem with the result found by Moha (1999), Arias (2002) and Uzoh (2014).

Also, the results show a significant negative impact of primary balance (PBGDP) on private investment (PI) in Nigeria. The estimated co-efficient for PBGDP shows that a percentage increase in primary balance leads to a corresponding decrease in PI by 3.15% in the long-run.

Also, the results show a significant negative impact of real interest rates (RIR) on private investment (PI) in Nigeria. The estimated co-efficient for RIR shows that a percentage increase in real interest rate leads to a corresponding decrease in PI by 2.75% in the long-run. The neoclassical school of thought also encompassed the theory of interest rates which explains that the balancing of savings and investments is achieved by the interest rate mechanism. Thus, the fluctuation in the rate of interest arises from variations either in the demand for loans or in the supply of loans. Hence, an increase in government debt, interest rates have to increase to bring the market into equilibrium, hence, dampening private

investment, Voss (2002) and Ganelli (2003). This result conforms of Uzoh (2014) and Kehinde et al (2015).

In addition, the results shows at 5% there is significant negative impact of inflation rates on private investment in Nigeria. The estimated co-efficient for CPI shows that a percentage increase in price fluctuation leads to a corresponding decrease in PI by 5.18% in the long-run. This is not surprising as Inflation rate is an important determinant of private investment. Though moderate inflation is needed for business to strive profitably in a country, high and rising inflation rates is an indicator of macroeconomic instability and it affects private investment adversely Ekpo (2016). This is in tandem with the study of Akram (2014), that in Pakistan, inflation due to its mild nature has helped investment. However the result of this study is in variance with similar studies by Uzoh (2014), Ude and Ekesiobi (2014) that inflation has a negative effect on private investment in Nigeria.

4.3.2.3 VECM Short-Run Analysis

After analyzing the long-run relationship between the variables, the study further estimates the short-run relationship between the variables. The short run results are illustrated in Table 4.10 below with delta sign showing the changes with the lag-operators that effect on the dependent variable

Table 4.10: Results of Vector Error Correction Model (VECEM)

Dependent Variable = LOGPI(-1)			
Variables	Coefficients	Standard error	t-statistics
D(LOGPI(-1))	0.029916	0.11752	0.25456
Δ(DGDP(-1))	-5.73E-08	3.6E-08	-1.57822*
Δ(PBGDP(-1))	0.003270	0.00281	1.16308
Δ(RIR(-1))	0.002322	0.00158	1.47178*
Δ(CPI(-1))	0.002082	0.00337	0.61834
Constant	0.000146	0.00724	0.02020
ECT_{t-1}	-0.094567	0.03972	-2.38110**

*Note: *** Statistical significance at the 1 per cent levels, **Statistical significance at the 5 per cent levels.*
**Statistical significance at the 10 per cent levels, Source: computed by the author using E-views. Version 10 (2019)*

The results show that lag values of private investment in the previous year can be describe as statistically influential factors that positively affect current private investment in the short-run. A 1% increase in the value of the private investment insignificantly changes current

private investment by approximately about 0.03%. This result is in variance with a similar study conducted by Susan (2015) that Ceteris paribus, an increase in the previous year's level of private investment increases the current year's level of private investment.

The past value of domestic debt to GDP is negative and statistically significant at 5% linked with private investment. A 1% increase the value of the DGDP significantly changes current private investment by approximately about -573E-6%. This finding is in line with the long run result.

The past value of real interest rates is positive and statistically insignificant at 5% affects current private investment in the short-run. A 1% increase the value of the RIR insignificantly changes current private investment by approximately about 0.2%. This also conforms to similar study carried out by Bosco and Emerence (2016) in Rwanda, that interest rate is positively related to investment but significantly.

The past value of consumer price index is positive and statistically insignificant at 5% affects current private investment in the short-run. A 1% increase the value of the CPI insignificantly changes current private investment by approximately about 0.21%. This also conforms to the study of Akram (2014) that inflation has an insignificant relationship with investment in the short run in Pakistan. Similarly in Rwanda, Bosco and Emerence had a similar result in their study that, inflation rates have a positive effect on investment in short run.

The value of the ECM is negative and statistically significant. The estimate of the lagged ECM is -0.094567. This indicates that short-run deviations towards long-run would be corrected by 9.5% in private investment function. This implies it would take almost ten years and five months to reach the stable log-run equilibrium path in level of private investment model in case of Nigeria. This empirically implies that for any disequilibrium in the system, the system will automatically adjust itself back to the equilibrium after ten years and five months.

4.3.2.4 Residual Diagnostics

Residual diagnostic check tests have been conducted for the lag selected to ensure that the selected lags are free of serial correlation and heteroskedasticity also ensure that the residuals of the selected lags are normally distributed.

Table 4.11 Serial Correlation

Lags	LM-Stat	Prob
1	23.26572	0.5621
2	21.83846	0.6451
3	19.54407	0.7703
4	85.73145	0.0000
5	28.33291	0.2928
6	10.80507	0.9938
7	28.10737	0.3029
8	29.68791	0.2362

Source: computed by the researcher using Eviews. Version 10.0

The table above shows the residual serial correlation test result using LM test, given in table 4.11, with the exception of lag 4, we cannot reject the null hypothesis of no serial correlation in all the lags at 5% level given the LM statistics and the probability values are greater than 0.05. Hence this model does not have problem of serial correlation.

Table 4.12 Heteroskedasticity Test

Dependent	F(12,61)	Prob.	Chi-sq(12)	Prob.
res1*res1	0.865667	0.5849	10.76809	0.5489
res2*res2	1.330188	0.2255	15.34788	0.2230
res3*res3	0.190360	0.9984	2.671109	0.9975
res4*res4	0.314018	0.9843	4.305322	0.9773
res5*res5	0.856522	0.5937	10.67073	0.5573
res2*res1	1.594946	0.1170	17.67311	0.1260
res3*res1	0.265817	0.9924	3.677311	0.9886
res3*res2	1.629220	0.1071	17.96071	0.1169
res4*res1	0.243224	0.9950	3.379026	0.9922
res4*res2	0.351371	0.9750	4.784335	0.9648
res4*res3	0.278535	0.9907	3.844104	0.9861
res5*res1	1.003675	0.4567	12.20172	0.4296
res5*res2	0.717043	0.7291	9.147887	0.6902
res5*res3	0.647080	0.7935	8.356099	0.7567
res5*res4	0.309677	0.9852	4.249218	0.9785
Joint Chi-sq	df	Prob.		
144.4790	180	0.9759		

Source: computed by the researcher using Eviews. Version 10.0

Similarly, from table 4.12 above, the test for heteroskedasticity indicates that, the residuals are homoscedastic given the f-statistics and chi-square values accompanied by the probability

values which are greater than 0.05. Given the joint chi-square value of 144.4790 with the probability value of 0.9759 indicates the acceptance of the null hypothesis of no problem heteroskedasticity.

Table 4.14 Normality Test

Component	Jarque-Bera	Df	Prob.
1	1072.518	2	0.0000
2	21.81570	2	0.0000
3	3664.859	2	0.0000
4	22.26875	2	0.0000
5	294.7161	2	0.0000
Joint	5076.178	10	0.0000

Source: computed by the researcher using Eviews. Version 10.0

From table 4.14 above the Jarque-Bera test for the normality of the residual indicates that, there is a departure from normality. The probability values from all the five components show the rejection of the null hypothesis of normality. Also from the Jarque - Bera statistics for the joint test and the probability value of 0.000 which is less than the critical value of 0.05 at the 5% level of significance, however Normality Test in VAR models is not a serious issue, but Serial Correlation is most important problem in VAR. Hence since our VAR has passed the Serial Correlation Test, this means that the selected lag is good for the VAR analysis.

4.3.2.5 VAR stability Test

VAR stability test is necessary to see if the VAR model is stable. A stable VAR model is appropriate for estimation and analysis. If the VAR framework is not stable one is required to jettison the model and formulate another model.

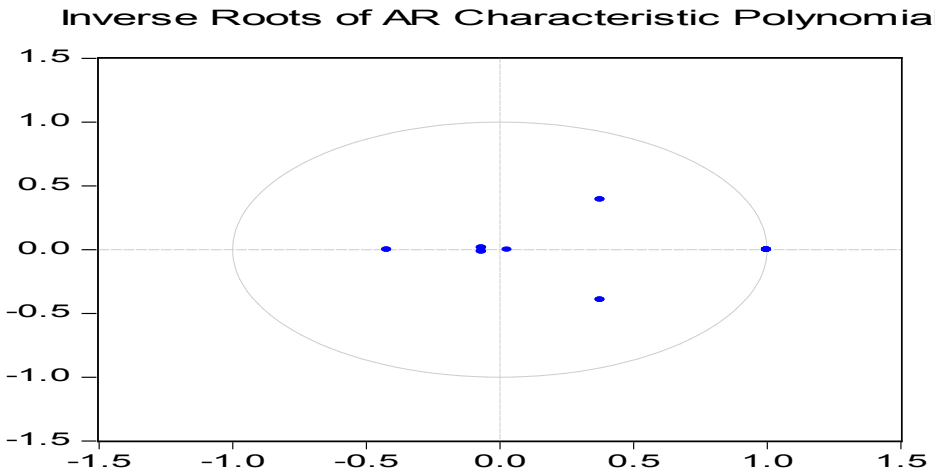


Figure 4.4

Source: Generated by the Author using E-views version 10.0 (2019)

The figure 4.4 above shows VAR AR-graph. It required that all points are in the modulus, this means the impact of the shocks are callable and finite. From our model we can see all the points are within the modulus; this means our VAR model is stable and good for analysis. To corroborate this fact from the AR table we can see all medullae are all less than one (1) hence it justifies our AR graph that our VAR model is good for analysis and we can use it.

4.3.3 Domestic Debt on Macroeconomic Variables in Nigeria

The third model of the study seeks to examine the third objective of the study, which is, an assessment how domestic debt affect macroeconomic variables in Nigeria. The VECM impulse response function and variance decomposition where used to examine this objective of the study.

4.3.3.1 Impulse Response Function (IRF)

Impulse response functions trace the effect of a shock emanating from an endogenous variable to other variables in a VECM. The table below presents the IRF of the variables used in the model.

Table 4.15 Impulse Response Function

Variables	Short-Term	Medium Term	Long-Term
Quarters	Q_1-Q_8	Q_9-Q_{16}	Q_{17}-Q_{20}
DGDP	0.006166*	0.001670*	0.001014*
LOGPI	-0.013347*	-0.009992*	-0.007606*
PBGDP	0.001799*	0.000529*	0.000140*
RIR	0.568651	0.374311	0.266564
CPI	0.124460	0.099452	0.042982

Source: computed by the researcher using Eviews. Version 10.0 (2019)

The result in table 4.15 above shows the shocks from domestic debt (DGDP) has a significant positive response on its own self in the short-term. Likewise, private investment (LOGPI) has a significant negative response to shocks from DGDP in the short-term as primary balance to GDP (PGDP) has a significant positive response to DGDP in the short-term. Meanwhile, real interest rates (RIR) and consumer price index (CPI) has an insignificant positive response to shocks from DGDP. The result shows in the short-term private investment, primary balance, real interest rates and consumer price index response to domestic debt by -0.013%, 0.002% 0.569% and 0.125% respectively.

Meanwhile in the medium term, shocks from domestic debt (DGDP) have a significant positive response on its own self in the medium-term. Likewise, private investment (LOGPI) has a significant negative response to shocks from DGDP in the medium-term as primary balance to GDP (PGDP) has a significant positive response to DGDP in the medium-term. Meanwhile, real interest rates (RIR) and consumer price index (CPI) has an insignificant positive response to shocks from DGDP. The result shows in the medium-term private investment, primary balance, real interest rates and consumer price index response to domestic debt by -0.010%, 0.001% 0.374% and 0.010% respectively.

Furthermore, in the long term, shocks from domestic debt (DGDP) have a significant positive response on its own self in the long-term. Likewise, private investment (LOGPI) has a significant negative response to shocks from DGDP in the long-term as primary balance to GDP (PGDP) has a significant positive response to DGDP in the long-term. Meanwhile, real

interest rates (RIR) and consumer price index (CPI) has an insignificant positive response to shocks from DGDP. The result shows in the long-term private investment, primary balance, real interest rates and consumer price index response to domestic debt by -0.008%, 0.0001% 0.267% and 0.043% respectively.

Going by the analysis above, it is observed that private investment, primary balance and domestic debt response significantly to domestic debt and itself. This is to conclude that there is element of effects of domestic debt to other macroeconomic variables in Nigeria over the period of study. This is because in all the quarters the coefficient of domestic debt to GDP on itself is positive and significant. This implies that increase in domestic debt leads to further increase in domestic debt itself. This implication is not a good one as regards to the theoretical base of debt over-hang thesis which implies that "large debt accumulation would lower growth through reduced investment. Although the channel for debt over-hang thesis is not only through the volume of investment but also through a poorer macroeconomic environment which is likely to affect the efficiency or quality of investment".

4.3.3.2 Variance Decomposition

The essence of using variance decomposition technique is to measure the fraction of forecast error variance for each of the variables under investigation to its shocks and also to shocks of other variables. Results of variance decomposition have been sent to appendix with both the direct and indirect effects of the shocks.

Table 4.16 Variance Decomposition

Variables	Short-Term	Medium Term	Long-Term
Quarters	Q_1-Q_8	Q_9-Q_{16}	Q_{17}-Q_{20}
DGDP	86.68144*	82.28783*	81.77925*
LOGPI	5.704687*	9.922490*	10.93221*
PBGDP	6.926232*	9.381357*	9.425073*
RIR	0.537135	1.391676	1.549089
CPI	0.289706	1.341239	1.453912

Source: computed by the researcher using Eviews. Version 10.0 (2019)

The table 4.16 shows the contemporaneous relationship between domestic debt and other macroeconomic variables in the VECM system. From the results, domestic debt account for 100% of its variance. The effect of innovation of shocks from domestic debt declines from 86.7% by Q_8 in the short-term to about 82.3% in Q_{16} in the medium term as the innovation further decline from Q_{20} in the medium term to about 81.8% in the long-term.

Also, the result shows the innovation of shocks from domestic debt account about 5.7% innovations in private investment in the short-term. However, in the medium-term of shocks from domestic debt account about 9.92% innovations in private investment. Also, in the long-term of shocks from domestic debt account about 10.93% innovations in private investment.

In addition, the result shows the innovation of shocks from domestic debt account about 6.93% innovations in primary balance in the short-term. However, in the medium-term of shocks from domestic debt account about 9.98% innovations in primary balance. Also, in the long-term of shocks from domestic debt account about 9.43% innovations in primary balance. Furthermore, the result shows the innovation of shocks from domestic debt account about 0.54% innovations in real interest rate in the short-term. However, in the medium-term of shocks from domestic debt account about 1.39% innovations in real interest rate. Also, in the long-term of shocks from domestic debt account about 1.55% innovations in real interest rate. Similarly, the result shows the innovation of shocks from domestic debt account about 0.29% innovations in consumer price index in the short-term. However, in the medium-term of shocks from domestic debt account about 1.34% innovations in consumer price index. Also, in the long-term of shocks from domestic debt account about 1.45% innovations in consumer price index.

Going by the analysis above, it is observed that DGDP is significant to private investment, primary balance and itself but insignificant to real interest rates and consumer

price index. This is to conclude that there is element of effects of domestic debt to other macroeconomic variables in Nigeria over the period of study. This finding is supported by the study of Ondo (2017), who concluded that public debt has contrasted effects on financial stability in EMCCA, according to regimes determined by the evolution of the price of oil. Likewise, Das (2016) estimation revealed that debt increase produces adverse effects on macroeconomic activity.

4.4 Test of Research Hypotheses

In order to evaluate the working hypothesis of this study we need to recap the hypotheses. They include the following:

H_o: Domestic debt does not affect economic growth in Nigeria.

H_o: Nigeria's domestic debt does not have effect on private investment.

H_o: Nigeria's domestic debt does not affect macroeconomic stability.

After subjecting these hypotheses to various economic, statistical and econometric tests, we hereby present following findings

i) The results obtained from estimation of the ARDL model, the first hypothesis of this study is thereby rejected given the t-value as well as the p-value of DGDP. Hence in conclusion domestic debt (DGDP) has a significant negative impact on economic growth in Nigeria.

ii) The results obtained from estimation of the VECM model and given the theoretical conditions, the second hypothesis of this study is thereby rejected given the t-value as well as the p-value of DGDP. Hence in conclusion domestic debt (DGDP) has a significant negative impact on private investment in Nigeria

iii) The results obtained from estimation of the VAR impulse response functions and variance decomposition for the second model and given the theoretical conditions, the

third hypothesis of this study is thereby rejected given the values of IRF. Hence in conclusion increase domestic debt may affect some macroeconomic variables.

4.5 Discussions of the Findings

The main aim of this study was to examine the impact of domestic debt on economic growth in Nigeria from the period of $1999Q_1$ to $2017Q_4$. The study outlined four specific objectives in a bit to achieve the main objective of the study which includes an empirical analysis of effect of domestic debt on economic growth in Nigeria. To also examine if Nigerian government domestic debt affects private investment and to further analyze if domestic debt can induce other macroeconomic variables in Nigeria. After subjecting the data collected to statistical and econometric analysis the findings of the study has some economic policy implication in relation to forth going events in the economy currently.

Going by the first objective of the study, the findings showed that domestic debt has a significant negative impact on economic growth in Nigeria. The findings are not surprising since within the period of study the Nigerian economy experience slow growth and even went into recession. Furthermore, within the same period government borrowings haven't gone into infrastructural development rather for recurrent spending mainly on payment of salaries. In addition, the findings implies that government domestic borrowing wasn't channeled to productive use in the economy that had negative impact on economic growth within the period of study. Theoretically this conforms to the debt over-hang thesis, which implies that "large debt accumulation would lower growth through reduced investment". This finding supports the study by Pattillo et al (2002), who maintains that debt accumulation stimulates investment initially, while past debt accumulation impacts negatively on investment and growth.

Likely, the specific objective on the relationship between domestic debt and private investments in Nigeria is analyzed and the findings showed that domestic debt has negative

impact on private investment in Nigeria. This outcome is not surprising because private investors would face credit crunch with an increasing domestic debt. Also, the continuous borrowing by the government from the domestic economy will likely crowd-out the private investment. Also, this shows the existence of debt overhang effects. An increase in government borrowing leads to a reduction of the resources available to the private sector. This also means that the private sector will be taxed more to pay for interest payments on debt thus discouraging private investments. To elaborate on this finding, deposit interest rates had negative impact on private investment in Nigeria. As the neoclassical school of thought also encompassed the theory of interest rates which explains that the balancing of savings and investments is achieved by the interest rate mechanism. Thus, the fluctuation in the rate of interest arises from variations either in the demand for loans or in the supply of loans. Hence, an increase in government debt, interest rates have to increase to bring the market into equilibrium, hence, dampening private investment, Voss (2002) and Ganelli (2003).

The analysis further showed that domestic debt can induce some level of macroeconomic variables. This is not surprising either, in a case where government domestic borrowing is more than the private sector borrowing may crowd-out the private sector which may lead some economic malaise such as unemployment, slowdown in private sector investment and development among others. These findings is supported by the study of Ondo (2017), who found concluded that debt has contrasted effects on financial stability in EMCCA, according to regimes determined by the evolution of the price of oil. Likewise, Das (2016) estimation revealed that debt increase produces adverse effects on macroeconomic activity. Supporting these findings also, is the study of Sutherland, et al (2012), their empirical evidence concludes that when private sector debt level, particularly for households, rise above trend the likelihood of recession increases.

Hence, from the forth going discussions so far, we can confidently conclude that domestic debt in Nigeria has greatly influence the economic activities over the stipulated period of study. As such this study provides effective policy recommendation which can help bring about stability in government fiscal policy.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter includes a summary of major findings, draws conclusion and provides some effective recommendations to policy makers and government.

5.2 Summary of Major Findings

Based on the specific objectives of the study, the study found out that, domestic debt has a significant negative impact on economic growth in Nigeria. The findings are not surprising since within the period of study the Nigerian economy experienced slow growth and even went into recession. Furthermore, within the same period government borrowings haven't gone into infrastructural development rather for recurrent spending mainly on payment on salaries. Likewise, the relationship between domestic debt and private investment had been reflected in the analysis and the findings showed that domestic debt has negative impact on private investment in Nigeria. This outcome is not surprising because private investors would face credit crunch with an increasing domestic debt. Also, the continuous borrowing by the government from the domestic economy will likely crowd-out the private investment.

In addition, the analysis further showed that domestic debt can induce some level of macroeconomic instability. This is not surprising either, in a case where government domestic borrowing is more than the private sector borrowing crowds out the private sector which may lead some economic malaise such as unemployment, slowdown in private sector investment and development among others.

From the above the study concluded that domestic debt (DGDP) has a significant negative impact on economic growth in Nigeria. Also, going by the econometric theory and given the theoretical conditions, the study further proved that an increase domestic debt may cause some element of macroeconomic instability/dynamic and domestic debt (DGDP) has a significant negative impact on private investment in Nigeria.

5.3 Conclusions

The study has drawn a number of conclusions based on the findings from the study. Domestic debt (DGDP) has a negative significant impact on economic growth in Nigeria, this implies that an increase in domestic debt will cause a decline in the level of economic growth. The study also concluded that domestic debt (DGDP) has a negative significant impact on private investment in Nigeria which implies that as government increases its borrowing from its organizations and financial institutions such as CBN, mortgage bank e.t.c, it will subsequently cause a reduction in private investment.

The study further proved that an increase in domestic debt may cause some element of macroeconomic instability that is when domestic debt of an economy increases it induces some macroeconomic variables such as inflation, interest rate among others.

5.4 Recommendations

Based on the findings of this research work, it is necessary to provide a set of policy recommendations.

i) Having concluded that domestic debt (DGDP) has a negative significant impact on economic growth in Nigeria. Hence, the study recommends that government should adopt economic policies that enhance investment and economic growth. High level of productive investment and economic growth typically generates additional tax revenue without necessitating an increase in tax rates. Also, government authorities need to engage in debt relief arrangements and consider the option of debt relief and development swaps. Debt relief takes financial obligations off the government's shoulder which increasesthe fiscal space for the government.

ii) The results showed that private investment had been affected by government domestic borrowing in Nigeria; hence the study recommends that the government should acquire

domestic debt largely for economic reasons such as: enhancing investments, curtailing inflation, etc, rather than social or political reasons. This would increase the productivity of the nation. Excessive deficit financing should be avoided and government borrowing from the banking sector should be drastically reduced. The structure of public expenditure should emphasized development oriented capital expenditure as this is classified as productive expenditure and represents investment in private sector production. Hence, public investment should concentrate on the provision of critical economic and social infrastructure like road, electricity supply, water supply, education and health services which enter private sector production directly, reduce production cost, enhance productivity, products competiveness, and profitability and consequently boost private investment.

iii) The study further proved that an increase domestic debt have significant influence on macroeconomic variables. The debt management office along with the various government financial agencies developed to advice the government should identify other sources at which government should borrow from even if it is from domestic economy so far as it wouldn't cause any economic malaise. Also, government should set a domestic borrowing limit so that it wouldn't crowd-out the private sector.

iv) The government should ensure economic and political stability in order to enjoy the benefits of domestic debt and make the debt burden minimal. Internal security, political stability and good governance are strongly recommended as there is a strong tie between internal security, political stability and economic stability. The political instability and continuous internal insecurity experienced for many years in Nigeria resulted in series of crises which created unconducive and unstable investment climate in the country. It resulted in increased wave of insecurity to lives, property and investment. The frequent changes of government

through coups and counter coups in Nigeria did not encouraged private investment as they were followed by suspension of existing economic policies and formulation of new policies which crippled plans and projection of investors.

v) Considering the instability in crude oil prices in international markets, in order to raise the required foreign exchange to meet the need of the economy, drastic steps should be taken to diversify the Nigerian economy to make it more export-oriented. This will take care of balance of payment deficit, ensure availability of foreign exchange and put downward pressure on foreign exchange rate.

vi) The banking sector should ensure proper mobilization of investible fund in the economy through high saving deposits rates and accessibility of such fund by prisvate investors through low lending rate. The Minimum Rediscounting Rate (rechristened Monetary Policy Rate (henceforth MPR) by the Central Bank of Nigeria in 2006), which is under the perpetual grip of the Central Bank of Nigeria, has the capacity to influence other rates of interest in the economy, hence should used adequately. The Commercial Banks should desist from its exploitative tendencies of paying low saving rate on saving deposits and low MPR to the Central Bank but charge high lending rate on loans offered to private investors.

Reference

Abbas, A.S & Christen J.E (2007). The Role of Domestic Markets in Economic Growth: An Empirical Investigation for low-Income countries and emerging countries and emergency markets". IMF Published Paper.

Ademola, E. O & Oluwaseyi, A. A. (2013). Relationship Between Domestic debt, Macro-Economic Indices and Viability of the Construction Sector in Nigeria. *International Journal of Economics, Finance and Management Sciences*.Vol 1 No 6 2013.

Adofu, I. & Abula M. (2010). Domestic debt and the Nigerian Economy*: Current Research Journal of Economics Theory.* 2(1), 22-26.

Ajayi, E.A (1989). Nigerian Debt Management Experience Central Bank of Nigeria. 13(2)

Akram, N (2011). Impact of Public Debt on the Economic Growth of Pakistan. Centre for poverty reduction and social policy development, Islamabad.

Amadeo, K (2018, April 26). Debt-to-GDP Ratio, Its Formula, and How to Use it [The Balance]. Retrieved May 26, 2018, from https://www.thebalance.com/debt-to-gdp-ratio-how-to-calculate-and-use-it.

Aminu, U. Ahmadu, A. H. & Salihu, M. (2013). External Debt and Domestic debt Impact on the Growth of the Nigerian Economy. *International Journal Educational Research.* 2013 Vol I, Issue 2, ISSN: 2306-7063

Antonietta C. (1987). Marginal Economics. The New Palgrave. A Dictionary of Economics 0.3. p323

Anyafo, A. M. (1996). Public Finance in a Developing Economy: *The Banking and Finance Publication* UNEC.

Anyawu, A. (2016). Government Domestic debt, Private Sector Credit and Economic Growth in Oil-Dependent Countries. A Dynamic Panel Data Analysis. A Thesis Submitted in Partial Fulfillment of the Requirement for the Degree of Doctor of Philosophy in Economic at Lincoln University.

Anyawu, J. C. & Erhijakpor, A. E. O. (2004) Domestic debt and Economic Growth: The Nigeria Case. *Research Gate*.

Apere O. ThankGod (2014). The Impact of Public Debt on Private Investment in Nigeria: Evidence from a Non Linear model. *International Journal of Research in Social Sciences.* Vol.4 No.2.

Ali A. Massoud (2015). Dealing with the Increasing Public Debt in Egypt*: International Journal of social science studies.* Vol, 3 No 1 January 2015.

Arias, (2002).Striking Diversity of Experience with Growth Episode and Poverty Changes.

Ariyo, A & M. I. Raheem (1991). Effect of Fiscal Deficit on Some Macro-Economic Aggregates in Nigeria. Final Report Presented at AERC Workshop, Nairobi, Kenya.

Aschauer, David A. (1989). Does Public Capital Crowd out Private Capital? *Journal of Monetary Economics* 24, 171-188.

Asogwa, R. C (2005). Domestic Government Debt Structure, Risk Characteristic and Monetary Policy Conduct: Evidence from Nigeria. Retrieved from: http://www.imt.org/external/np/res/seminars/2017

Asma P & Kashif M (2017).Impact of Total Internal and external government debt on interest rate in Pakistan. Online https://mpra.ub.uni-mmenden.def82427.MPRA paper No 83427, post 22 December (2017)

Babalola.O.O, Danladi ,J.D, Akomolate, K.J & Ajiboye , O.P (2015). Inflation, Interest rate and Economic growth in Nigeria. *European Journal of business management*. ISSN 2222-1905 (paper) ISSN 2222-2839 (online) vol 7. No 30, 20156

Bahmani O, M (1999). Do Federal Details Crowd Out or Crowed In Private Investment. *Journal of Policy Modelling*. 21, 633 640

Baldacci, E & Kumar, M. S (2010). Fiscal Deficits Public Debt and Sovereign Bond Yields. IMF Working Paper.

Barro, Robert J. (1974). Are Government Bonds Net Wealth*? Journal of Political Economy*, 82, 1095-1117.

Bassey O E & Imoke D I, (2017).Public debt carrying capacity and debt transmission channels. The Nigerian Experience: International *Journal of economic and financial issues 2019.* ISSN: 2146-4138

Ben, M. D. & Onogbosele, D. O. (2016). The Impact of Domestic debt on Economic Growth of Nigeria. *Asian research Journal of Arts and Social Science* 1(3), 1-13, 2016, Article No: ARJASS 27224

Benedict I, Ehikioya I.L & Asin. O. M (2014), determinants and sustainability of external debt in a deregulated economy: a cointegration analysis from Nigeria (1986-2010). *American International Journal of Contemporary Research Vol. 4, No. 6; June 2014*

Bildirici M & Ersin O. O (2007). Domestic Debt, Inflation and Economic Crises: A Panel Cointegration Application to Emerging and Developing Economies. *Applied Econometrics and International Development. Vol 7-1.*

Borensztein, E. (1990). Debt overhang, debt reduction and investment: The case of the Philippines. *International Monetary Fund working paper,* No. WP/90/77, September.

Blinder A. S & Solow R. M (1973). Does Fiscal Policy Matter? *Journal of Public Economics,* 2, 319-337

Buchanam J. M. (1999). Public Principles of Public Debt; A Defense And Restatement of the Collected Works of James Buchanams Indianapolis, Ind: Liberty Fund 1999, 2 (82): 126.

Buiter, W. (1996). Principles of Budgetary and Financial Policy. Cambridge, Mass M2T Press.

Bosco, J.N & Emerence, U.(2016). Effect of GDP, Interest rate and Inflation of Private Investment in Rwanda. *Internal Academic journal of policy of economics*. Vol,3 No 1, 2016 pp 1-17 ISSN 2454-2474.

Chandia E. K & Javid A. Y (2013), an analysis of debt sustainability in the economy of Pakistan. *International Conference on Applied Economics (ICOAE) 2013, Procedia Economics and Finance* 5 (2013) 133 – 142

CBN Statistical Bulletin.Available http://statistic.cbn.gov.ng/cbn-olinestates.

Chinedu, S. O & Gbadebo O. O. (nd) External Debt, Debt Burden and Economic Growth Nexus: Empirical Evidence and Policy Lessons from Selected West African States (Unpublished Paper)

Christensen, J. (2004) Domestic debt Market in Sub-Saharan Africa. IMF Working Paper wp/0646.

Claessens, S & Diwan I. (1996) "Investment incentives: New Money, Debt Relief, and the Critical Role of Conditionality in Debt Crisis," The World Bank Economic Review, 4(1).

Debt Management Office (2016) Domestic debt Stock by Instrument as at June 30, 2016

Debt Management Office (2016) Report of the Annual National Debt Sustainability Analysis (DSA)

Debt Management Office (2017), Domestic debt Instrument, http://Hdmo.gov.ng/debt-profile/domestic debts/debt-stock accessed 23/4/2018

Dolan, E. G. & Lindsey, D. E. (1991). Marco-Economic, 6th Edition: The Dryden Press, Chicago. ISBN: 0030328926

Eda, B & Pelin, V. F (2015). The Analysis of Domestic debt Asymmetry in Turkey by Regime Switching Models. *Istanbul Conference of Economics and Finance*: ICEE 2015, 22-23 October 2015. Istanbul Turkey.

Egbetunde, T. (2012). Public Debt and Economic Growth in Nigeria; Evidence from Granger Causality. *America Journal of Economics* P-ISSN: 2166-4951 E-ISSN: 2166-496X 2012; 2(6) 101-106

Ekpo, U. N., (1999). Government Deficit and Private Investment: The Nigerian Experience 91970-1994). An Unpublished MSc. Dissertation, University of Uyo, Uyo, Nigeria.

Ekpo, U. N (2016). Determinants of Private Sector Investment in Nigeria: an Empirical Exploration. *Journal of Economic and Sustainable Development*.ISSN 222-1700 (paper) vol 7, No 11. 2016

El-mahdy , A.M & Erayeh , N,M. (2009), Debt Sustainably and Economic Growth in Egypt*: International journal of applied econometrics and quantitative Estudies*. Vol.6-1(2009)

Engle. R.F & Granger C.W.J, (1987).*"Dynamic Model specification with equilibrium constrains"* Co-integration and error correction.Economics 55(3).#

Eric M. E & Hubbard R. G (). Federal Government Debt and Interest Rate. American Enterprise Institute and Columbia University and NBER.

Eroke L. (2011) Nigeria: Heavy Debt, Job Losses Limiting Construction Industry. http//allafrica.com/stories. Retrieved 14/08/2012

Essia, U. (2005). Macro economic theory. Calabar sea spirit, (Nig) Co.

Essien, S. N, Ngozi, T. I., Micheal, K. M. & Onomonu, O. G. (2016) An Empirical Analysis of the Macro-Economic Impact of the Public Debt in Nigeria: *CBN Journal of Applied Statistics. Vol 7, No. 1(9) June 2016.*

Eze Onyekpere (2018). 2018 Budget: Deficit and Debt. (culled from www.punchng.com0 accessed 04/02/2018.

Fiscler, S. & Easterly. W. (1990): The Economics of the Government Budget Constraint. *The World Bank research observer, vol. 5(2).Pp127-42.*

Gale, W. G. & Orszag P. (2004) Budget Defies National Saving and Interest Rate. *Brooking Papers on Economic Activity, 2(2004-2), 101-210.*

Ganelli, G. (2003). Useful Government Spending, Direct Crowding Out and Policy Interdependence. *Journal of International Money and Finance, 22, 87-103*.

Genmell, N. & Au J. (2012). Government Size Fiscal Policy and the Level of Growth of Output: A review of Recent Evidence. Working Papers in Public Finance, Working Paper No. 10/2012.

Godfrey K. P & Cyrus M. M (2013). Domestic debt and Ecoonmic Growth Nexus In Jenya: *Current Research Journal of Economic Theory* 5(1): 1-10,2013

Hassler, U; & Wolters, J. (2005). Autoregressive Distributed Lag Models and Cointegration. Diskussionsbeiträge des FachbereichsWirtschaftswissenschaft der FreienUniversität Berlin no. 2005/22.

Henry B. (2017). Still on Nigeria Debt Profile October 9, 2017. http://www.vanguard.com/2017/10/stillnigerian-debt-profile.

http://www.stearsing.com/1rticle/publicdebt-how-much-is-toomuch.2018

Hurlin, C. & Herry, P. (2004).“Impact of Remittances*”* using OECD Panel data Mimeo LEO, University of Orleans.

Ibrahim A. O. B, Olarewaju F. O, Oluwatomisin A & Adebayo. M (2016). Empirical Analysis of the Effect of Domestic debt of Nigerian Economic Growth: *International Journal of Social Science and Humanities Reviews* Vol.6, No 1, February, 2016, p.40-50.

Igbodika, M. N., Jessie, I. C. & Andabai, P.W. (2016). Domestic debt and the Performance of Nigerian Economy. (1987-2014): An Empirical Investigation.

Ijeoma, N. B. (2013). An Empirical Analysis of the Impact of Debt in the Nigeria Economy: *An International Journal of Arts and Humanities*. Bahir Dar, Ethiopia. Vol.2 (3), S/N 7, July, 2013: 165-191

International Monetary Fund (IMF). (1989). Nigeria country report, no. 89/315, November.

Iweala, O. N (2011). Frets over Rising Domestic Liabilities. The Nation Newspaper of 25th August, 2011.

James, O. B., Symon, K., Aguilars M. K. & Mose, G. (2015). Effect of Domestic debt on Economic Growth in the East African Community: *American Journal of Research Communication.* www.usa.journal.com

Jhingan, M. L (2016). Macro-Economic Theory (12thed) New Delhi Urinda Publication.

Joseph Raji (2017) World Bank Reacts to Buhari Plan to Increase External Borrowing (www.dialypost.ng27/10/17)

Juliani D.G and Edward G. (2008). A simple stochastic approach to Lebanon: 2008 *International Monetary Fund*. (working paper).

Kehinde J A, Olanike B, Oni E & Achukonu M . Public debt and private investment in Nigeria.(2015). *American Journal of economics* (2015). American Journal of economic (2015). 5(5):501-507

Krugman P. Financing Overhang, Some Analytical Notes. *Journal of Development Economics*. 1988, 253-268. Available: http://dx.doi.org/10.1016/03043878.

Krugman P. (1989), Financing US Forgiving a Debt Overhang; *Journal of Development Economics*, Vol 29, pp 253-268

Krugman, P.R & Obstfeld, M. (2003). International Economic: Theory and Policy: New York: University of California.

Lipsey, R. G (1986). Economic: New York Harper and Row.

Maana I., Owino, R., & Mutai N., (2008): Domestic debt and its impact on the economy. The case of Kenya" Paper presented during the 13th annual African econometrics society conference in Pretoria, South Africa.

Moha A E. (1999). Foreign Direct Investment and Growth in Nigeria: An empirical investigation journal of policy Modelling. Vol. 26: 627 – 639

Muhammad, J. A, Muhammad, R. S, & Khadija, T. (2012). Domestic debt and Inflationary Effects: An Evidence From Pakistan. *International Journal of Humanities and Social Science.* Vol.2, No 18, October 2012.

Muhammad, R. S., Muhammad, Z. F. & Khadija, T. (2010). Domestic debt and Economic Growth In Pakistan: An Empirical Analysis Pakistan. *Journal of Social Science*s (PJSS). Vol.30. No 2 (Dec 2010) Pp373-387.

Myers S.C. Determinants of Corporate Borrowing. *Journal of Financial Economics* s. 147-175

National Bureau of Statistics (NBS).(2017), *The Nigerian Statistical Fact sheets on Economic & Social Development*. Abuja: NBS.

Nur Hayati & Rahman (2012). The relationship between budget deficit and economic growth from Malaysia's perceptive: An ARDL approach.

Nzotta, S. M. (2004). Money Banking and Finance.Owerin, Nigeria, Hudson Juggle Nigeria Publishers.

Obademi O. E (2012). An Empirical Analysis of the Impact of Public Debt on Economic Growth: Evidence from Nigeria 1975-2005. *Canadian social science*. Vol. 8, No 4, 2012, pp.154-161

Obiwuru, T. C., Okwu, A. T & Ekezie, J. O (2013) Effects of Domestic debt on Economic Growth of Nigeria. *Journal of Strategic and International Studies*, 1x (1): 44-60

Ogonna, I. C, Idenyi, O.S, Ifeyinwa, A. C. & Gabriel, N. U. (2016). The Implications of Rising Public Debt on Unemployment in Nigeria: An Auto-Regressive Distributed Lag Approach*: Asian Research Journal of Arts and Social Sciences* (1): 1-15, 2016, Article no. ARSASS. 26394

Okwu, A. T., Obiwuru T. C., obiakor R. T. & Oluwalaiye, O. B. (2016). Domestic debt and Economic Growth in Nigeria Data Based Evidence. *Greener Journal of Economics And Accountancy.* ISSN: 2354-2357

Ola, C. S & Adeyemo, J. (1998). Public Finance in Nigeria. Lagos, Nigeria: CSS Publishing Company

Omotosho, B. S, Bawa, S. & Doguwa, S. I. (2016). Determining the Optimal Public Debt Threshold for Nigeria: *CBN Journal of Applied Statistics* Vol 7 No 2, (December 2016)

Onyeiwu, C. (2012). Domestic debt and the Growth of Nigerian Economy. *Research Journal of Finance and Accounting*.

Osafo K, P., & Okonjo-Iweala, N. (2007) Nigeria's Economic Reforms Progress and Challenges in Global Economy and Development Programme. New York, Washington D.C. the Brookings Institution.

Osinowo O. H (2015) Effect of Fiscal Policy in Sectorial Output Growth in Nigeria: *Journal of Advance in Economic and Business,* 3(6): 195-203

Oti, P.A, Odigbo, B.E & Odey, F.I (2016). Nigerian's Debt Burden and Development Tangle: The Socio –Economic and Political Implications. *Journal of economics and sustainable development*, ISSN 222-1700 (paper), ISSN 2222- 2855 (online) vol7, No 20, 2016.

Ozurumba. B. A & Kanu S. I., (2014). Domestic debt and Economic Growth in Nigeria (1980-2011). *Journal of Economic and Sustainable Development.* Vol.5, No.1

Patillo, C. (2002). External Debt, growth finance and development. A Quality Mag of the IMF.Vol 39, No 2.

Patillo, C. H & Luca R. (2002) External Debt and Growth.IMF working Paper 69, IMF Washington DC.

Pattillo C., H. Poirson & Ricci L., (2002) External Debt and Growth.IMF Working Paper.Wp/02/69, International Monetary Fund, Washington, D.C, 2002

Paul A. Samuelson & Williams D, Nordhaus. (2017) Economics (Nineteenth Edition), Tata McGrow Hill Education Pot.

Pesaran, H; Shin, Y & Smith, R. (2001).Bounds Testing Approaches to the Analysis of level relationships. *Journal of Applied Econometrics no*. 16: 289-326.

Peter N., Mba, Denis N. Yuni & Chukwunedo S. Oburota (2013). Analysis of Domestic debt. Implication for Economic Growth in Nigeria: *Global Journal of Social Sciences* Vol 12, 2013, 1-9.

Premchand, A (1984). Government Budgeting and Expenditure Control. Theory and Practice. IMF, Washington D.C

Sanusi O. J (2003) Management of Nigeria's Domestic debt. A Keynote Address Delivered at the 7th Monetary Policy Forum Organized by the Central Bank of Nigeria at the CBN conference Hall, Abuja, 22 May.

Serven, J. E., & Sahmano, S. M. (1989).The African debt crisis. AERC special paper 3, Initiative publisher: Nairobi.

Schiller (1999). The Impact of Domestic debt on Nigeria's Economic Growth

Soludo C. (1998). Investment in the Growth Process: A measures of Economist Ignorance in Africa. In: Ben Aigbokhan. Ed: Rekindling Investment for Economic Development in Nigeria. The Nigerian Economic Society, Ibadan pp 3-34.

Soludo, C. C. (2003) Debt Poverty and Inequality in Okonjo-Iweala, Soludo and Muhtar (Eds), The Debt Trap in Nigeria, Africa World Press NJ. P.23-74, 2003

Stiglitz, J. (2000) Economic of the Public Sector. 3rd ed. W. W. Norton and Co. New York.

Stoica T & Leonte A (2011), Estimating a Fiscal Reaction Function for Greece, *2011 International Conference on Financial Management and Economics, IPEDR vol.11 (2011) © (2011) IACSIT Press, Singapore*

Susan W K. & Stephen M.M (2015). The Effect of Public Debt on Private Investments in Kenya (1980-2013) *: International journal of development and sustainability* volume 4 numbers 8(2015) : pages 860-871. I

Uchendu O. (1993). Interest Rate Policy Saving and Investment in Nigeria. CBN Quaterly Review. 31(1), 34-52.

Ude, K.D & Ekesiola S.C (2014). Domestic debt and Private Investment in Nigeria. *International journal of scientific research and education.*

Udo, N. E (2016) Determinants of private investment in Nigeria: An Empirical Exploration: *Journal of Economics and Sustainable Development*. ISSN 2222-1700 (paper) Vol. 7, No. 11, 2016

Udoh E & Rafik R.A.M (2017), determinants and transmission channel of external debt: evidence from Malaysia, *Asian Journal of Economics, Business and Accounting4(1): 1-10, 2017; Article no.AJEBA.35031 ISSN: 2456-639X*

Ugwu, O. J. (2017) Imperatives of Domestic debt Payments and Economic Growth: the Nigerian Evidence: IOSR *Journal of Economics and Finance* (IOSR-JEF). ISSN: 2321-5933. Vol 8, Issue 1.

Uzoh, E. O. (2014) Structure and Composition of Domestic debt and the Impact on Private Investment in Nigeria: MSc Project of Department of Economics. University of Nigeria, NSUKKA.

Voss, G. M. (2002) Public and Private Investment in the United States and Canada. Economic Modeling, 19, 641-664

Waheed A. (2016). Sustainability of Public Debt: Empirical Analysis for Bahrain. *Journal of Internet Banking and Commerce,* April 2016, vol. 21, no. 2

Warega J. A (2012). The Relationship between Government Budget Deficit and Domestic Debt in Kenya. University of Nairobi.

World Bank & Intenational Monetary Fund (2001). "Developing Government Bond Market a Handbook" World bank Washington.

www.dmo.gov.ng(2018)
www.kpmg.com/ng.2017
www.punch.com

APPENDIX

Year	RGDP	PI	RIR	CPI	DGDP	PBGDP	LOGRGDP	LOGPI
1999Q1	134.441	14.69808	20.29	6.618373	0.199138	0.056337	2.128532	1.167261
1999Q2	134.152	14.69808	20.29	6.618373	0.199138	0.056337	2.127597	1.167261
1999Q3	134.262	14.69808	20.29	6.618373	0.199138	0.056337	2.127953	1.167261
1999Q4	134.772	14.69808	20.29	6.618373	0.199138	0.056337	2.1296	1.167261
2000Q1	136.858	14.47748	21.27417	6.933292	0.15323	0.101776	2.13627	1.160693
2000Q2	137.698	14.47748	21.27417	6.933292	0.15323	0.101776	2.138928	1.160693
2000Q3	138.467	14.47748	21.27417	6.933292	0.153229	0.101776	2.141346	1.160693
2000Q4	139.165	14.47748	21.27417	6.933292	0.15323	0.101776	2.14353	1.160693
2001Q1	139.745	16.57256	23.43833	18.87365	0.129934	0.109907	2.145336	1.21939
2001Q2	140.321	16.57256	23.43833	18.87365	0.129931	0.109907	2.147123	1.21939
2001Q3	140.846	16.57256	23.43833	18.87365	0.129936	0.109907	2.148745	1.21939
2001Q4	141.319	16.57256	23.43833	18.87365	0.129936	0.109907	2.150201	1.21939
2002Q1	140.188	13.04419	24.77083	12.87658	0.093256	0.093538	2.146711	1.115417
2002Q2	141.179	13.04419	24.77083	12.87658	0.093276	0.093538	2.14977	1.115417
2002Q3	142.738	13.04419	24.77083	12.87658	0.093266	0.093538	2.15454	1.115417
2002Q4	144.866	13.04419	24.77083	12.87658	0.093227	0.093538	2.160966	1.115417
2003Q1	143.417	13.81568	20.71417	14.03178	0.079517	0.10901	2.156601	1.140372
2003Q2	148.342	13.81568	20.71417	14.03178	0.079433	0.10901	2.171264	1.140372
2003Q3	155.495	13.81568	20.71417	14.03178	0.079324	0.10901	2.191716	1.140372
2003Q4	164.877	13.81568	20.71417	14.03178	0.079792	0.10901	2.21716	1.140372
2004Q1	189.066	13.13731	19.18083	14.99803	0.060807	0.068702	2.276613	1.118506
2004Q2	197.871	13.13731	19.18083	14.99803	0.060665	0.068702	2.296382	1.118506
2004Q3	203.871	13.13731	19.18083	14.99803	0.062352	0.068702	2.309355	1.118506
2004Q4	207.068	13.13731	19.18083	14.99803	0.059405	0.068702	2.316113	1.118506
2005Q1	199	13.2359	17.94833	17.86349	0.046852	0.071846	2.298853	1.121753
2005Q2	199.972	13.2359	17.94833	17.86349	0.052435	0.071846	2.300969	1.121753
2005Q3	201.524	13.2359	17.94833	17.86349	0.039326	0.071846	2.304327	1.121753
2005Q4	203.656	13.2359	17.94833	17.86349	0.048794	0.071846	2.308897	1.121753
2006Q1	208.182	13.18334	16.9	8.239527	0.053755	0.065591	2.318443	1.120025
2006Q2	210.748	13.18334	16.9	8.239527	5.36E-11	0.065591	2.323763	1.120025
2006Q3	213.168	13.18334	16.9	8.239527	0.059979	0.065591	2.328722	1.120025
2006Q4	215.442	13.18334	16.9	8.239527	6.12E-11	0.065591	2.33333	1.120025
2007Q1	217.349	25.24882	16.93917	5.382224	0.017368	0.072434	2.337158	1.402241
2007Q2	219.42	25.24882	16.93917	5.382224	0.023157	0.072434	2.341276	1.402241
2007Q3	221.433	25.24882	16.93917	5.382224	0.013508	0.072434	2.345242	1.402241
2007Q4	223.389	25.24882	16.93917	5.382224	6.58E-11	0.072434	2.349062	1.402241
2008Q1	224.882	33.7511	15.47983	11.57798	0.027113	0.069973	2.351955	1.528288
2008Q2	226.884	33.7511	15.47983	11.57798	0.036218	0.069973	2.355804	1.528288
2008Q3	228.991	33.7511	15.47983	11.57798	0.045122	0.069973	2.359818	1.528288
2008Q4	231.202	33.7511	15.47983	11.57798	5.93E-11	0.069973	2.363992	1.528288
2009Q1	233.402	38.38656	18.36167	11.53767	0.056177	0.068871	2.368105	1.584179
2009Q2	235.868	38.38656	18.36167	11.53767	0.063515	0.068871	2.372669	1.584179
2009Q3	238.485	38.38656	18.36167	11.53767	0.069056	0.068871	2.377461	1.584179
2009Q4	241.251	38.38656	18.36167	11.53767	7.29E-11	0.068871	2.382469	1.584179
2010Q1	245.67	15.42156	17.585	13.7202	6.35E-11	0.080568	2.390352	1.188128
2010Q2	248.137	15.42156	17.585	13.7202	0.068936	0.080568	2.394692	1.188128
2010Q3	250.154	15.42156	17.585	13.7202	0.077448	0.080568	2.398207	1.188128
2010Q4	251.72	15.42156	17.585	13.7202	0.083348	0.080568	2.400918	1.188128
2011Q1	250.901	12.47631	16.01667	10.84079	0.07731	0.074626	2.399502	1.096086
2011Q2	252.342	12.47631	16.01667	10.84079	0.082731	0.074626	2.40199	1.096086
2011Q3	254.108	12.47631	16.01667	10.84079	0.077438	0.074626	2.405018	1.096086
2011Q4	256.198	12.47631	16.01667	10.84079	0.089279	0.074626	2.408576	1.096086
2012Q1	259.143	11.80391	16.7925	12.21701	0.083205	0.068327	2.413539	1.072026
2012Q2	261.669	11.80391	16.7925	12.21701	0.085797	0.068327	2.417752	1.072026
2012Q3	264.307	11.80391	16.7925	12.21701	0.088491	0.068327	2.422109	1.072026

2012Q4	267.057	11.80391	16.7925	12.21701	0.091161	0.068327	2.426604	1.072026
2013Q1	269.919	12.59411	16.7225	8.475827	0.081073	0.062303	2.431233	1.100168
2013Q2	272.893	12.59411	16.7225	8.475827	0.085535	0.062303	2.435992	1.100168
2013Q3	275.978	12.59411	16.7225	8.475827	0.087809	0.062303	2.440874	1.100168
2013Q4	279.176	12.59411	16.7225	8.475827	0.088884	0.062303	2.445878	1.100168
2014Q1	378.326	14.60898	16.54833	8.057383	0.08067	0.055703	2.577866	1.16462
2014Q2	378.326	14.60898	16.54833	8.057383	0.083342	0.055703	2.577866	1.16462
2014Q3	378.326	14.60898	16.54833	8.057383	0.085925	0.055703	2.577866	1.16462
2014Q4	378.326	14.60898	16.54833	8.057383	0.088766	0.055703	2.577866	1.16462
2015Q1	366.9144	13.00233	16.68778	9.583406	0.090366	0.046736	2.564565	1.114021
2015Q2	366.9144	13.00233	16.68778	9.583406	0.089188	0.046736	2.564565	1.114021
2015Q3	366.9144	13.00233	16.68778	9.583406	0.091478	0.046736	2.564565	1.114021
2015Q4	366.9144	13.00233	16.68778	9.583406	0.093866	0.046736	2.564565	1.114021
2016Q1	341.8731	13.40181	16.65287	8.705539	0.098237	0.059711	2.533865	1.127163
2016Q2	341.8731	13.40181	16.65287	8.705539	0.104507	0.059711	2.533865	1.127163
2016Q3	341.8731	13.40181	16.65287	8.705539	0.108959	0.059711	2.533865	1.127163
2016Q4	341.8731	13.40181	16.65287	8.705539	0.106861	0.059711	2.533865	1.127163
2017Q1	360.8953	13.67104	16.62966	8.782109	0.117956	0.072914	2.557381	1.135802
2017Q2	360.8953	13.67104	16.62966	8.782109	0.118568	0.072914	2.557381	1.135802
2017Q3	360.8953	13.67104	16.62966	8.782109	0.123124	0.072914	2.557381	1.135802
2017Q4	360.8953	13.67104	16.62966	8.782109	0.124047	0.072914	2.557381	1.135802

	RGDP	DGDP	PBGDP	PI	RIR	INF
Mean	236.5353	0.083819	0.074151	16.65953	4.603716	11.01657
Median	227.9375	0.083345	0.069973	13.67104	6.685325	10.84079
Maximum	378.326	0.199138	0.109907	38.38656	23.83785	18.87365
Minimum	134.152	5.36E-11	0.046736	11.80391	-42.3102	5.382224
Std. Dev.	78.3845	0.046509	0.017319	7.303724	14.49947	3.647541
Skewness	0.421021	0.404648	0.808837	2.107401	-1.61888	0.556025
Kurtosis	2.120218	3.493534	2.816811	5.99885	6.461843	2.535925
Jarque-Bera	4.696334	2.845367	8.393028	84.73257	71.1468	4.598061
Probability	0.095544	0.241066	0.015048	0	0	0.100356
Sum	17976.68	6.370214	5.635494	1266.124	349.8824	837.2595
Sum Sq. Dev.	460809.7	0.162235	0.022497	4000.829	15767.6	997.8418
Observations	76	76	76	76	76	76

UNIT ROOT TEST AT LEVEL

RGDP

Null Hypothesis: RGDP has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.293291	0.1768
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RGDP)
Method: Least Squares
Date: 05/24/19 Time: 01:08
Sample (adjusted): 1999Q3 2017Q4
Included observations: 74 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDP(-1)	-0.110162	0.048037	-2.293291	0.0248
D(RGDP(-1))	0.263301	0.120362	2.187577	0.0320
C	1.73E+11	1.13E+11	1.532521	0.1298

R-squared	0.103590	Mean dependent var	6.50E+09
Adjusted R-squared	0.078339	S.D. dependent var	7.51E+11
S.E. of regression	7.21E+11	Akaike info criterion	57.48476
Sum squared resid	3.69E+25	Schwarz criterion	57.57817
Log likelihood	-2123.936	Hannan-Quinn criter.	57.52203
F-statistic	4.102420	Durbin-Watson stat	2.043848
Prob(F-statistic)	0.020606		

Null Hypothesis: RGDP has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*

Phillips-Perron test statistic		-2.171840	0.2182
Test critical values:	1% level	-3.520307	
	5% level	-2.900670	
	10% level	-2.587691	

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

Residual variance (no correction)	5.25E+23
HAC corrected variance (Bartlett kernel)	7.65E+23

Phillips-Perron Test Equation
Dependent Variable: D(RGDP)
Method: Least Squares
Date: 05/24/19 Time: 01:08
Sample (adjusted): 1999Q2 2017Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDP(-1)	-0.086589	0.047691	-1.815621	0.0735
C	1.44E+11	1.14E+11	1.270976	0.2078

R-squared	0.043206	Mean dependent var	7.25E+09
Adjusted R-squared	0.030099	S.D. dependent var	7.46E+11
S.E. of regression	7.34E+11	Akaike info criterion	57.50886
Sum squared resid	3.94E+25	Schwarz criterion	57.57066
Log likelihood	-2154.582	Hannan-Quinn criter.	57.53354
F-statistic	3.296481	Durbin-Watson stat	1.493589
Prob(F-statistic)	0.073535		

Null Hypothesis: RGDP is stationary
Exogenous: Constant
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.239016
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction)	3.12E+24
HAC corrected variance (Bartlett kernel)	1.62E+25

KPSS Test Equation
Dependent Variable: RGDP
Method: Least Squares
Date: 05/24/19 Time: 01:08
Sample: 1999Q1 2017Q4
Included observations: 76

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	1.59E+12	2.04E+11	7.780381	0.0000

R-squared	0.000000	Mean dependent var	1.59E+12
Adjusted R-squared	0.000000	S.D. dependent var	1.78E+12
S.E. of regression	1.78E+12	Akaike info criterion	59.26469
Sum squared resid	2.37E+26	Schwarz criterion	59.29535
Log likelihood	-2251.058	Hannan-Quinn criter.	59.27694
Durbin-Watson stat	0.173457		

DGDP

Null Hypothesis: DGDP has a unit root
Exogenous: Constant
Lag Length: 5 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.547216	0.5040
Test critical values:	1% level	-3.527045	
	5% level	-2.903566	
	10% level	-2.589227	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DGDP)
Method: Least Squares
Date: 05/24/19 Time: 01:09
Sample (adjusted): 2000Q3 2017Q4
Included observations: 70 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DGDP(-1)	-0.142132	0.091863	-1.547216	0.1268
D(DGDP(-1))	-0.382361	0.139480	-2.741339	0.0080
D(DGDP(-2))	-0.191860	0.143332	-1.338566	0.1855
D(DGDP(-3))	-0.222339	0.137913	-1.612174	0.1119
D(DGDP(-4))	-0.136359	0.134291	-1.015404	0.3138
D(DGDP(-5))	0.346930	0.118163	2.936024	0.0046
C	21931.98	23932.27	0.916419	0.3629

R-squared	0.444123	Mean dependent var	0.009809
Adjusted R-squared	0.391182	S.D. dependent var	206762.3
S.E. of regression	161330.0	Akaike info criterion	26.91493
Sum squared resid	1.64E+12	Schwarz criterion	27.13978
Log likelihood	-935.0226	Hannan-Quinn criter.	27.00424
F-statistic	8.389055	Durbin-Watson stat	2.022309
Prob(F-statistic)	0.000001		

Null Hypothesis: DGDP has a unit root
Exogenous: Constant, Linear Trend
Lag length: 5 (Spectral OLS AR based on HQ, maxlag=11)

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.773356	0.2117
Test critical values:	1% level	-4.085092	

	5% level	-3.470851
	10% level	-3.162458

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

Residual variance (no correction)	3.24E+10
HAC corrected variance (Spectral OLS autoregression)	9.41E+09

Phillips-Perron Test Equation
Dependent Variable: D(DGDP)
Method: Least Squares
Date: 05/24/19 Time: 01:12
Sample (adjusted): 1999Q2 2017Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DGDP(-1)	-0.360060	0.092298	-3.901072	0.0002
C	3957.664	42920.67	0.092209	0.9268
@TREND("1999Q1")	1260.480	1059.534	1.189655	0.2381

R-squared	0.175415	Mean dependent var	0.008347
Adjusted R-squared	0.152510	S.D. dependent var	199654.9
S.E. of regression	183800.8	Akaike info criterion	27.12027
Sum squared resid	2.43E+12	Schwarz criterion	27.21297
Log likelihood	-1014.010	Hannan-Quinn criter.	27.15728
F-statistic	7.658308	Durbin-Watson stat	2.353602
Prob(F-statistic)	0.000965		

Null Hypothesis: DGDP is stationary
Exogenous: Constant
Bandwidth: 9.04 (Andrews automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.301140
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction)	6.12E+10
HAC corrected variance (Bartlett kernel)	3.71E+11

KPSS Test Equation
Dependent Variable: DGDP
Method: Least Squares
Date: 05/24/19 Time: 01:17
Sample: 1999Q1 2017Q4
Included observations: 76

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	142124.9	28569.73	4.974669	0.0000

R-squared	0.000000	Mean dependent var	142124.9
Adjusted R-squared	0.000000	S.D. dependent var	249065.1
S.E. of regression	249065.1	Akaike info criterion	27.70189
Sum squared resid	4.65E+12	Schwarz criterion	27.73255
Log likelihood	-1051.672	Hannan-Quinn criter.	27.71414
Durbin-Watson stat	0.634023		

PBGDP

Null Hypothesis: PBGDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.630039	0.0915
Test critical values:	1% level	-3.520307	
	5% level	-2.900670	
	10% level	-2.587691	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PBGDP)
Method: Least Squares
Date: 05/24/19 Time: 01:16
Sample (adjusted): 1999Q2 2017Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PBGDP(-1)	-0.098882	0.037597	-2.630039	0.0104
C	0.478309	0.456781	1.047129	0.2985

R-squared	0.086553	Mean dependent var	-0.380093
Adjusted R-squared	0.074041	S.D. dependent var	2.876047
S.E. of regression	2.767528	Akaike info criterion	4.900090
Sum squared resid	559.1223	Schwarz criterion	4.961890
Log likelihood	-181.7534	Hannan-Quinn criter.	4.924766
F-statistic	6.917103	Durbin-Watson stat	2.012764
Prob(F-statistic)	0.010406		

Null Hypothesis: PBGDP has a unit root
Exogenous: Constant
Bandwidth: 0.654 (Andrews automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.630039	0.0915
Test critical values:	1% level	-3.520307	
	5% level	-2.900670	
	10% level	-2.587691	

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

Residual variance (no correction)	7.454963
HAC corrected variance (Bartlett kernel)	7.454963

Phillips-Perron Test Equation
Dependent Variable: D(PBGDP)
Method: Least Squares
Date: 05/24/19 Time: 01:16
Sample (adjusted): 1999Q2 2017Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PBGDP(-1)	-0.098882	0.037597	-2.630039	0.0104
C	0.478309	0.456781	1.047129	0.2985

R-squared	0.086553	Mean dependent var	-0.380093
Adjusted R-squared	0.074041	S.D. dependent var	2.876047
S.E. of regression	2.767528	Akaike info criterion	4.900090
Sum squared resid	559.1223	Schwarz criterion	4.961890
Log likelihood	-181.7534	Hannan-Quinn criter.	4.924766
F-statistic	6.917103	Durbin-Watson stat	2.012764
Prob(F-statistic)	0.010406		

Null Hypothesis: PBGDP is stationary
Exogenous: Constant
Bandwidth: 21.8 (Andrews automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.366121
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction)	71.82497
HAC corrected variance (Bartlett kernel)	915.0457

KPSS Test Equation
Dependent Variable: PBGDP
Method: Least Squares
Date: 05/24/19 Time: 01:16
Sample: 1999Q1 2017Q4
Included observations: 76

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.597094	0.978604	8.785056	0.0000

R-squared	0.000000	Mean dependent var	8.597094
Adjusted R-squared	0.000000	S.D. dependent var	8.531274

S.E. of regression	8.531274	Akaike info criterion	7.138425
Sum squared resid	5458.698	Schwarz criterion	7.169093
Log likelihood	-270.2602	Hannan-Quinn criter.	7.150681
Durbin-Watson stat	0.114118		

CPI

Null Hypothesis: CPI has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.820072	0.0603
Test critical values:	1% level	-3.520307	
	5% level	-2.900670	
	10% level	-2.587691	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CPI)
Method: Least Squares
Date: 05/24/19 Time: 01:21
Sample (adjusted): 1999Q2 2017Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI(-1)	-0.188860	0.066970	-2.820072	0.0062
C	2.115070	0.778869	2.715568	0.0083

R-squared	0.098240	Mean dependent var	0.028850
Adjusted R-squared	0.085887	S.D. dependent var	2.207027
S.E. of regression	2.110122	Akaike info criterion	4.357674
Sum squared resid	325.0410	Schwarz criterion	4.419473
Log likelihood	-161.4128	Hannan-Quinn criter.	4.382350
F-statistic	7.952806	Durbin-Watson stat	1.838887
Prob(F-statistic)	0.006178		

Null Hypothesis: CPI has a unit root
Exogenous: None
Bandwidth: 0.324 (Andrews automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.738597	0.3933
Test critical values:	1% level	-2.596160	
	5% level	-1.945199	
	10% level	-1.613948	

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

Residual variance (no correction)	4.771679
HAC corrected variance (Bartlett kernel)	4.771679

Phillips-Perron Test Equation
Dependent Variable: D(CPI)
Method: Least Squares
Date: 05/24/19 Time: 01:22
Sample (adjusted): 1999Q2 2017Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI(-1)	-0.016127	0.021834	-0.738597	0.4625

R-squared	0.007146	Mean dependent var	0.028850
Adjusted R-squared	0.007146	S.D. dependent var	2.207027
S.E. of regression	2.199127	Akaike info criterion	4.427242
Sum squared resid	357.8759	Schwarz criterion	4.458142
Log likelihood	-165.0216	Hannan-Quinn criter.	4.439580
Durbin-Watson stat	1.982515		

Null Hypothesis: CPI is stationary
Exogenous: Constant
Bandwidth: 13.7 (Andrews automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.219428
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction)	13.12950
HAC corrected variance (Bartlett kernel)	58.75458

KPSS Test Equation
Dependent Variable: CPI
Method: Least Squares
Date: 05/24/19 Time: 01:22
Sample: 1999Q1 2017Q4
Included observations: 76

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.01657	0.418402	26.33013	0.0000

R-squared	0.000000	Mean dependent var	11.01657
Adjusted R-squared	0.000000	S.D. dependent var	3.647541
S.E. of regression	3.647541	Akaike info criterion	5.439054
Sum squared resid	997.8418	Schwarz criterion	5.469722
Log likelihood	-205.6841	Hannan-Quinn criter.	5.451310
Durbin-Watson stat	0.361294		

RIR

Null Hypothesis: RIR has a unit root
Exogenous: Constant

Lag Length: 4 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.434995	0.5604
Test critical values:	1% level	-3.525618	
	5% level	-2.902953	
	10% level	-2.588902	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RIR)
Method: Least Squares
Date: 05/24/19 Time: 01:22
Sample (adjusted): 2000Q2 2017Q4
Included observations: 71 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR(-1)	-0.069187	0.048214	-1.434995	0.1561
D(RIR(-1))	-0.024086	0.107284	-0.224509	0.8231
D(RIR(-2))	-0.102741	0.107616	-0.954695	0.3433
D(RIR(-3))	-0.032121	0.106405	-0.301875	0.7637
D(RIR(-4))	-0.493087	0.106124	-4.646331	0.0000
C	0.981687	0.604669	1.623513	0.1093

R-squared	0.302884	Mean dependent var	0.300025
Adjusted R-squared	0.249260	S.D. dependent var	5.027415
S.E. of regression	4.356016	Akaike info criterion	5.861715
Sum squared resid	1233.367	Schwarz criterion	6.052927
Log likelihood	-202.0909	Hannan-Quinn criter.	5.937754
F-statistic	5.648268	Durbin-Watson stat	1.911698
Prob(F-statistic)	0.000220		

Null Hypothesis: RIR has a unit root
Exogenous: Constant
Bandwidth: 0.709 (Andrews automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.952920	0.3068
Test critical values:	1% level	-3.520307	
	5% level	-2.900670	
	10% level	-2.587691	

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

Residual variance (no correction)	22.90352
HAC corrected variance (Bartlett kernel)	22.90352

Phillips-Perron Test Equation
Dependent Variable: D(RIR)
Method: Least Squares
Date: 05/24/19 Time: 01:23

Sample (adjusted): 1999Q2 2017Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RIR(-1)	-0.093534	0.047894	-1.952920	0.0547
C	0.754433	0.633797	1.190339	0.2378

R-squared	0.049651	Mean dependent var	0.175263
Adjusted R-squared	0.036633	S.D. dependent var	4.942246
S.E. of regression	4.850878	Akaike info criterion	6.022501
Sum squared resid	1717.764	Schwarz criterion	6.084301
Log likelihood	-223.8438	Hannan-Quinn criter.	6.047177
F-statistic	3.813895	Durbin-Watson stat	1.935922
Prob(F-statistic)	0.054663		

Null Hypothesis: RIR is stationary
Exogenous: Constant
Bandwidth: 22.7 (Andrews automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.396852
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction)	135.0531
HAC corrected variance (Bartlett kernel)	1922.121

KPSS Test Equation
Dependent Variable: RIR
Method: Least Squares
Date: 05/24/19 Time: 01:23
Sample: 1999Q1 2017Q4
Included observations: 76

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.223938	1.341905	4.638137	0.0000

R-squared	0.000000	Mean dependent var	6.223938
Adjusted R-squared	0.000000	S.D. dependent var	11.69845
S.E. of regression	11.69845	Akaike info criterion	7.769861
Sum squared resid	10264.04	Schwarz criterion	7.800528
Log likelihood	-294.2547	Hannan-Quinn criter.	7.782117
Durbin-Watson stat	0.176326		

PI

Null Hypothesis: PI has a unit root
Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.950656	0.3078
Test critical values:	1% level	-3.520307	
	5% level	-2.900670	
	10% level	-2.587691	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PI)
Method: Least Squares
Date: 05/24/19 Time: 01:23
Sample (adjusted): 1999Q2 2017Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PI(-1)	-0.099725	0.051124	-1.950656	0.0549
C	1.651645	0.931648	1.772822	0.0804

R-squared	0.049542	Mean dependent var	-0.013694
Adjusted R-squared	0.036522	S.D. dependent var	3.290668
S.E. of regression	3.230019	Akaike info criterion	5.209158
Sum squared resid	761.6105	Schwarz criterion	5.270957
Log likelihood	-193.3434	Hannan-Quinn criter.	5.233834
F-statistic	3.805057	Durbin-Watson stat	1.904900
Prob(F-statistic)	0.054937		

Null Hypothesis: PI has a unit root
Exogenous: Constant
Bandwidth: 1.01 (Andrews automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.993805	0.2890
Test critical values:	1% level	-3.520307	
	5% level	-2.900670	
	10% level	-2.587691	

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

Residual variance (no correction)	10.15481
HAC corrected variance (Bartlett kernel)	10.63839

Phillips-Perron Test Equation
Dependent Variable: D(PI)
Method: Least Squares
Date: 05/24/19 Time: 01:24
Sample (adjusted): 1999Q2 2017Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

PI(-1)	-0.099725	0.051124	-1.950656	0.0549
C	1.651645	0.931648	1.772822	0.0804

R-squared	0.049542	Mean dependent var	-0.013694
Adjusted R-squared	0.036522	S.D. dependent var	3.290668
S.E. of regression	3.230019	Akaike info criterion	5.209158
Sum squared resid	761.6105	Schwarz criterion	5.270957
Log likelihood	-193.3434	Hannan-Quinn criter.	5.233834
F-statistic	3.805057	Durbin-Watson stat	1.904900
Prob(F-statistic)	0.054937		

Null Hypothesis: PI is stationary
Exogenous: Constant
Bandwidth: 21.8 (Andrews automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.117739
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction)	52.64248
HAC corrected variance (Bartlett kernel)	328.9644

KPSS Test Equation
Dependent Variable: PI
Method: Least Squares
Date: 05/24/19 Time: 01:24
Sample: 1999Q1 2017Q4
Included observations: 76

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.65953	0.837795	19.88498	0.0000

R-squared	0.000000	Mean dependent var	16.65953
Adjusted R-squared	0.000000	S.D. dependent var	7.303724
S.E. of regression	7.303724	Akaike info criterion	6.827716
Sum squared resid	4000.829	Schwarz criterion	6.858384
Log likelihood	-258.4532	Hannan-Quinn criter.	6.839973
Durbin-Watson stat	0.200289		

UNIT ROOT TEST AT FIRST DIFFERENCE

RGDP

Null Hypothesis: D(LOGRGDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

	t-Statistic	Prob.*

Augmented Dickey-Fuller test statistic		-9.025823	0.0000
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGRGDP,2)
Method: Least Squares
Date: 05/24/19 Time: 01:25
Sample (adjusted): 1999Q3 2017Q4
Included observations: 74 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGRGDP(-1))	-1.062137	0.117678	-9.025823	0.0000
C	0.002038	0.131569	0.015489	0.9877

R-squared	0.530839	Mean dependent var	-0.004150
Adjusted R-squared	0.524323	S.D. dependent var	1.640991
S.E. of regression	1.131781	Akaike info criterion	3.112117
Sum squared resid	92.22681	Schwarz criterion	3.174389
Log likelihood	-113.1483	Hannan-Quinn criter.	3.136958
F-statistic	81.46549	Durbin-Watson stat	1.995091
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LOGRGDP) has a unit root
Exogenous: Constant
Bandwidth: 0.12 (Andrews automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.025823	0.0000
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

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

Residual variance (no correction)	1.246308
HAC corrected variance (Bartlett kernel)	1.246308

Phillips-Perron Test Equation
Dependent Variable: D(LOGRGDP,2)
Method: Least Squares
Date: 05/24/19 Time: 01:25
Sample (adjusted): 1999Q3 2017Q4
Included observations: 74 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGRGDP(-1))	-1.062137	0.117678	-9.025823	0.0000
C	0.002038	0.131569	0.015489	0.9877

R-squared	0.530839	Mean dependent var	-0.004150

Adjusted R-squared	0.524323	S.D. dependent var	1.640991
S.E. of regression	1.131781	Akaike info criterion	3.112117
Sum squared resid	92.22681	Schwarz criterion	3.174389
Log likelihood	-113.1483	Hannan-Quinn criter.	3.136958
F-statistic	81.46549	Durbin-Watson stat	1.995091
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LOGRGDP) is stationary
Exogenous: Constant
Bandwidth: 1.21 (Andrews automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.158337
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction)	1.234457
HAC corrected variance (Bartlett kernel)	1.150688

KPSS Test Equation
Dependent Variable: D(LOGRGDP)
Method: Least Squares
Date: 05/24/19 Time: 01:26
Sample (adjusted): 1999Q2 2017Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001909	0.129158	0.014781	0.9882

R-squared	0.000000	Mean dependent var	0.001909
Adjusted R-squared	0.000000	S.D. dependent var	1.118543
S.E. of regression	1.118543	Akaike info criterion	3.075175
Sum squared resid	92.58425	Schwarz criterion	3.106075
Log likelihood	-114.3191	Hannan-Quinn criter.	3.087513
Durbin-Watson stat	2.123250		

DGDP

Null Hypothesis: D(DGDP) has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.058936	0.0020
Test critical values:	1% level	-3.527045	
	5% level	-2.903566	
	10% level	-2.589227	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DGDP,2)
Method: Least Squares
Date: 05/24/19 Time: 01:26
Sample (adjusted): 2000Q3 2017Q4
Included observations: 70 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DGDP(-1))	-1.941320	0.478283	-4.058936	0.0001
D(DGDP(-1),2)	0.441642	0.403176	1.095408	0.2774
D(DGDP(-2),2)	0.157576	0.313342	0.502889	0.6168
D(DGDP(-3),2)	-0.135829	0.221035	-0.614512	0.5411
D(DGDP(-4),2)	-0.322115	0.118338	-2.721997	0.0084
C	0.013114	19491.47	6.73E-07	1.0000

R-squared	0.796117	Mean dependent var	0.005168
Adjusted R-squared	0.780189	S.D. dependent var	347831.2
S.E. of regression	163077.4	Akaike info criterion	26.92365
Sum squared resid	1.70E+12	Schwarz criterion	27.11638
Log likelihood	-936.3279	Hannan-Quinn criter.	27.00021
F-statistic	49.98110	Durbin-Watson stat	1.996372
Prob(F-statistic)	0.000000		

Null Hypothesis: D(DGDP) has a unit root
Exogenous: Constant
Bandwidth: 1.43 (Andrews automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-13.48297	0.0001
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

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

Residual variance (no correction)	3.30E+10
HAC corrected variance (Bartlett kernel)	2.98E+10

Phillips-Perron Test Equation
Dependent Variable: D(DGDP,2)
Method: Least Squares
Date: 05/24/19 Time: 01:26
Sample (adjusted): 1999Q3 2017Q4
Included observations: 74 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DGDP(-1))	-1.415026	0.107222	-13.19716	0.0000
C	0.010009	21407.41	4.68E-07	1.0000

R-squared	0.707513	Mean dependent var	0.004958
Adjusted R-squared	0.703451	S.D. dependent var	338167.4
S.E. of regression	184153.5	Akaike info criterion	27.11158

Sum squared resid	2.44E+12	Schwarz criterion	27.17385
Log likelihood	-1001.129	Hannan-Quinn criter.	27.13642
F-statistic	174.1649	Durbin-Watson stat	2.161875
Prob(F-statistic)	0.000000		

Null Hypothesis: D(DGDP) is stationary
Exogenous: Constant
Bandwidth: 4.84 (Andrews automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.208868
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction)	3.93E+10
HAC corrected variance (Bartlett kernel)	5.27E+09

KPSS Test Equation
Dependent Variable: D(DGDP)
Method: Least Squares
Date: 05/24/19 Time: 01:26
Sample (adjusted): 1999Q2 2017Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.008347	23054.16	3.62E-07	1.0000

R-squared	0.000000	Mean dependent var	0.008347
Adjusted R-squared	0.000000	S.D. dependent var	199654.9
S.E. of regression	199654.9	Akaike info criterion	27.25981
Sum squared resid	2.95E+12	Schwarz criterion	27.29071
Log likelihood	-1021.243	Hannan-Quinn criter.	27.27215
Durbin-Watson stat	2.830053		

PBGDP

Null Hypothesis: D(PBGDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.653080	0.0000
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PBGDP,2)
Method: Least Squares
Date: 05/24/19 Time: 01:27
Sample (adjusted): 1999Q3 2017Q4
Included observations: 74 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PBGDP(-1))	-1.019608	0.117832	-8.653080	0.0000
C	-0.411000	0.340593	-1.206719	0.2315

R-squared	0.509790	Mean dependent var	-0.047982
Adjusted R-squared	0.502981	S.D. dependent var	4.124257
S.E. of regression	2.907582	Akaike info criterion	4.999176
Sum squared resid	608.6905	Schwarz criterion	5.061448
Log likelihood	-182.9695	Hannan-Quinn criter.	5.024017
F-statistic	74.87579	Durbin-Watson stat	2.002634
Prob(F-statistic)	0.000000		

Null Hypothesis: D(PBGDP) has a unit root
Exogenous: Constant
Bandwidth: 0.308 (Andrews automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.653080	0.0000
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

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

Residual variance (no correction)	8.225547
HAC corrected variance (Bartlett kernel)	8.225547

Phillips-Perron Test Equation
Dependent Variable: D(PBGDP,2)
Method: Least Squares
Date: 05/24/19 Time: 01:27
Sample (adjusted): 1999Q3 2017Q4
Included observations: 74 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PBGDP(-1))	-1.019608	0.117832	-8.653080	0.0000
C	-0.411000	0.340593	-1.206719	0.2315

R-squared	0.509790	Mean dependent var	-0.047982
Adjusted R-squared	0.502981	S.D. dependent var	4.124257
S.E. of regression	2.907582	Akaike info criterion	4.999176
Sum squared resid	608.6905	Schwarz criterion	5.061448
Log likelihood	-182.9695	Hannan-Quinn criter.	5.024017
F-statistic	74.87579	Durbin-Watson stat	2.002634
Prob(F-statistic)	0.000000		

Null Hypothesis: D(PBGDP) is stationary
Exogenous: Constant
Bandwidth: 0.559 (Andrews automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.168972
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction)	8.161357
HAC corrected variance (Bartlett kernel)	8.161357

KPSS Test Equation
Dependent Variable: D(PBGDP)
Method: Least Squares
Date: 05/24/19 Time: 01:27
Sample (adjusted): 1999Q2 2017Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.380093	0.332097	-1.144522	0.2561

R-squared	0.000000	Mean dependent var	-0.380093
Adjusted R-squared	0.000000	S.D. dependent var	2.876047
S.E. of regression	2.876047	Akaike info criterion	4.963954
Sum squared resid	612.1018	Schwarz criterion	4.994854
Log likelihood	-185.1483	Hannan-Quinn criter.	4.976292
Durbin-Watson stat	2.028851		

CPI

Null Hypothesis: D(CPI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.486771	0.0000
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CPI,2)
Method: Least Squares
Date: 05/24/19 Time: 01:28
Sample (adjusted): 1999Q3 2017Q4

Included observations: 74 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CPI(-1))	-1.000176	0.117851	-8.486771	0.0000
C	0.029245	0.260123	0.112427	0.9108

R-squared	0.500088	Mean dependent var	-2.29E-17
Adjusted R-squared	0.493145	S.D. dependent var	3.142786
S.E. of regression	2.237468	Akaike info criterion	4.475222
Sum squared resid	360.4509	Schwarz criterion	4.537494
Log likelihood	-163.5832	Hannan-Quinn criter.	4.500063
F-statistic	72.02528	Durbin-Watson stat	2.000000
Prob(F-statistic)	0.000000		

Null Hypothesis: D(CPI) has a unit root
Exogenous: Constant
Bandwidth: 0.00137 (Andrews automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.486771	0.0000
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

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

Residual variance (no correction)	4.870958
HAC corrected variance (Bartlett kernel)	4.870958

Phillips-Perron Test Equation
Dependent Variable: D(CPI,2)
Method: Least Squares
Date: 05/24/19 Time: 01:28
Sample (adjusted): 1999Q3 2017Q4
Included observations: 74 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CPI(-1))	-1.000176	0.117851	-8.486771	0.0000
C	0.029245	0.260123	0.112427	0.9108

R-squared	0.500088	Mean dependent var	-2.29E-17
Adjusted R-squared	0.493145	S.D. dependent var	3.142786
S.E. of regression	2.237468	Akaike info criterion	4.475222
Sum squared resid	360.4509	Schwarz criterion	4.537494
Log likelihood	-163.5832	Hannan-Quinn criter.	4.500063
F-statistic	72.02528	Durbin-Watson stat	2.000000
Prob(F-statistic)	0.000000		

Null Hypothesis: D(CPI) is stationary
Exogenous: Constant
Bandwidth: 0.024 (Andrews automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.072478
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction)	4.806024
HAC corrected variance (Bartlett kernel)	4.806024

KPSS Test Equation
Dependent Variable: D(CPI)
Method: Least Squares
Date: 05/24/19 Time: 01:29
Sample (adjusted): 1999Q2 2017Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.028850	0.254846	0.113205	0.9102

R-squared	0.000000	Mean dependent var	0.028850
Adjusted R-squared	0.000000	S.D. dependent var	2.207027
S.E. of regression	2.207027	Akaike info criterion	4.434414
Sum squared resid	360.4518	Schwarz criterion	4.465314
Log likelihood	-165.2905	Hannan-Quinn criter.	4.446752
Durbin-Watson stat	2.000346		

RIR

Null Hypothesis: D(RIR) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.849532	0.0000
Test critical values:	1% level	-3.525618	
	5% level	-2.902953	
	10% level	-2.588902	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RIR,2)
Method: Least Squares
Date: 05/24/19 Time: 01:29
Sample (adjusted): 2000Q2 2017Q4
Included observations: 71 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RIR(-1))	-1.781964	0.227015	-7.849532	0.0000

D(RIR(-1),2)	0.723838	0.191149	3.786775	0.0003
D(RIR(-2),2)	0.586598	0.150790	3.890162	0.0002
D(RIR(-3),2)	0.522493	0.104959	4.978070	0.0000
C	0.543832	0.526209	1.033492	0.3051

R-squared	0.647490	Mean dependent var	-0.038810
Adjusted R-squared	0.626126	S.D. dependent var	7.180986
S.E. of regression	4.390831	Akaike info criterion	5.864734
Sum squared resid	1272.440	Schwarz criterion	6.024078
Log likelihood	-203.1981	Hannan-Quinn criter.	5.928100
F-statistic	30.30720	Durbin-Watson stat	1.918556
Prob(F-statistic)	0.000000		

Null Hypothesis: D(RIR) has a unit root
Exogenous: Constant
Bandwidth: 0.0668 (Andrews automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.569571	0.0000
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

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

Residual variance (no correction)	24.41304
HAC corrected variance (Bartlett kernel)	24.41304

Phillips-Perron Test Equation
Dependent Variable: D(RIR,2)
Method: Least Squares
Date: 05/24/19 Time: 01:29
Sample (adjusted): 1999Q3 2017Q4
Included observations: 74 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(RIR(-1))	-1.015163	0.118461	-8.569571	0.0000
C	0.169017	0.582960	0.289929	0.7727

R-squared	0.504942	Mean dependent var	-0.069093
Adjusted R-squared	0.498066	S.D. dependent var	7.070292
S.E. of regression	5.009109	Akaike info criterion	6.087048
Sum squared resid	1806.565	Schwarz criterion	6.149320
Log likelihood	-223.2208	Hannan-Quinn criter.	6.111889
F-statistic	73.43755	Durbin-Watson stat	1.973378
Prob(F-statistic)	0.000000		

Null Hypothesis: D(RIR) is stationary
Exogenous: Constant
Bandwidth: 0.47 (Andrews automatic) using Bartlett kernel

	LM-Stat.

Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.052608
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction)	24.10012
HAC corrected variance (Bartlett kernel)	24.10012

KPSS Test Equation
Dependent Variable: D(RIR)
Method: Least Squares
Date: 05/24/19 Time: 01:30
Sample (adjusted): 1999Q2 2017Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.175263	0.570681	0.307112	0.7596

R-squared	0.000000	Mean dependent var	0.175263
Adjusted R-squared	0.000000	S.D. dependent var	4.942246
S.E. of regression	4.942246	Akaike info criterion	6.046761
Sum squared resid	1807.509	Schwarz criterion	6.077660
Log likelihood	-225.7535	Hannan-Quinn criter.	6.059099
Durbin-Watson stat	2.019106		

PI

Null Hypothesis: D(LOGPI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.485676	0.0000
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGPI,2)
Method: Least Squares
Date: 05/24/19 Time: 01:30
Sample (adjusted): 1999Q3 2017Q4
Included observations: 74 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGPI(-1))	-1.000046	0.117851	-8.485676	0.0000
C	-0.000425	0.007349	-0.057852	0.9540

R-squared	0.500023	Mean dependent var	0.000000
Adjusted R-squared	0.493079	S.D. dependent var	0.088787

S.E. of regression	0.063215	Akaike info criterion	-2.657909
Sum squared resid	0.287718	Schwarz criterion	-2.595637
Log likelihood	100.3426	Hannan-Quinn criter.	-2.633068
F-statistic	72.00669	Durbin-Watson stat	2.000000
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LOGPI) has a unit root
Exogenous: Constant
Bandwidth: 0.000561 (Andrews automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.485676	0.0000
Test critical values:	1% level	-3.521579	
	5% level	-2.901217	
	10% level	-2.587981	

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

Residual variance (no correction)	0.003888
HAC corrected variance (Bartlett kernel)	0.003888

Phillips-Perron Test Equation
Dependent Variable: D(LOGPI,2)
Method: Least Squares
Date: 05/24/19 Time: 01:30
Sample (adjusted): 1999Q3 2017Q4
Included observations: 74 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGPI(-1))	-1.000046	0.117851	-8.485676	0.0000
C	-0.000425	0.007349	-0.057852	0.9540

R-squared	0.500023	Mean dependent var	0.000000
Adjusted R-squared	0.493079	S.D. dependent var	0.088787
S.E. of regression	0.063215	Akaike info criterion	-2.657909
Sum squared resid	0.287718	Schwarz criterion	-2.595637
Log likelihood	100.3426	Hannan-Quinn criter.	-2.633068
F-statistic	72.00669	Durbin-Watson stat	2.000000
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LOGPI) is stationary
Exogenous: Constant
Bandwidth: 0.00991 (Andrews automatic) using Bartlett kernel

		LM-Stat.
Kwiatkowski-Phillips-Schmidt-Shin test statistic		0.076908
Asymptotic critical values*:	1% level	0.739000
	5% level	0.463000
	10% level	0.347000

*Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1)

Residual variance (no correction)	0.003836
HAC corrected variance (Bartlett kernel)	0.003836

KPSS Test Equation
Dependent Variable: D(LOGPI)
Method: Least Squares
Date: 05/24/19 Time: 01:30
Sample (adjusted): 1999Q2 2017Q4
Included observations: 75 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000419	0.007200	-0.058257	0.9537

R-squared	0.000000	Mean dependent var	-0.000419
Adjusted R-squared	0.000000	S.D. dependent var	0.062354
S.E. of regression	0.062354	Akaike info criterion	-2.698719
Sum squared resid	0.287718	Schwarz criterion	-2.667819
Log likelihood	102.2020	Hannan-Quinn criter.	-2.686381
Durbin-Watson stat	2.000092		

ARDL

Dependent Variable: LOGRGDP
Method: ARDL
Date: 05/24/19 Time: 09:58
Sample (adjusted): 2000Q1 2017Q4
Included observations: 72 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic): DGDP PBGDP RIR CPI
Fixed regressors: C
Number of models evalulated: 2500
Selected Model: ARDL(2, 2, 1, 4, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOGRGDP(-1)	0.688055	0.127895	5.379856	0.0000
LOGRGDP(-2)	-0.158357	0.105252	-1.504546	0.1380
DGDP	-2.98E-06	5.98E-07	-4.983631	0.0000
DGDP(-1)	1.29E-06	7.49E-07	1.726229	0.0897
DGDP(-2)	-1.39E-06	6.96E-07	-1.999784	0.0503
PBGDP	0.252787	0.044838	5.637733	0.0000
PBGDP(-1)	-0.073504	0.036794	-1.997723	0.0505
RIR	0.003525	0.023075	0.152764	0.8791
RIR(-1)	0.039040	0.026651	1.464861	0.1485
RIR(-2)	-0.037201	0.026280	-1.415536	0.1624
RIR(-3)	0.016247	0.026594	0.610939	0.5437
RIR(-4)	0.030485	0.020582	1.481138	0.1441
CPI	-0.126434	0.045605	-2.772363	0.0075
CPI(-1)	0.071632	0.046198	1.550550	0.1265
C	4.204232	1.061531	3.960536	0.0002

R-squared	0.950203	Mean dependent var	10.01823
Adjusted R-squared	0.937972	S.D. dependent var	3.075228
S.E. of regression	0.765896	Akaike info criterion	2.487512
Sum squared resid	33.43604	Schwarz criterion	2.961818
Log likelihood	-74.55043	Hannan-Quinn criter.	2.676334

F-statistic	77.68931	Durbin-Watson stat	1.532784
Prob(F-statistic)	0.000000		

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

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LOGRGDP)
Selected Model: ARDL(2, 2, 1, 4, 1)
Case 2: Restricted Constant and No Trend
Date: 05/24/19 Time: 09:59
Sample: 1999Q1 2017Q4
Included observations: 72

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.204232	1.061531	3.960536	0.0002
LOGRGDP(-1)*	-0.470302	0.103182	-4.557992	0.0000
DGDP(-1)	-3.08E-06	1.09E-06	-2.816279	0.0067
PBGDP(-1)	0.179283	0.040888	4.384748	0.0001
RIR(-1)	0.052097	0.018829	2.766766	0.0076
CPI(-1)	-0.054802	0.034348	-1.595521	0.1161
D(LOGRGDP(-1))	0.158357	0.105252	1.504546	0.1380
D(DGDP)	-2.98E-06	5.98E-07	-4.983631	0.0000
D(DGDP(-1))	1.39E-06	6.96E-07	1.999784	0.0503
D(PBGDP)	0.252787	0.044838	5.637733	0.0000
D(RIR)	0.003525	0.023075	0.152764	0.8791
D(RIR(-1))	-0.009531	0.020155	-0.472903	0.6381
D(RIR(-2))	-0.046732	0.019831	-2.356494	0.0219
D(RIR(-3))	-0.030485	0.020582	-1.481138	0.1441
D(CPI)	-0.126434	0.045605	-2.772363	0.0075

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DGDP	-6.55E-06	1.46E-06	-4.493377	0.0000
PBGDP	0.381208	0.056361	6.763710	0.0000
RIR	0.110773	0.031140	3.557246	0.0008
CPI	-0.116526	0.071270	-1.635000	0.1076
C	8.939430	1.039393	8.600629	0.0000

EC = LOGRGDP - (-0.0000*DGDP + 0.3812*PBGDP + 0.1108*RIR -0.1165 *CPI + 8.9394)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	4.019723	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87

		1%	3.29	4.37
Actual Sample Size	72	Finite Sample: n=75		
		10%	2.313	3.228
		5%	2.725	3.718
		1%	3.687	4.842
		Finite Sample: n=70		
		10%	2.32	3.232
		5%	2.725	3.718
		1%	3.608	4.86

ARDL Error Correction Regression
Dependent Variable: D(LOGRGDP)
Selected Model: ARDL(2, 2, 1, 4, 1)
Case 2: Restricted Constant and No Trend
Date: 05/24/19 Time: 09:59
Sample: 1999Q1 2017Q4
Included observations: 72

ECM Regression
Case 2: Restricted Constant and No Trend

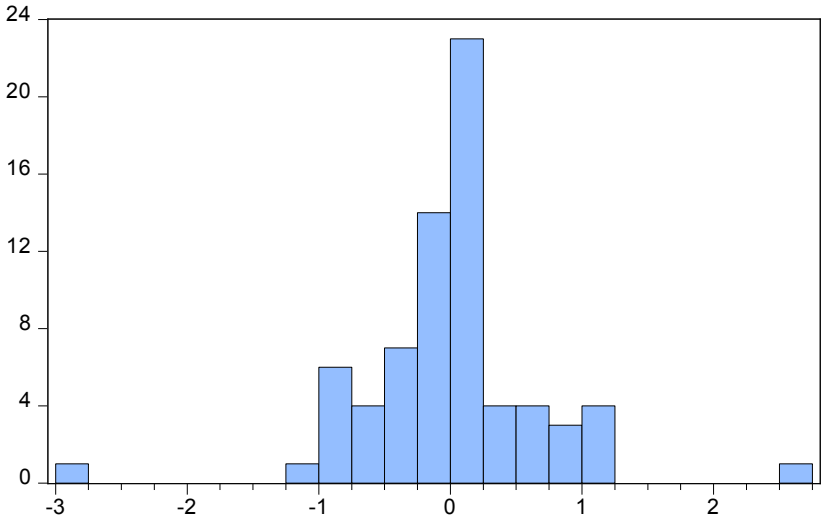
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGRGDP(-1))	0.158357	0.095229	1.662897	0.1018
D(DGDP)	-2.98E-06	4.98E-07	-5.985775	0.0000
D(DGDP(-1))	1.39E-06	5.89E-07	2.365090	0.0215
D(PBGDP)	0.252787	0.039430	6.410975	0.0000
D(RIR)	0.003525	0.019821	0.177843	0.8595
D(RIR(-1))	-0.009531	0.017982	-0.530051	0.5981
D(RIR(-2))	-0.046732	0.018320	-2.550935	0.0135
D(RIR(-3))	-0.030485	0.018648	-1.634743	0.1076
D(CPI)	-0.126434	0.039501	-3.200784	0.0022
CointEq(-1)*	-0.470302	0.091822	-5.121912	0.0000

R-squared	0.638854	Mean dependent var	0.001200
Adjusted R-squared	0.586430	S.D. dependent var	1.141924
S.E. of regression	0.734364	Akaike info criterion	2.348623
Sum squared resid	33.43604	Schwarz criterion	2.664827
Log likelihood	-74.55043	Hannan-Quinn criter.	2.474505
Durbin-Watson stat	1.532784		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	4.019723	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37



Series: Residuals
Sample 2000Q1 2017Q4
Observations 72

Mean	2.31e-16
Median	0.022977
Maximum	2.527078
Minimum	-2.995591
Std. Dev.	0.686244
Skewness	-0.367155
Kurtosis	8.733521
Jarque-Bera	100.2374
Probability	0.000000

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.122703	Prob. F(8,49)	0.3650
Obs*R-squared	11.15313	Prob. Chi-Square(8)	0.1932

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 05/24/19 Time: 10:00
Sample: 2000Q1 2017Q4
Included observations: 72
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGRGDP(-1)	-0.426926	0.207734	-2.055160	0.0452
LOGRGDP(-2)	0.289529	0.158103	1.831261	0.0731
DGDP	2.23E-07	6.41E-07	0.347001	0.7301
DGDP(-1)	-1.49E-06	9.74E-07	-1.531861	0.1320
DGDP(-2)	7.63E-07	7.89E-07	0.967732	0.3379
PBGDP	0.046510	0.048288	0.963187	0.3402
PBGDP(-1)	0.012937	0.037396	0.345940	0.7309
RIR	-0.014296	0.025035	-0.571049	0.5706
RIR(-1)	0.013216	0.029682	0.445256	0.6581
RIR(-2)	0.006448	0.030873	0.208842	0.8354
RIR(-3)	-0.007160	0.031215	-0.229365	0.8195
RIR(-4)	0.015841	0.023797	0.665679	0.5087
CPI	0.004258	0.046309	0.091944	0.9271
CPI(-1)	-0.026672	0.047556	-0.560860	0.5774
C	1.201004	1.199783	1.001018	0.3217
RESID(-1)	0.681071	0.250649	2.717227	0.0091
RESID(-2)	-0.007570	0.168684	-0.044878	0.9644
RESID(-3)	0.110895	0.167700	0.661269	0.5115
RESID(-4)	0.019551	0.164475	0.118872	0.9059
RESID(-5)	-0.124631	0.159095	-0.783378	0.4372
RESID(-6)	-0.011855	0.158282	-0.074898	0.9406
RESID(-7)	0.004933	0.159201	0.030986	0.9754
RESID(-8)	0.016197	0.167703	0.096582	0.9235

R-squared	0.154905	Mean dependent var	2.31E-16

Adjusted R-squared	-0.224526	S.D. dependent var	0.686244
S.E. of regression	0.759385	Akaike info criterion	2.541429
Sum squared resid	28.25665	Schwarz criterion	3.268697
Log likelihood	-68.49143	Hannan-Quinn criter.	2.830956
F-statistic	0.408256	Durbin-Watson stat	1.859727
Prob(F-statistic)	0.987623		

Heteroskedasticity Test: ARCH

F-statistic	0.293390	Prob. F(8,55)	0.9653
Obs*R-squared	2.619407	Prob. Chi-Square(8)	0.9559

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/24/19 Time: 10:01
Sample (adjusted): 2002Q1 2017Q4
Included observations: 64 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.731553	0.275794	2.652532	0.0104
RESID^2(-1)	-0.061236	0.134095	-0.456661	0.6497
RESID^2(-2)	-0.069241	0.134288	-0.515618	0.6082
RESID^2(-3)	0.000965	0.133801	0.007210	0.9943
RESID^2(-4)	-0.105356	0.132917	-0.792645	0.4314
RESID^2(-5)	-0.082499	0.133020	-0.620196	0.5377
RESID^2(-6)	-0.114266	0.133542	-0.855655	0.3959
RESID^2(-7)	-0.039381	0.134064	-0.293752	0.7701
RESID^2(-8)	-0.110414	0.133509	-0.827020	0.4118

R-squared	0.040928	Mean dependent var	0.456490
Adjusted R-squared	-0.098573	S.D. dependent var	1.366790
S.E. of regression	1.432571	Akaike info criterion	3.686519
Sum squared resid	112.8743	Schwarz criterion	3.990112
Log likelihood	-108.9686	Hannan-Quinn criter.	3.806120
F-statistic	0.293390	Durbin-Watson stat	2.018100
Prob(F-statistic)	0.965289		

Ramsey RESET Test
Equation: UNTITLED
Specification: LOGRGDP LOGRGDP(-1) LOGRGDP(-2) DGDP DGDP(-1) DGDP(-2) PBGDP PBGDP(-1) RIR RIR(-1) RIR(-2) RIR(-3) RIR(-4) CPI CPI(-1) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.861994	56	0.3938
F-statistic	0.743034	(1, 56)	0.3938

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.331744	1	0.331744
Restricted SSR	18.19061	57	0.443673
Unrestricted SSR	17.85887	56	0.446472

Unrestricted Test Equation:
Dependent Variable: LOGRGDP
Method: ARDL
Date: 05/24/19 Time: 10:01
Sample: 2000Q1 2017Q4
Included observations: 72
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.*
LOGRGDP(-1)	1.779389	0.435878	4.082309	0.0001
LOGRGDP(-2)	-0.406746	0.138303	-2.940978	0.0047
DGDP	-7.42E-06	1.80E-06	-4.132954	0.0001
DGDP(-1)	2.21E-06	7.95E-07	2.775132	0.0075
DGDP(-2)	-3.86E-06	1.16E-06	-3.339987	0.0015
PBGDP	0.786599	0.209114	3.761577	0.0004
PBGDP(-1)	-0.237583	0.072026	-3.298574	0.0017
RIR	0.015333	0.022445	0.683151	0.4973
RIR(-1)	0.112534	0.037934	2.966587	0.0044
RIR(-2)	-0.105435	0.036215	-2.911346	0.0052
RIR(-3)	0.048879	0.028258	1.729756	0.0892
RIR(-4)	0.090297	0.030176	2.992359	0.0041
CPI	-0.401641	0.114129	-3.519179	0.0009
CPI(-1)	0.217309	0.071119	3.055580	0.0034
C	5.346699	1.102140	4.851197	0.0000
FITTED^2	-0.096226	0.036900	-2.607720	0.0117

R-squared	0.955595	Mean dependent var	10.01823
Adjusted R-squared	0.943701	S.D. dependent var	3.075228
S.E. of regression	0.729671	Akaike info criterion	2.400683
Sum squared resid	29.81548	Schwarz criterion	2.906609
Log likelihood	-70.42460	Hannan-Quinn criter.	2.602094
F-statistic	80.34184	Durbin-Watson stat	1.767428
Prob(F-statistic)	0.000000		

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

VAR/VECM

VAR Lag Order Selection Criteria
Endogenous variables: LOGPI DGDP PBGDP RIR CPI

Exogenous variables: C
Date: 05/24/19 Time: 10:06
Sample: 1999Q1 2017Q4
Included observations: 68

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1501.841	NA	1.22e+13	44.31887	44.48207	44.38353
1	-1286.203	393.2236	4.48e+10	38.71184	39.69104*	39.09983*
2	-1270.398	26.49693	5.94e+10	38.98228	40.77747	39.69359
3	-1253.072	26.49858	7.67e+10	39.20799	41.81917	40.24262
4	-1221.323	43.88699	6.68e+10	39.00951	42.43670	40.36747
5	-1176.545	55.31442	4.13e+10*	38.42780	42.67098	40.10908
6	-1153.303	25.29262	5.09e+10	38.47951	43.53868	40.48411
7	-1139.418	13.06868	8.94e+10	38.80641	44.68157	41.13433
8	-1084.428	43.66830*	5.24e+10	37.92436*	44.61552	40.57560

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Date: 05/24/19 Time: 10:08
Sample (adjusted): 1999Q3 2017Q4
Included observations: 74 after adjustments
Trend assumption: Linear deterministic trend
Series: LOGPI DGDP PBGDP RIR CPI
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.350590	76.48347	69.81889	0.0133
At most 1	0.262642	44.53832	47.85613	0.0991
At most 2	0.159937	21.99186	29.79707	0.2989
At most 3	0.070657	9.095253	15.49471	0.3566
At most 4	0.048420	3.672735	3.841466	0.0553

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.350590	31.94515	33.87687	0.0835
At most 1	0.262642	22.54646	27.58434	0.1937
At most 2	0.159937	12.89661	21.13162	0.4618
At most 3	0.070657	5.422518	14.26460	0.6878
At most 4	0.048420	3.672735	3.841466	0.0553

Max-eigenvalue test indicates no cointegration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LOGPI	DGDP	PBGDP	RIR	CPI
5.540583	6.96E-07	0.174729	0.152176	0.287006
2.834189	2.78E-06	0.157064	0.021156	-0.152290
1.317626	4.95E-06	0.013645	-0.062539	0.076423
5.659589	-1.93E-06	0.003601	-0.013135	0.046447
-3.453924	-4.39E-07	0.043922	-0.027062	0.108760

Unrestricted Adjustment Coefficients (alpha):

D(LOGPI)	-0.017068	0.004692	-0.012050	-0.009959	0.004957
D(DGDP)	-21936.79	-42068.42	-40601.71	26250.39	14950.37
D(PBGDP)	0.154048	-1.057570	0.006595	-0.274699	-0.366493
D(RIR)	-1.477256	-0.913816	1.383308	0.206824	0.325143
D(CPI)	-0.828772	0.446624	-0.144670	0.181079	-0.273192

1 Cointegrating Equation(s): Log likelihood -1448.586

Normalized cointegrating coefficients (standard error in parentheses)

LOGPI	DGDP	PBGDP	RIR	CPI
1.000000	1.26E-07	0.031536	0.027466	0.051801
	(1.8E-07)	(0.00580)	(0.00425)	(0.00995)

Adjustment coefficients (standard error in parentheses)

D(LOGPI)	-0.094567
	(0.03972)
D(DGDP)	-121542.6
	(121662.)
D(PBGDP)	0.853516
	(1.93177)
D(RIR)	-8.184860
	(3.17308)
D(CPI)	-4.591882
	(1.38193)

2 Cointegrating Equation(s): Log likelihood -1437.313

Normalized cointegrating coefficients (standard error in parentheses)

LOGPI	DGDP	PBGDP	RIR	CPI
1.000000	0.000000	0.028034	0.030399	0.067277
		(0.00637)	(0.00496)	(0.01192)
0.000000	1.000000	27880.16	-23350.11	-123205.1
		(16151.8)	(12585.0)	(30217.7)

Adjustment coefficients (standard error in parentheses)

D(LOGPI)	-0.081268	1.18E-09
	(0.04447)	(2.1E-08)
D(DGDP)	-240772.5	-0.132373
	(132860.)	(0.06126)
D(PBGDP)	-2.143838	-2.84E-06
	(2.01535)	(9.3E-07)
D(RIR)	-10.77479	-3.57E-06
	(3.49575)	(1.6E-06)
D(CPI)	-3.326064	6.66E-07
	(1.51464)	(7.0E-07)

3 Cointegrating Equation(s): Log likelihood -1430.865

Normalized cointegrating coefficients (standard error in parentheses)

LOGPI	DGDP	PBGDP	RIR	CPI
1.000000	0.000000	0.000000	0.032652	0.171143
			(0.01060)	(0.03502)
0.000000	1.000000	0.000000	-21109.75	-19909.57
			(5028.19)	(16617.8)
0.000000	0.000000	1.000000	-0.080357	-3.704984
			(0.30320)	(1.00207)

Adjustment coefficients (standard error in parentheses)

D(LOGPI)	-0.097146	-5.84E-08	-0.002410
	(0.04448)	(4.0E-08)	(0.00165)
D(DGDP)	-294270.3	-0.333297	-10994.44
	(132089.)	(0.11878)	(4886.68)
D(PBGDP)	-2.135148	-2.80E-06	-0.139099
	(2.06002)	(1.9E-06)	(0.07621)
D(RIR)	-8.952107	3.27E-06	-0.382773
	(3.40769)	(3.1E-06)	(0.12607)
D(CPI)	-3.516685	-4.95E-08	-0.076636
	(1.54413)	(1.4E-06)	(0.05713)

4 Cointegrating Equation(s): Log likelihood -1428.153

Normalized cointegrating coefficients (standard error in parentheses)

LOGPI	DGDP	PBGDP	RIR	CPI
1.000000	0.000000	0.000000	0.000000	0.041408
				(0.02014)
0.000000	1.000000	0.000000	0.000000	63965.88
				(24232.6)
0.000000	0.000000	1.000000	0.000000	-3.385701
				(0.87723)
0.000000	0.000000	0.000000	1.000000	3.973304
				(0.93889)

Adjustment coefficients (standard error in parentheses)

D(LOGPI)	-0.153510	-3.92E-08	-0.002446	-0.001614
	(0.05862)	(4.2E-08)	(0.00162)	(0.00115)
D(DGDP)	-145703.9	-0.383990	-10899.92	-2033.895
	(174677.)	(0.12386)	(4828.61)	(3413.70)
D(PBGDP)	-3.689834	-2.27E-06	-0.140089	0.004264
	(2.74246)	(1.9E-06)	(0.07581)	(0.05360)
D(RIR)	-7.781567	2.87E-06	-0.382028	-0.333364
	(4.55605)	(3.2E-06)	(0.12594)	(0.08904)
D(CPI)	-2.491855	-3.99E-07	-0.075984	-0.110001
	(2.05819)	(1.5E-06)	(0.05689)	(0.04022)

Vector Error Correction Estimates
Date: 05/24/19 Time: 10:08
Sample (adjusted): 1999Q3 2017Q4
Included observations: 74 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
LOGPI(-1)	1.000000

DGDP(-1)	1.26E-07
	(1.8E-07)
	[0.70039]
PBGDP(-1)	0.031536
	(0.00580)
	[5.44016]
RIR(-1)	0.027466
	(0.00425)
	[6.46076]
CPI(-1)	0.051801
	(0.00995)
	[5.20862]
C	-2.226652

Error Correction:	D(LOGPI)	D(DGDP)	D(PBGDP)	D(RIR)	D(CPI)
CointEq1	-0.094567	-121542.6	0.853516	-8.184860	-4.591882
	(0.03972)	(121662.)	(1.93177)	(3.17308)	(1.38193)
	[-2.38110]	[-0.99902]	[0.44183]	[-2.57947]	[-3.32279]
D(LOGPI(-1))	0.029916	32867.54	0.149497	6.598401	0.735645
	(0.11752)	(360007.)	(5.71623)	(9.38936)	(4.08923)
	[0.25456]	[0.09130]	[0.02615]	[0.70275]	[0.17990]
D(DGDP(-1))	-5.73E-08	-0.419401	8.59E-07	1.47E-07	5.85E-07
	(3.6E-08)	(0.11120)	(1.8E-06)	(2.9E-06)	(1.3E-06)
	[-1.57822]	[-3.77168]	[0.48632]	[0.05069]	[0.46323]
D(PBGDP(-1))	0.003270	-990.9102	-0.030691	0.175451	0.139672
	(0.00281)	(8612.18)	(0.13675)	(0.22461)	(0.09782)
	[1.16308]	[-0.11506]	[-0.22444]	[0.78112]	[1.42779]
D(RIR(-1))	0.002322	321.8691	0.014912	0.109462	0.046488
	(0.00158)	(4833.53)	(0.07675)	(0.12606)	(0.05490)
	[1.47178]	[0.06659]	[0.19430]	[0.86831]	[0.84673]
D(CPI(-1))	0.002082	1863.993	0.030021	0.293402	0.086751
	(0.00337)	(10315.8)	(0.16380)	(0.26905)	(0.11718)
	[0.61834]	[0.18069]	[0.18328]	[1.09052]	[0.74035]
C	0.000146	-468.8159	-0.419258	0.196479	0.065840
	(0.00724)	(22171.4)	(0.35204)	(0.57825)	(0.25184)
	[0.02020]	[-0.02115]	[-1.19094]	[0.33978]	[0.26144]
R-squared	0.114563	0.189569	0.010213	0.100076	0.144296
Adj. R-squared	0.035271	0.116993	-0.078424	0.019486	0.067665
Sum sq. resids	0.254756	2.39E+12	602.7055	1626.141	308.4394
S.E. equation	0.061663	188893.3	2.999267	4.926536	2.145594
F-statistic	1.444815	2.612005	0.115224	1.241790	1.883011
Log likelihood	104.8446	-1000.346	-182.6039	-219.3277	-157.8175
Akaike AIC	-2.644449	27.22557	5.124430	6.116966	4.454527
Schwarz SC	-2.426497	27.44352	5.342382	6.334918	4.672479
Mean dependent	-0.000425	0.008527	-0.404019	0.165460	0.029240
S.D. dependent	0.062780	201017.8	2.888154	4.975248	2.222090

Determinant resid covariance (dof adj.)	1.14E+11
Determinant resid covariance	6.93E+10

Log likelihood	-1448.586
Akaike information criterion	40.23206
Schwarz criterion	41.47750
Number of coefficients	40

System: UNTITLED
Estimation Method: Least Squares
Date: 05/24/19 Time: 10:12
Sample: 1999Q3 2017Q4
Included observations: 74
Total system (balanced) observations 370

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.094567	0.039716	-2.381097	0.0178
C(2)	0.029916	0.117522	0.254560	0.7992
C(3)	5.73E-08	3.63E-08	1.578216	0.1155
C(4)	0.003270	0.002811	1.163082	0.2456
C(5)	0.002322	0.001578	1.471777	0.1420
C(6)	0.002082	0.003368	0.618342	0.5368
C(7)	0.000146	0.007238	0.020201	0.9839
C(8)	-121542.6	121662.3	-0.999016	0.3185
C(9)	32867.54	360006.9	0.091297	0.9273
C(10)	-0.419401	0.111197	-3.771684	0.0002
C(11)	-990.9102	8612.177	-0.115059	0.9085
C(12)	321.8691	4833.533	0.066591	0.9469
C(13)	1863.993	10315.83	0.180692	0.8567
C(14)	-468.8159	22171.38	-0.021145	0.9831
C(15)	0.853516	1.931767	0.441832	0.6589
C(16)	0.149497	5.716227	0.026153	0.9792
C(17)	8.59E-07	1.77E-06	0.486317	0.6271
C(18)	-0.030691	0.136745	-0.224442	0.8226
C(19)	0.014912	0.076747	0.194303	0.8461
C(20)	0.030021	0.163796	0.183282	0.8547
C(21)	-0.419258	0.352039	-1.190941	0.2345
C(22)	-8.184860	3.173082	-2.579467	0.0103
C(23)	6.598401	9.389359	0.702753	0.4827
C(24)	1.47E-07	2.90E-06	0.050685	0.9596
C(25)	0.175451	0.224615	0.781119	0.4353
C(26)	0.109462	0.126064	0.868311	0.3858
C(27)	0.293402	0.269048	1.090519	0.2763
C(28)	0.196479	0.578253	0.339780	0.7342
C(29)	-4.591882	1.381934	-3.322795	0.0010
C(30)	0.735645	4.089233	0.179898	0.8573
C(31)	5.85E-07	1.26E-06	0.463228	0.6435
C(32)	0.139672	0.097824	1.427791	0.1543
C(33)	0.046488	0.054903	0.846730	0.3978
C(34)	0.086751	0.117175	0.740352	0.4596
C(35)	0.065840	0.251839	0.261437	0.7939

Determinant residual covariance	6.93E+10

Equation: D(LOGPI) = C(1)*(LOGPI(-1) + 1.25614562351E-07*DGDP(-1) + 0.0315362876677*PBGDP(-1) + 0.0274657541998*RIR(-1) + 0.0518006531317*CPI(-1) - 2.22665218085) + C(2)*D(LOGPI(-1)) + C(3)*D(DGDP(-1)) + C(4)*D(PBGDP(-1)) + C(5)*D(RIR(-1)) + C(6) *D(CPI(-1)) + C(7)
Observations: 74

R-squared	0.114563	Mean dependent var	-0.000425
Adjusted R-squared	0.035271	S.D. dependent var	0.062780
S.E. of regression	0.061663	Sum squared resid	0.254756
Durbin-Watson stat	2.115380		

Equation: D(DGDP) = C(8)*(LOGPI(-1) + 1.25614562351E-07*DGDP(-1) + 0.0315362876677*PBGDP(-1) + 0.0274657541998*RIR(-1) + 0.0518006531317*CPI(-1) - 2.22665218085) + C(9)*D(LOGPI(-1)) + C(10)*D(DGDP(-1)) + C(11)*D(PBGDP(-1)) + C(12)*D(RIR(-1)) + C(13) *D(CPI(-1)) + C(14)

Observations: 74

R-squared	0.189569	Mean dependent var	0.008527
Adjusted R-squared	0.116993	S.D. dependent var	201017.8
S.E. of regression	188893.3	Sum squared resid	2.39E+12
Durbin-Watson stat	2.162894		

Equation: D(PBGDP) = C(15)*(LOGPI(-1) + 1.25614562351E-07*DGDP(-1) + 0.0315362876677*PBGDP(-1) + 0.0274657541998*RIR(-1) + 0.0518006531317*CPI(-1) - 2.22665218085) + C(16)*D(LOGPI(-1)) + C(17)*D(DGDP(-1)) + C(18)*D(PBGDP(-1)) + C(19)*D(RIR(-1)) + C(20) *D(CPI(-1)) + C(21)

Observations: 74

R-squared	0.010213	Mean dependent var	-0.404019
Adjusted R-squared	-0.078424	S.D. dependent var	2.888154
S.E. of regression	2.999267	Sum squared resid	602.7055
Durbin-Watson stat	2.009781		

Equation: D(RIR) = C(22)*(LOGPI(-1) + 1.25614562351E-07*DGDP(-1) + 0.0315362876677*PBGDP(-1) + 0.0274657541998*RIR(-1) + 0.0518006531317*CPI(-1) - 2.22665218085) + C(23)*D(LOGPI(-1)) + C(24)*D(DGDP(-1)) + C(25)*D(PBGDP(-1)) + C(26)*D(RIR(-1)) + C(27) *D(CPI(-1)) + C(28)

Observations: 74

R-squared	0.100076	Mean dependent var	0.165460
Adjusted R-squared	0.019486	S.D. dependent var	4.975248
S.E. of regression	4.926536	Sum squared resid	1626.141
Durbin-Watson stat	2.014693		

Equation: D(CPI) = C(29)*(LOGPI(-1) + 1.25614562351E-07*DGDP(-1) + 0.0315362876677*PBGDP(-1) + 0.0274657541998*RIR(-1) + 0.0518006531317*CPI(-1) - 2.22665218085) + C(30)*D(LOGPI(-1)) + C(31)*D(DGDP(-1)) + C(32)*D(PBGDP(-1)) + C(33)*D(RIR(-1)) + C(34) *D(CPI(-1)) + C(35)

Observations: 74

R-squared	0.144296	Mean dependent var	0.029240
Adjusted R-squared	0.067665	S.D. dependent var	2.222090
S.E. of regression	2.145594	Sum squared resid	308.4395
Durbin-Watson stat	2.070755		

IMPULSE RESPONSE

Response of LOGPI:

Period	LOGPI	DGDP	PBGDP	RIR	CPI
1	0.060684	0.000000	0.000000	0.000000	0.000000
	(0.00495)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
2	0.051813	-0.005675	0.001104	-0.002089	-0.009434
	(0.00604)	(0.00380)	(0.00363)	(0.00467)	(0.00474)
3	0.044661	-0.009160	0.000854	-0.003239	-0.014992
	(0.00775)	(0.00614)	(0.00611)	(0.00725)	(0.00756)
4	0.038792	-0.011248	-0.000118	-0.003705	-0.017944
	(0.00895)	(0.00763)	(0.00789)	(0.00862)	(0.00921)
5	0.033901	-0.012445	-0.001404	-0.003688	-0.019164
	(0.00974)	(0.00861)	(0.00919)	(0.00929)	(0.01013)
6	0.029769	-0.013073	-0.002748	-0.003343	-0.019258
	(0.01028)	(0.00926)	(0.01011)	(0.00954)	(0.01056)
7	0.026237	-0.013332	-0.003998	-0.002792	-0.018642
	(0.01064)	(0.00969)	(0.01075)	(0.00952)	(0.01068)
8	0.023189	-0.013347	-0.005072	-0.002127	-0.017598
	(0.01087)	(0.00995)	(0.01115)	(0.00935)	(0.01057)
9	0.020538	-0.013194	-0.005933	-0.001416	-0.016321
	(0.01099)	(0.01009)	(0.01135)	(0.00907)	(0.01032)
10	0.018217	-0.012922	-0.006572	-0.000710	-0.014939
	(0.01104)	(0.01013)	(0.01138)	(0.00873)	(0.00999)
11	0.016173	-0.012561	-0.007000	-4.31E-05	-0.013538
	(0.01100)	(0.01009)	(0.01127)	(0.00836)	(0.00960)
12	0.014367	-0.012132	-0.007237	0.000561	-0.012173
	(0.01091)	(0.00999)	(0.01106)	(0.00797)	(0.00920)
13	0.012765	-0.011650	-0.007308	0.001088	-0.010878
	(0.01075)	(0.00984)	(0.01075)	(0.00757)	(0.00878)
14	0.011341	-0.011126	-0.007240	0.001533	-0.009670
	(0.01054)	(0.00964)	(0.01038)	(0.00718)	(0.00838)
15	0.010073	-0.010570	-0.007060	0.001893	-0.008561
	(0.01029)	(0.00940)	(0.00996)	(0.00680)	(0.00798)
16	0.008942	-0.009992	-0.006792	0.002173	-0.007552
	(0.01000)	(0.00914)	(0.00951)	(0.00642)	(0.00760)
17	0.007932	-0.009399	-0.006460	0.002377	-0.006641
	(0.00968)	(0.00886)	(0.00904)	(0.00605)	(0.00723)
18	0.007030	-0.008799	-0.006082	0.002512	-0.005826
	(0.00934)	(0.00856)	(0.00855)	(0.00568)	(0.00687)
19	0.006225	-0.008199	-0.005676	0.002587	-0.005098
	(0.00898)	(0.00825)	(0.00806)	(0.00533)	(0.00652)
20	0.005505	-0.007606	-0.005255	0.002610	-0.004453
	(0.00860)	(0.00792)	(0.00758)	(0.00499)	(0.00618)

Response of DGDP:

Period	LOGPI	DGDP	PBGDP	RIR	CPI
1	0.001881	0.019786	0.000000	0.000000	0.000000
	(0.00229)	(0.00162)	(0.00000)	(0.00000)	(0.00000)
2	-0.001263	0.016707	0.000296	-0.002418	-0.000407
	(0.00237)	(0.00183)	(0.00116)	(0.00150)	(0.00153)
3	-0.003098	0.014174	0.000245	-0.003613	-0.000261
	(0.00271)	(0.00225)	(0.00194)	(0.00229)	(0.00241)
4	-0.004071	0.012039	5.85E-05	-0.004034	0.000118
	(0.00295)	(0.00256)	(0.00247)	(0.00268)	(0.00289)
5	-0.004489	0.010216	-0.000150	-0.003988	0.000554
	(0.00309)	(0.00275)	(0.00283)	(0.00283)	(0.00312)
6	-0.004557	0.008652	-0.000323	-0.003679	0.000953
	(0.00316)	(0.00286)	(0.00307)	(0.00284)	(0.00319)
7	-0.004413	0.007311	-0.000440	-0.003243	0.001276
	(0.00318)	(0.00291)	(0.00321)	(0.00277)	(0.00315)
8	-0.004149	0.006166	-0.000497	-0.002765	0.001511

	(0.00317)	(0.00291)	(0.00326)	(0.00264)	(0.00303)
9	-0.003823	0.005193	-0.000502	-0.002297	0.001660
	(0.00313)	(0.00288)	(0.00324)	(0.00249)	(0.00288)
10	-0.003476	0.004373	-0.000465	-0.001869	0.001736
	(0.00307)	(0.00282)	(0.00317)	(0.00233)	(0.00270)
11	-0.003130	0.003686	-0.000400	-0.001495	0.001751
	(0.00299)	(0.00275)	(0.00306)	(0.00217)	(0.00252)
12	-0.002799	0.003114	-0.000316	-0.001179	0.001719
	(0.00289)	(0.00266)	(0.00292)	(0.00201)	(0.00235)
13	-0.002492	0.002641	-0.000223	-0.000920	0.001653
	(0.00279)	(0.00256)	(0.00276)	(0.00186)	(0.00218)
14	-0.002211	0.002252	-0.000129	-0.000713	0.001564
	(0.00267)	(0.00246)	(0.00259)	(0.00172)	(0.00203)
15	-0.001957	0.001932	-3.82E-05	-0.000552	0.001460
	(0.00255)	(0.00235)	(0.00242)	(0.00158)	(0.00189)
16	-0.001730	0.001670	4.45E-05	-0.000429	0.001348
	(0.00242)	(0.00224)	(0.00224)	(0.00146)	(0.00176)
17	-0.001528	0.001456	0.000117	-0.000338	0.001233
	(0.00229)	(0.00213)	(0.00207)	(0.00134)	(0.00165)
18	-0.001349	0.001280	0.000179	-0.000273	0.001120
	(0.00216)	(0.00201)	(0.00190)	(0.00124)	(0.00154)
19	-0.001191	0.001135	0.000229	-0.000227	0.001010
	(0.00204)	(0.00191)	(0.00174)	(0.00114)	(0.00144)
20	-0.001052	0.001014	0.000267	-0.000196	0.000906
	(0.00191)	(0.00180)	(0.00159)	(0.00104)	(0.00134)

Response of PBGDP:

Period	LOGPI	DGDP	PBGDP	RIR	CPI
1	0.000266	-0.000253	0.007989	0.000000	0.000000
	(0.00092)	(0.00092)	(0.00065)	(0.00000)	(0.00000)
2	0.000412	0.000670	0.007039	-0.000633	-0.000227
	(0.00098)	(0.00095)	(0.00074)	(0.00060)	(0.00062)
3	0.000480	0.001282	0.006151	-0.001109	-0.000414
	(0.00114)	(0.00107)	(0.00094)	(0.00094)	(0.00100)
4	0.000502	0.001658	0.005326	-0.001443	-0.000554
	(0.00126)	(0.00117)	(0.00112)	(0.00113)	(0.00122)
5	0.000499	0.001855	0.004568	-0.001654	-0.000652
	(0.00134)	(0.00124)	(0.00126)	(0.00121)	(0.00133)
6	0.000483	0.001922	0.003879	-0.001763	-0.000710
	(0.00138)	(0.00129)	(0.00136)	(0.00123)	(0.00138)
7	0.000462	0.001893	0.003259	-0.001790	-0.000738
	(0.00140)	(0.00131)	(0.00142)	(0.00121)	(0.00137)
8	0.000438	0.001799	0.002707	-0.001756	-0.000740
	(0.00140)	(0.00131)	(0.00145)	(0.00117)	(0.00134)
9	0.000416	0.001662	0.002222	-0.001676	-0.000724
	(0.00139)	(0.00130)	(0.00145)	(0.00112)	(0.00128)
10	0.000394	0.001500	0.001800	-0.001565	-0.000695
	(0.00137)	(0.00127)	(0.00142)	(0.00105)	(0.00121)
11	0.000374	0.001325	0.001436	-0.001434	-0.000657
	(0.00134)	(0.00124)	(0.00138)	(0.00099)	(0.00114)
12	0.000355	0.001148	0.001126	-0.001292	-0.000613
	(0.00130)	(0.00120)	(0.00132)	(0.00092)	(0.00106)
13	0.000337	0.000976	0.000864	-0.001147	-0.000567
	(0.00125)	(0.00115)	(0.00125)	(0.00085)	(0.00099)
14	0.000320	0.000813	0.000646	-0.001005	-0.000519
	(0.00119)	(0.00110)	(0.00117)	(0.00078)	(0.00092)
15	0.000303	0.000664	0.000466	-0.000868	-0.000473
	(0.00114)	(0.00105)	(0.00109)	(0.00072)	(0.00085)
16	0.000287	0.000529	0.000319	-0.000741	-0.000428
	(0.00107)	(0.00099)	(0.00100)	(0.00065)	(0.00079)
17	0.000271	0.000409	0.000201	-0.000624	-0.000385

	(0.00101)	(0.00094)	(0.00092)	(0.00060)	(0.00073)
18	0.000255	0.000305	0.000108	-0.000518	-0.000345
	(0.00094)	(0.00088)	(0.00083)	(0.00054)	(0.00068)
19	0.000239	0.000216	3.49E-05	-0.000424	-0.000308
	(0.00088)	(0.00083)	(0.00075)	(0.00050)	(0.00063)
20	0.000223	0.000140	-2.05E-05	-0.000341	-0.000274
	(0.00081)	(0.00077)	(0.00068)	(0.00045)	(0.00058)

Response of RIR:

Period	LOGPI	DGDP	PBGDP	RIR	CPI
1	6.398003	-0.404658	-2.476881	8.957712	0.000000
	(1.19447)	(1.07367)	(1.05393)	(0.73139)	(0.00000)
2	3.872671	-0.257380	-1.411460	6.025057	-0.724192
	(1.09767)	(0.98318)	(0.95698)	(0.98143)	(0.87179)
3	2.178646	-0.043001	-0.796706	3.995518	-0.955468
	(1.16728)	(1.05713)	(1.06428)	(1.17796)	(1.20190)
4	1.056234	0.164367	-0.452956	2.604145	-0.924379
	(1.14470)	(1.05560)	(1.11725)	(1.15132)	(1.24327)
5	0.325779	0.332950	-0.267500	1.661003	-0.769050
	(1.06570)	(0.99654)	(1.10297)	(1.01846)	(1.14437)
6	-0.137067	0.453934	-0.170908	1.030339	-0.569409
	(0.97302)	(0.91527)	(1.04403)	(0.85750)	(0.99138)
7	-0.418347	0.529986	-0.121445	0.615516	-0.369299
	(0.88710)	(0.83310)	(0.96045)	(0.70957)	(0.83317)
8	-0.577540	0.568651	-0.094860	0.348115	-0.190647
	(0.81283)	(0.75914)	(0.86632)	(0.59192)	(0.69583)
9	-0.655682	0.578759	-0.077743	0.180025	-0.042448
	(0.74814)	(0.69541)	(0.77098)	(0.50713)	(0.59063)
10	-0.680990	0.568603	-0.063247	0.077702	0.073610
	(0.68960)	(0.64070)	(0.68046)	(0.44948)	(0.51826)
11	-0.672770	0.545168	-0.048361	0.018012	0.159685
	(0.63479)	(0.59296)	(0.59845)	(0.41023)	(0.47219)
12	-0.644145	0.513916	-0.032205	-0.014796	0.219702
	(0.58261)	(0.55034)	(0.52700)	(0.38144)	(0.44287)
13	-0.603946	0.478870	-0.014984	-0.031262	0.258148
	(0.53297)	(0.51154)	(0.46685)	(0.35774)	(0.42173)
14	-0.558035	0.442830	0.002636	-0.038293	0.279410
	(0.48622)	(0.47577)	(0.41777)	(0.33613)	(0.40306)
15	-0.510232	0.407616	0.019875	-0.040290	0.287443
	(0.44287)	(0.44261)	(0.37875)	(0.31532)	(0.38392)
16	-0.462955	0.374311	0.036028	-0.039950	0.285634
	(0.40332)	(0.41182)	(0.34820)	(0.29489)	(0.36329)
17	-0.417672	0.343469	0.050542	-0.038835	0.276785
	(0.36775)	(0.38328)	(0.32429)	(0.27492)	(0.34118)
18	-0.375211	0.315280	0.063045	-0.037770	0.263142
	(0.33616)	(0.35687)	(0.30518)	(0.25559)	(0.31810)
19	-0.335977	0.289704	0.073333	-0.037118	0.246465
	(0.30836)	(0.33250)	(0.28926)	(0.23713)	(0.29473)
20	-0.300099	0.266564	0.081348	-0.036967	0.228099
	(0.28403)	(0.31004)	(0.27526)	(0.21971)	(0.27169)

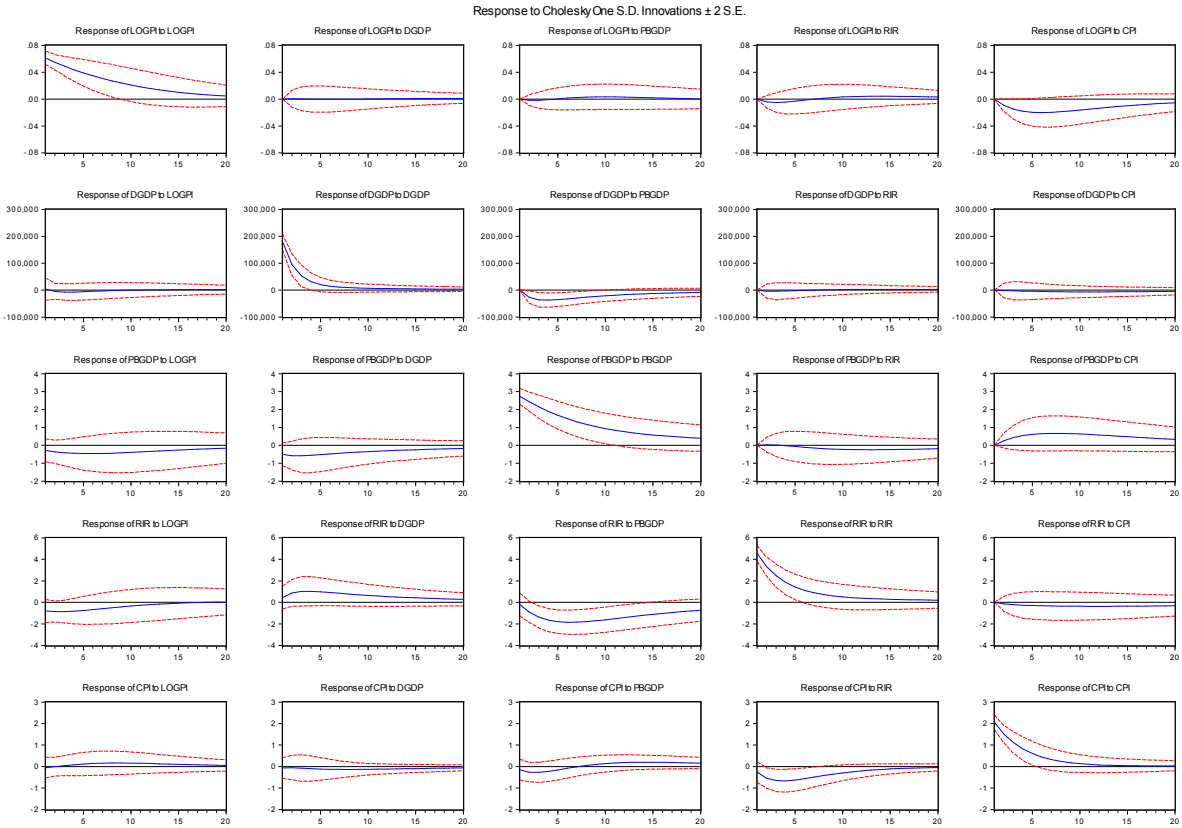
Response of CPI:

Period	LOGPI	DGDP	PBGDP	RIR	CPI
1	-0.004656	0.048475	0.408964	0.346510	2.020991
	(0.24150)	(0.24146)	(0.23911)	(0.23507)	(0.16501)
2	0.104903	-0.008646	0.564728	0.330208	1.476041
	(0.23442)	(0.22394)	(0.21622)	(0.23299)	(0.20121)
3	0.166633	-0.015371	0.653887	0.272518	1.057028
	(0.25739)	(0.23931)	(0.23430)	(0.25897)	(0.25630)
4	0.196992	0.004931	0.692235	0.196801	0.737790

	(0.26893)	(0.24995)	(0.25414)	(0.26482)	(0.28001)
5	0.207332	0.036848	0.693088	0.117828	0.496961
	(0.27024)	(0.25254)	(0.26653)	(0.25524)	(0.28120)
6	0.205385	0.070704	0.667380	0.044385	0.317286
	(0.26651)	(0.24995)	(0.27130)	(0.23877)	(0.27010)
7	0.196335	0.100863	0.623879	-0.018833	0.184956
	(0.26086)	(0.24469)	(0.27004)	(0.22100)	(0.25377)
8	0.183585	0.124460	0.569457	-0.069849	0.089010
	(0.25450)	(0.23821)	(0.26442)	(0.20465)	(0.23645)
9	0.169305	0.140456	0.509369	-0.108424	0.020812
	(0.24765)	(0.23114)	(0.25579)	(0.19054)	(0.22032)
10	0.154829	0.148960	0.447528	-0.135367	-0.026401
	(0.24019)	(0.22367)	(0.24519)	(0.17843)	(0.20612)
11	0.140926	0.150753	0.386746	-0.152058	-0.057888
	(0.23197)	(0.21584)	(0.23338)	(0.16774)	(0.19377)
12	0.127996	0.146947	0.328963	-0.160128	-0.077717
	(0.22296)	(0.20764)	(0.22089)	(0.15787)	(0.18282)
13	0.116204	0.138770	0.275429	-0.161248	-0.089013
	(0.21323)	(0.19907)	(0.20808)	(0.14840)	(0.17275)
14	0.105574	0.127425	0.226865	-0.157006	-0.094160
	(0.20290)	(0.19018)	(0.19519)	(0.13909)	(0.16313)
15	0.096044	0.114005	0.183596	-0.148827	-0.094966
	(0.19215)	(0.18102)	(0.18240)	(0.12987)	(0.15370)
16	0.087517	0.099452	0.145659	-0.137942	-0.092790
	(0.18113)	(0.17169)	(0.16982)	(0.12073)	(0.14433)
17	0.079876	0.084540	0.112883	-0.125381	-0.088646
	(0.17002)	(0.16229)	(0.15754)	(0.11176)	(0.13502)
18	0.073005	0.069876	0.084963	-0.111974	-0.083281
	(0.15893)	(0.15289)	(0.14564)	(0.10305)	(0.12582)
19	0.066799	0.055917	0.061508	-0.098372	-0.077238
	(0.14800)	(0.14361)	(0.13419)	(0.09469)	(0.11682)
20	0.061162	0.042982	0.042082	-0.085065	-0.070907
	(0.13731)	(0.13450)	(0.12323)	(0.08676)	(0.10811)

Cholesky Ordering: LOGPI DGDP PBGDP RIR CPI

Standard Errors: Analytic



Variance Decomposition of LOGPI:

Period	S.E.	LOGPI	DGDP	PBGDP	RIR	CPI
1	0.060684	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.080584	98.04740	0.495955	0.018778	0.067215	1.370656
3	0.093853	94.92866	1.318227	0.022122	0.168651	3.562339
4	0.103805	91.56477	2.251689	0.018213	0.265257	5.900069
5	0.111635	88.39187	3.189710	0.031557	0.338472	8.048389
6	0.117937	85.56938	4.086681	0.082547	0.383621	9.877773
7	0.123071	83.12351	4.926295	0.181324	0.403746	11.36513
8	0.127289	81.02575	5.704687	0.328283	0.405347	12.53594
9	0.130774	79.23072	6.422549	0.516835	0.395747	13.43415
10	0.133670	77.69262	7.081842	0.736443	0.381606	14.10749
11	0.136085	76.37123	7.684660	0.975153	0.368188	14.60077
12	0.138108	75.23324	8.232979	1.221412	0.359132	14.95323
13	0.139804	74.25172	8.728744	1.465199	0.356523	15.19781
14	0.141230	73.40493	9.174012	1.698573	0.361136	15.36134
15	0.142429	72.67513	9.571070	1.915814	0.372756	15.46523
16	0.143435	72.04755	9.922490	2.113281	0.390494	15.52618
17	0.144279	71.50964	10.23113	2.289115	0.413083	15.55703
18	0.144984	71.05047	10.50010	2.442886	0.439102	15.56744
19	0.145572	70.66038	10.73267	2.575224	0.467152	15.56457
20	0.146061	70.33074	10.93221	2.687487	0.495967	15.55360

Variance Decomposition of DGDP:

Period	S.E.	LOGPI	DGDP	PBGDP	RIR	CPI
1	0.019875	0.895716	99.10428	0.000000	0.000000	0.000000
2	0.026112	0.752918	98.35278	0.012875	0.857145	0.024287
3	0.030092	1.626489	96.24441	0.016345	2.086925	0.025832

4	0.032914	2.889479	93.82682	0.013978	3.246848	0.022878
5	0.034987	4.203448	91.56431	0.014202	4.172760	0.045276
6	0.036528	5.412693	89.61412	0.020850	4.842695	0.109646
7	0.037677	6.459451	87.99691	0.033212	5.292601	0.217824
8	0.038535	7.333969	86.68144	0.048374	5.574265	0.361951
9	0.039177	8.048173	85.62190	0.063204	5.736936	0.529791
10	0.039658	8.622388	84.77287	0.075450	5.820727	0.708566
11	0.040020	9.078846	84.09445	0.084068	5.855458	0.887179
12	0.040293	9.438634	83.55326	0.089074	5.861834	1.057197
13	0.040501	9.720407	83.12202	0.091193	5.853377	1.213006
14	0.040661	9.940002	82.77863	0.091481	5.838389	1.351495
15	0.040783	10.11050	82.50533	0.091019	5.821614	1.471539
16	0.040879	10.24249	82.28783	0.090713	5.805524	1.573441
17	0.040953	10.34443	82.11472	0.091203	5.791222	1.658428
18	0.041012	10.42301	81.97685	0.092840	5.779052	1.728246
19	0.041059	10.48348	81.86695	0.095729	5.768971	1.784863
20	0.041096	10.52993	81.77925	0.099784	5.760770	1.830258

Variance Decomposition of PBGDP:

Period	S.E.	LOGPI	DGDP	PBGDP	RIR	CPI
1	0.007997	0.110253	0.100093	99.78965	0.000000	0.000000
2	0.010704	0.209878	0.447346	98.94812	0.349690	0.044965
3	0.012477	0.302542	1.384619	97.12246	1.047400	0.142981
4	0.013764	0.381784	2.588107	94.79082	1.959498	0.279793
5	0.014736	0.447761	3.842861	92.30135	2.968461	0.439564
6	0.015484	0.502948	5.021211	89.88254	3.984681	0.608620
7	0.016060	0.550135	6.057422	87.66881	4.946940	0.776694
8	0.016502	0.591657	6.926232	85.72730	5.817991	0.936822
9	0.016838	0.629214	7.627057	84.08004	6.578945	1.084742
10	0.017091	0.663921	8.173230	82.72057	7.224082	1.218199
11	0.017278	0.696433	8.584973	81.62564	7.756605	1.336348
12	0.017415	0.727074	8.884946	80.76333	8.185359	1.439292
13	0.017514	0.755950	9.095509	80.09843	8.522360	1.527748
14	0.017584	0.783041	9.237123	79.59605	8.780982	1.602808
15	0.017633	0.808266	9.327514	79.22379	8.974669	1.665766
16	0.017667	0.831533	9.381357	78.95304	9.116070	1.718005
17	0.017690	0.852769	9.410306	78.75951	9.216507	1.760908
18	0.017706	0.871938	9.423244	78.62331	9.285707	1.795804
19	0.017717	0.889048	9.426661	78.52863	9.331732	1.823926
20	0.017724	0.904154	9.425073	78.46333	9.361050	1.846392

Variance Decomposition of RIR:

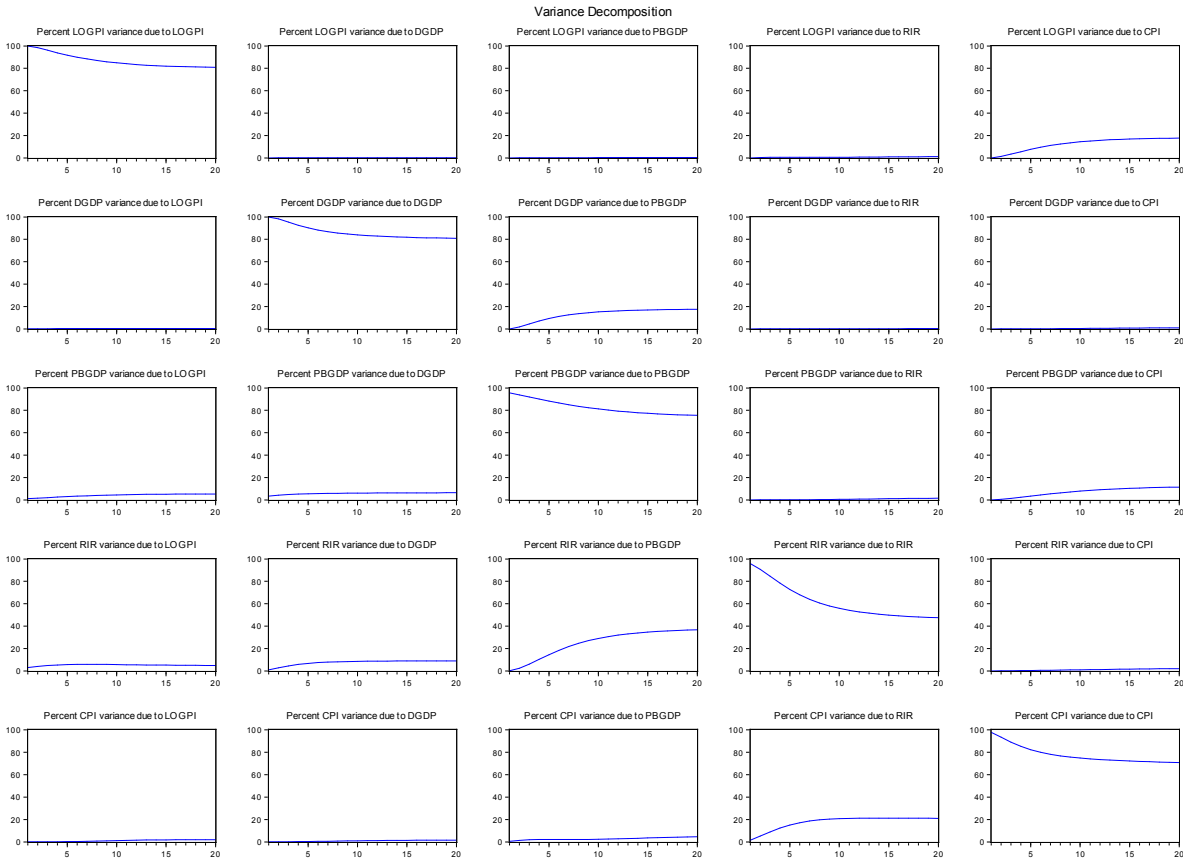
Period	S.E.	LOGPI	DGDP	PBGDP	RIR	CPI
1	11.29043	32.11206	0.128456	4.812709	62.94677	0.000000
2	13.46683	30.84109	0.126819	4.481340	64.26156	0.289186
3	14.26940	29.80051	0.113862	4.303154	65.07655	0.705924
4	14.58079	29.06598	0.121759	4.217820	65.51643	1.078013
5	14.70505	28.62593	0.170975	4.179933	65.68977	1.333384
6	14.76070	28.41910	0.264262	4.161878	65.68260	1.472159
7	14.79406	28.37105	0.391409	4.149870	65.55983	1.527840
8	14.82187	28.41654	0.537135	4.138411	65.36926	1.538658
9	14.84900	28.50776	0.687088	4.126040	65.14526	1.533857
10	14.87600	28.61393	0.830696	4.112885	64.91174	1.530743
11	14.90213	28.71751	0.961619	4.099530	64.68448	1.536863
12	14.92655	28.80983	1.077014	4.086590	64.47306	1.553502
13	14.94871	28.88772	1.176443	4.074586	64.28253	1.578722
14	14.96833	28.95102	1.260885	4.063913	64.11475	1.609430
15	14.98539	29.00105	1.332004	4.054839	63.96954	1.642560
16	15.00003	29.03974	1.391676	4.047506	63.84547	1.675616
17	15.01246	29.06907	1.441716	4.041939	63.74044	1.706835

18	15.02294	29.09090	1.483749	4.038061	63.65216	1.735135
19	15.03174	29.10682	1.519158	4.035718	63.57831	1.759989
20	15.03909	29.11819	1.549089	4.034698	63.51675	1.781272

Variance Decomposition of CPI:

Period	S.E.	LOGPI	DGDP	PBGDP	RIR	CPI
1	2.091434	0.000496	0.053722	3.823679	2.745012	93.37709
2	2.644206	0.157703	0.034678	6.953391	3.276779	89.57745
3	2.939213	0.449046	0.030801	10.57692	3.511678	85.43156
4	3.120906	0.796698	0.027569	14.30101	3.512334	81.36238
5	3.244322	1.145637	0.038410	17.79750	3.382096	77.63636
6	3.334793	1.463636	0.081306	20.84998	3.218792	74.38629
7	3.404901	1.736480	0.165745	23.35751	3.090663	71.64960
8	3.461160	1.961827	0.289706	25.31130	3.031733	69.40544
9	3.507088	2.143828	0.442561	26.76216	3.048426	67.60302
10	3.544733	2.289318	0.609804	27.79070	3.129856	66.18032
11	3.575439	2.405519	0.777151	28.48543	3.257196	65.07470
12	3.600227	2.498904	0.933080	28.92943	3.410319	64.22827
13	3.619970	2.574768	1.069883	29.19364	3.571640	63.59007
14	3.635457	2.637209	1.183641	29.33485	3.727789	63.11651
15	3.647416	2.689282	1.273588	29.39617	3.869874	62.77108
16	3.656508	2.733212	1.341239	29.40886	3.992972	62.52372
17	3.663318	2.770601	1.389513	29.39457	4.095283	62.35003
18	3.668352	2.802610	1.421987	29.36760	4.177225	62.23058
19	3.672032	2.830087	1.442327	29.33682	4.240624	62.15014
20	3.674703	2.853677	1.453912	29.30731	4.288048	62.09706

Cholesky Ordering: LOGPI DGDP PBGDP RIR CPI



VEC Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Date: 05/24/19 Time: 10:15
Sample: 1999Q1 2017Q4
Included observations: 74

Lags	LM-Stat	Prob
1	23.26572	0.5621
2	21.83846	0.6451
3	19.54407	0.7703
4	85.73145	0.0000
5	28.33291	0.2928
6	10.80507	0.9938
7	28.10737	0.3029
8	29.68791	0.2362

Probs from chi-square with 25 df.

VEC Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 05/24/19 Time: 10:16
Sample: 1999Q1 2017Q4

Included observations: 74

Component	Skewness	Chi-sq	df	Prob.
1	-1.526952	28.75619	1	0.0000
2	-0.522784	3.370742	1	0.0664
3	-5.149826	327.0888	1	0.0000
4	0.632479	4.933703	1	0.0263
5	1.087385	14.58302	1	0.0001
Joint		378.7324	5	0.0000

Component	Kurtosis	Chi-sq	df	Prob.
1	21.39884	1043.762	1	0.0000
2	5.445843	18.44495	1	0.0000
3	35.90167	3337.770	1	0.0000
4	5.371113	17.33505	1	0.0000
5	12.53174	280.1331	1	0.0000
Joint		4697.445	5	0.0000

Component	Jarque-Bera	df	Prob.
1	1072.518	2	0.0000
2	21.81570	2	0.0000
3	3664.859	2	0.0000
4	22.26875	2	0.0000
5	294.7161	2	0.0000
Joint	5076.178	10	0.0000

VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)
Date: 05/24/19 Time: 10:16
Sample: 1999Q1 2017Q4
Included observations: 74

Joint test:

Chi-sq	df	Prob.
144.4790	180	0.9759

Individual components:

Dependent	R-squared	F(12,61)	Prob.	Chi-sq(12)	Prob.
res1*res1	0.145515	0.865667	0.5849	10.76809	0.5489
res2*res2	0.207404	1.330188	0.2255	15.34788	0.2230
res3*res3	0.036096	0.190360	0.9984	2.671109	0.9975
res4*res4	0.058180	0.314018	0.9843	4.305322	0.9773
res5*res5	0.144199	0.856522	0.5937	10.67073	0.5573
res2*res1	0.238826	1.594946	0.1170	17.67311	0.1260
res3*res1	0.049693	0.265817	0.9924	3.677311	0.9886

res3*res2	0.242712	1.629220	0.1071	17.96071	0.1169
res4*res1	0.045663	0.243224	0.9950	3.379026	0.9922
res4*res2	0.064653	0.351371	0.9750	4.784335	0.9648
res4*res3	0.051947	0.278535	0.9907	3.844104	0.9861
res5*res1	0.164888	1.003675	0.4567	12.20172	0.4296
res5*res2	0.123620	0.717043	0.7291	9.147887	0.6902
res5*res3	0.112920	0.647080	0.7935	8.356099	0.7567
res5*res4	0.057422	0.309677	0.9852	4.249218	0.9785