EXCHANGE RATE VOLATILITY AND ECONOMIC GROWTH IN NIGERIA

BY

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A PROJECT PRESENTED TO THE DEPARTMENT OF ECONOMICS, FACULTY OF SOCIAL SCIENCES, UNIVERSITY OF BENIN, BENIN CITY, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF BACHELOR OF SCIENCE DEGREE (B.Sc) IN ECONOMICS, UNIVERSITY OF BENIN

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CERTIFICATION

This is to certify that this project was carried out by EHIGIE Freda Esosa of the department of Economics and Statistics, University of Benin, Benin City, Nigeria.

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DEDICATION

This project is dedicated to Almighty God for His grace and guidance throughout the journey of the project. Also to my project Mr. and Mrs.

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ABSTRACT

The exchange rate is a key macroeconomic factor that affects international trade and the real economy of each country. This study made use of annual data of Nigeria from 1981-2019 to examine the impact of exchange rate volatility on economic growth in Nigeria and the Error Correction Mechanism (ECM) was used to examine the relationship. The study found that the level of foreign direct investment positively and significantly affects economic growth in Nigeria, the level of government expenditure positively and significantly affects economic growth in Nigeria and the level of exchange rate volatility which is the key independent variable in the study was found to have a negative and significant impact on economic growth in Nigeria. The study therefore recommends that in order to regulate the tendencies of exchange rate volatility, The government should diversify the economy as well as increase industrialization and manufacturing activities , which will help reduce the pressure on the currency as the dependency effect would be reduced

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Exchange rate is the price of the domestic currency in relation to the currency of another country. It represents the quotation of the local currency with respect to foreign currencies (Azid, Jamil & Kousar, 2005). Exchange rate is an indicator of a country's international competitiveness. The lower the exchange rates of a country, the higher the country's competitiveness in the world market and vice-versa. Essentially, exchange rate influences four key relative prices in the economy, which are the price of tradable goods relative to non-tradable goods; the price of exports relative to the price of exports of competitor countries (in foreign currency); the price of imports relative to the price of domestic import substitutes (in domestic currency); and the price of exports or import substitutes relative to the cost of producing these goods. By influencing these relative prices, the exchange rate can affect the allocation of resources in the economy, including the volume of international trade (Umoh, 1994).

Exchange rate is associated with volatility. Exchange rate volatility is generally referred to as uncertainty associated with movements in exchange rate.

This uncertainty has posed serious implication for the investment and growth in both developed and developing countries. Aizenman, (1992) observed that the increase in exchange rate volatility leads to the decrease in the level of investment. Private investors are more concerned about exchange rate volatililty because of its effect on their investment in form of capital gains or losses (Mordi, 2006). Excessive exchange rate volatility erodes the confidence of investors in the business environment. Obstfeld and Rogoff (1998) argue that excessive volatility of exchange rate is harmful to the domestic economy.

Exchange rate volatility became a prominent feature in countries as a result of the adoption of the flexible exchange rate system following the collapse of the Bretton Woods Agreement in 1973. The advocates of the fixed exchange rate system believe that a flexible exchange rate system increases uncertainty associated with international trade (Alagidede & Ibrahim, 2016). Exchange rates have been highly volatile in African countries since the adoption of the flexible exchange rate system (Omojimite & Akpokodje, 2010). Nigeria adopted the Structural Adjustment Programme recommended by the Bretton Woods institutions (World Bank and International Monetary Fund) in 1986. This led to shift from the fixed exchange rate system to the flexible exchange rate system (Oloyede and Fapetu, 2014).

Empirical studies such as Aghion, Bacchetta, Rancieri and Rogoff (2009) and Ndambendia and Alhayky (2011) argue that the level of financial development influences the impact of exchange rate volatility on economic growth. They posit that economies with a relatively low level of financial development tend to be more negatively affected than economies with relatively high level of financial development. Nigeria is an open economy with a relatively low level of financial development. Therefore, it is important to determine the extent and manner to which economic growth responds to exchange rate volatility in Nigeria.

1.2 Statement of the Problem

The statement of problem of this study is the distortions in Nigeria's economic growth that has been caused by high level of exchange volatility which has bedeviled the country over the past few years.Exchange rate volatility may lead to a major decline or problem in investment decisions, allocation of resources, balance of payment problem, devaluation of currency and the economy in general. Fluctuation whether positive or negative is not desirable as it increases risk and discourages trades (Morina, 2020).

Unstable exchange rate of Nigeria’s domestic currency that is domiciled in US dollars has made returns on investment to be negative thereby discouraging

investment in the country (Osinubi, 2009). Decrease in exchange rate dampens investment by increasing demands in both the domestic and export markets, but it reduces investment because of the increasing cost of imported intermediate goods and the user cost of capital (Harchaoui, 2005).

Inflation has continued in galloping and geometric progression, interest rate is increasing in a disorganized proportion hence discouraging investment, unemployment has grown rapidly over the years with social implications, GDP (gross domestic product), output has been decreasing and domestic prices are unpredictable and disturbing to the society. Standard of living and general economic survival are in serious question. The major aim of the study is to find out the validity of the claim or otherwise, establish the relationship between exchange rate fluctuations and economic growth, impact of exchange rate fluctuation on economic growth in Nigeria.

Hence, the following research questions seek to be answered;

1. What is the relationship between exchange rate volatility and economic growth in Nigeria?
2. Does interest rate significantly influence economic growth in Nigeria?

1.3 Objective of the Study

The broad objective of this study is to ascertain the effect of exchange rate volatility on economic growth inNigeria. The specific objectives are as follows;

1. To determine the relationship between exchange rate and economic growth in Nigeria.
2. To determine the effect of interest rate on economic growth in Nigeria.

1.4 Hypothesis of the Study

1. Exchange rate volatility does not have significant impact on economic growth in Nigeria
2. Interest rate does not significantly influence the economic growth in Nigeria

1.5 Scope of the Study

The scope of this research is primarily focused on analyzing the impact of exchange rate volatility on economic growth in Nigeria ranging from 1981-2019. This study used time series secondary data sourced from Central Bank of Nigeria Statistical Bulletin and World Development Index (WDI). The dependent variable for this study is Real GDP while the independent variables include; gross fixed capital formation, exchange rate, interest rate, government expenditure, foreign direct investment.

1.6 Significance of the Study

Generally, the research draws its relevance from the present and prospective beneficiaries and its contributions to academia at large. The pertinence of this research is justified on the ground that it will show the impact of exchange rate volatility on the economic growth in Nigeria for the years under review; and thus provides a framework for policy prescriptions and interventions. In furtherance to the above, the research will be of significance to the following:

a) The Banking Sector: as exchange rate is a pure financial variable, the banking sector will find this research relevant given that it will provide clear information on the extent to which exchange rate has affected the economic growth in Nigeria.

b) Government: The federal government will find this study highly relevant as it will provide a picture of the relative impact of exchange rate volatility on economic growth and thus motivate relevant policy reforms or sustenance. This research will also find its relevance in the coffers of financial variable analysts given that the subject under study is purely a monetary phenomenon.

c) Subsequent Analysts: This investigation will also serve as a stepping stone for researchers who develop interest in carrying an empirical analysis on the concept of exchange rate volatility and economic growth.

d) Scholars: Students will find this piece highly relevant as it will undeniably increase their knowledge and horizon on the concept of exchange rate and its relationship with economic growth.

e) The Academia: The education sector is also considered as one of the significant beneficiaries because it is believed that this research will be an addition to the existing stock of knowledge.

1.7 Limitations of the Study

The study is limited due to the following reasons; firstly, the study is subjected to time constraint. Secondly, this study is also limited, in that the secondary data that will be sourced and made available for this study may not be 100% accurate and reliable. Lastly, the major limitation of this research was fund. A substantial amount was committed to this work in terms of literature . In reviewing of the related literature, the researcher faced some challenges of accessing journals with relevant materials. Some internets sites were secured and could not be accessed, in some cases, subscription were made in order to gain access to needed materials.

1.8 Structure of the Study

The paper is structured as follows; Chapter One is the Introduction. Literature Review is the focus of Chapter Two. The Third Chapter is on Theoretical

Framework and Model Specification. Chapter Four will deal with presentation and analysis of result while the Final Chapter will focus on Summary of findings, Recommendations and Conclusion.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents an overview of previous research on exchange rate volatility and economic growth in Nigeria

2.1 Conceptual Literature

2.1.1 Exchange rate

Exchange rate is the price of one country's currency expressed in terms of some other currency. It determines the relative prices of domestic and foreign goods, as well as the strength of external sector participation in the international trade. Exchange rate regime and interest rate remain important issues of discourse in the International finance as well as in developing nations, with more economies embracing trade liberalization as a requisite for economic growth (Obansa, Okoroafor, Aluko and Millicent, 2013).

Aliyu (2011) asserted that appreciation of exchange rate results in increased imports and reduced export while depreciation would expand export and discourage import. Also, depreciation of exchange rate tends to cause a shift from foreign goods to domestic goods. Hence, it leads to diversion of income from importing countries

to countries exporting through a shift in terms of trade, and this tends to have impact on the exporting and importing countries' economic growth.

In the same vein, Hossain (2002) agreed that exchange rate helps to connect the price systems of two different countries by making it possible for international trade and also effects on the volume of imports and exports, as well as country's balance of payments position.

2.1.2 Exchange Rate Volatility

The exchange rate is defined as the price of one currency in terms of another currency. Volatility is defined as an unobservable or latent variable, deterministic or stochastic. Exchange rate volatility is defined as the risk associated with unexpected movements in the exchange rate. Economic fundamentals such as the inflation rate, interest rate and the balance of payments, which have become more volatile in the 1980s and early 1990s, by themselves, are sources of exchange rate volatility. More recently, increase cross-border flows that have been facilitated by the trend towards liberalization of the capital account, the advancement in technology, and currency speculation have also caused exchange rate to fluctuate (Hook and Boon 2000).

Exchange rates are highly volatile in the short run and are very responsive to political events, monetary policy and changes in expectations. In the long run,

exchange rates are determined by the relative prices of goods in different countries (Samuelson and Nordhaus, 2001). The exchange rate is more volatile than the fundamental variables which determine the exchange rate in the long run (Gärtner, 1993).

Exchange rates have become more volatile in recent years due to the abandonment of the fixed exchange rates, which have resulted in a massive volume in foreign exchange transactions. These transactions have grown faster than international trade and international in- vestments flows of capital. The risk associated with foreign exchange transactions and trad- ing at the foreign exchange market has increased but so has also the awareness and knowledge about the subject. There are also better instruments to cover the risk. International private capital flows are much larger than trade flows today which indicates that exchange rates reflect mostly financial rather then trade flows, especially in the short run. However, the trade flow has a large influence upon exchange rates in the long run (Salvatore, 2004).

Exchange rate volatility is directly influenced by several macro variables, such as demand and supply for goods, services and investments, different growth and inflation rates in different countries, changes in relative rates of return and so forth.

The present floating rate has been affected by previous real and monetary disturbances. Expectations about current events and future events are also important factors due to the large influence it has on ex- change rate volatility.

The volatility can also arise from “overshooting” behaviour which occurs when the current spot rate does not equal a measure of the long-run equilibrium calculated from a long-run model. If this behaviour arises because the financial market is not working correctly, high exchange rate volatility does not have to imply high transaction costs (Jones and Kenen, 1990).

It would only be efficient for the exchange rate to be highly volatile if the underlying economic variables are equally volatile. If not, there would exist abnormal profit opportunities for speculators that smooth exchange rate movements. The exchange rate cannot contain any pattern or signals about future rates, since it could be used to gain a profit. The volatilty is a risk for a company that trade on the international market since it is a variable that can not be foreseen (Jones and Kenen, 1990).

The determination of exchange rate volatility is an important issue for both policymakers and economic agents involved in the financial market. Firms use volatility models in their estimation of risks and as inputs when they evaluate prices.

The policymakers on the other hand use the information about how the factors impact the exchange rate volatility so that the most appropriate policy can be conducted (Bauwens and Sucarrat, 2005).

2.1.3 Economic Growth

Kuznets (1971) in his Nobel Memorial lecture defined economic growth as a long-term increase in the capacity to supply increasingly . diverse economic goods to its population. The increasing capacity is hinged on advancing technology and the institutional and ideological adjustments that it demands. Kuznets's view of economic growth was cited as having stimulated new insights into the world economic and social structure. He developed the concept of Gross National Product, the total sum of goods and services produced in a nation by both nationals and non-nationals, which is used to determine the rate of economic growth of a nation (Iyoha, 2004).

The term economic growth is often used interchangeably with the term economic development when analysing economic performance and variations in economic conditions in a country. Although, the two terms are used to describe the process of sustainable economic progress in less developed countries (LDCs), they are not the same strictly speaking (Iyoha, 2004). Kindleberger (1965) of the

Massachusetts Institute of Technology, USA has suggested a useful way of differentiating both of the terms. According to Kindleberger, “economic growth means more output and economic development implies both more output and changes in the technical and institutional arrangements by which it is produced”. Simply put, economic development goes beyond mere economic growth to include changes in the structure of outputs and in the allocation of inputs by subsectors and various sectors in the overall economy.

Kuznets (1966) in his work ‘’Modern Economic Growth” stated six main characteristics of economic growth and they include:

i. High rates of growth of per capita income
ii. High rates of growth of total factor productivity
iii. High rates of structural transformation of the economy
iv. Growth of trade, specifically import of raw materials and export of manufacturers.
v. Limited spread of development to only a one-third of the world population.
vi. High rates of social and ideological transformation

According to Pettinger (2011), economic growth which is an increase in real GDP can be affected by several factors which can be split into two:

i. Demand side factors

ii. Supply side factors

Demand side factors influences the growth of aggregate demand (AD). AD=C+I+G+X-M. Therefore, a rise in consumption, investment, government spending or exports can lead to higher aggregate demand and higher economic growth. Aggregate demand can be affected by interest rates, consumer confidence, asset prices, real wages, value of exchange rate and the banking sector.

Supply side factors also influences the growth of aggregate supply in the long-run (the production possibility frontier of the economy). If there is no increase in the long-run aggregate supply, then a rise in aggregate demand will just be inflationary. The long-run aggregate supply can be affected by the following factors;

***Levels of infrastructure*:** investment in roads, transport, power and communication can help firms reduce costs and expand production. Without necessary infrastructure it can be difficult for firms to be competitive in the international markets.

Availability of resources: resources such as natural resources, physical resources and even managerial know-how is indeed necessary for firms as this resources serve as the necessary inputs needed for production process.

***Human capital**:* human capital is the productivity of workers. This will be determined by the levels of education, training, motivation and health status. Increased labour productivity can assist firms take on more sophisticated production process and become more efficient.

***Development of technology*:** in the long-run, development of new technology is a key factor in enabling improved productivity and higher economic growth.

2.2 Types of Exchange Rate Regimes

2.2.1 Flexible Exchange Rate Policy

A flexible exchange-rate system is a monetary system that allows the exchange rate to be determined by supply and demand.

The main rationale behind the choice of flexible exchange rates is the autonomy in monetary policy they allow when capital mobility is high according to Dornbusch and Giovannini (1990), therefore, flexibility in exchange rates, as stated allows a country to choose its long term inflation rate and, it frees monetary policy that can be aimed at domestic stabilization. Furthermore, exchange rate flexibility would ease the reaction of policy to external shocks by initiating an automatic adjustment of the domestic economy to changes in the balance of payments.

Dornbusch and Giovannini (1990) argued that an economy adjusts to changes in money aggregates under flexible exchange rate regimes. Apart from monetary policy, a flexible exchange regime would soften the constraints on available policy instruments. Constraints imposed by exchange rate fixity on monetary and fiscal policies can impede the authorities' ability to influence domestic economic conditions shifting the bulk of the adjustment process on the real economy. Therefore, one would expect, ceteris paribus, a higher volatility of growth under a system of fixed exchange rates relative to a flexible exchange rate arrangement.

Obaseki and Bello (1996) states that a flexible exchange rate mechanism was adopted to correct a perceived overvaluation of the Naira, stimulate the external sector, ensure competitiveness of the economy and above all secure a realistic exchange rate. In other words, the movement from a fixed regime to a flexible regime was to stimulate growth and maintain a healthy external balance, which is what is generally referred to as macroeconomic stability.

2.2.2 Fixed Exchange Rate Policy

A fixed exchange rate, often called a pegged exchange rate, is a type of exchange rate regime in which a currency's value is fixed or pegged by a monetary

authority against the value of another currency, a basket of other currencies, or another measure of value, such as gold.

Obstfeld (1994) argued that the opposite, under fixed exchange rate regimes, monetary policy will be diverted, partially or totally, to pursue external balance. And, in the presence of high capital mobility and perfect substitutability between domestic and foreign assets monetary policy becomes entirely devoted to the defense of the exchange rate parity. Indeed, when the nominal exchange rate is credibly fixed, interest rate parity predicts the equality of domestic and foreign interest rates, adjusted for risk premium and transaction costs. Any additional money creation will push domestic interest rates downwards and trigger an equivalent amount of capital outflow. Therefore, in a small country, monetary policy becomes inefficient in stabilizing the economy when the exchange rate is pegged and capital is highly mobile.

pegged exchange rates would likely raise growth volatility in an insufficiently flexible economy because the loss of automatic adjustment and the decrease in monetary policy autonomy when capital markets are highly integrated are not sufficiently compensated for (Goldstein, 2002).

2.3 Exchange rate policies in Nigeria

2.3.1 Exchange Rate policies before the SAP (Fixed regime)

Exchange rate policy in Nigeria has undergone substantial transformation since the immediate post-independence era, when the country operated a fixed exchange rate system up to the early 1970s and then from 1986 when market based exchange rate system was introduced in the context of the structural adjustment programmes (SAP). it is difficult to define a system that might be effective and optimal at all times. When economic conditions change, the suitability of the existing system may be called to question, thereby, necessitating the need for change Before, 1973, Nigeria's exchange rate policy was in consonance with the International Monetary Funds (IMF) par value or fixed exchange system. The Nigerian currency had its exchange rate largely subjected to the administrative management. The exchange rate was largely passive as it was dictated by the fortunes, or otherwise, of the British pound sterling precisely on a 1:1 ratio before it was devalued by 10%. Thereafter, the currency was allowed to move independently of the sterling. Following the breakdown of the IMF per value system in 1971, the naira was adjusted in relation to the dollar.

In 1978, the CBN applied the basket-of- currencies (12 currencies) approach as a guide in determining the exchange rate movement. The exchange rate during this period was determined by the relative strengthen of the currencies of the country's trading partners and the volume of the trade with such countries. Weights were assigned to countries' currencies with the dollar and sterling dominating in the exchange rate calculation. This policy was jettisoned in 1965 in favour of quoting the naira against the dollar.The main objectives of Nigeria's exchange rate policy during this period were to equilibrate the balance of payments, preserve the value of external reserves and maintain a stable exchange rate. Thus, throughout the 1970s, except 1976 and 1977, the naira was appreciated progressively to source imports cheaply to implement the various development projects. This enhanced the reliance on imports which ultimately led to balance of payment problems and eventually depletion of the countries of external reserves. By 1981, a policy of gradual depreciation of the naira against the dollar or pound sterling based on whichever, was stronger, following the collapse of oi9l price in the world market. Nevertheless, up to the time of SAP, the exchange rate policy encouraged the overvaluation of the naira as reflected in real exchange rate appreciation particularly in the 1970s. Obadan (1987) states that a major factor in the real exchange rate appreciation was the sharp

increase in oil prices and foreign exchange inflow, as the exchange rate in Nigeria generally mirrored movements in oil prices.

Generally, the overriding objectives of exchange rate management then was apparently not medium or long term balance of payment objective as the exchange rate policy was not geared towards the attainment of a long term equilibrium rate that would equilibrate the balance of payment in the medium long term and yet facilitate the achievement of certain structural adjustment objectives, such as export diversification and less import driven economy. For example, according to the theory, a fixed exchange rate regime can increase trade and output growth by reducing exchange rate uncertainty and thus the cost of hedging, and also encourage investment by lowering currency premium from interest rates. However, on the other hand it can also reduce trade and output growth by stopping, delaying or slowing the necessary relative price adjustment process.

2.3.2 Exchange Rate policies since the SAP (Flexible regime)

With introduction of the Structural Adjustment Programme (SAP) in 1986 a flexible exchange rate mechanism was adopted with the floating of the naira in the second-tier system; the exchange rate was largely determined by market forces. Although these forces were expected to produce a clearing price as the basis for the

allocation of foreign exchange, the monetary authorities still had the power to intervene in the market when necessary. Such intervention depends on the state of the balance of payments, the rate of inflation, domestic liquidity, and the employment situation. The NFEM began as a dual exchange rate system which produced the official first-tier exchange rate and the (SFEM) or free market exchange rate. Pre-SFEM was applied to a few official international transitional transactions, debt service payments, contributions to international organizations, and expenses of Nigerian embassies were excluded from the SFEM and settled at the first-tier rate. The second-tier rate was determined by auction at the SFEM. At the first two sessions of the SFEM, the average of successful bids of authorized dealers was used to determine the exchange rate. Allocations were made to banks on pre-determined quota basis. Owing to the downward trend of the nominal exchange rate, the average pricing method was abandoned in the auction and the marginal rate was adopted. Under this method, the last successful bid determined the clearing price, which was also the ruling rate.

However, the method did not succeed in entrenching professional discipline in the system as the hidings appeared unrelated to market situations. As such, Dutch Auction System(DAS) was adopted in April 1987, with an aim of introducing

professionalism. Under the DAS, individual bank bid rate were used to allocate foreign exchange. They system, however, created the problem of multiplicity of rate, which resulted in the further depreciation of the naira. The objectives of the exchange rate regime under SAP can be said to some extent to have reflected the need of medium/long term BOP equilibrium. Thus, the SFEM was expected to achieve a realistic exchange rate of the naira, which would reduce excess demand for foreign exchange to import finished goods and stimulate non-oil earnings. Essentially, the objectives of SFEM includes the achievement of a realistic exchange rate determined by the market forces, encouragement of foreign exchange inflow and discourage outflow, stimulation of non-oil exports, enhance revenue for government and elimination of currency trafficking and wiping out of unofficial parallel foreign exchange market. Therefore, the ultimate expectation was that the exchange rate policy and management action under SAP would lead to an improvement in the balance of payment position and ensure the convertibility of the naira.

2.4 Determinants of Exchange Rate Regimes

Meon and Rizzo (2002) assumed that the empirical findings on the determinants of exchange rate regimes are numerous and controversial. The reason for the differences among the findings mostly depends on the country samples taken

into consideration, time periods, regime classifications used in the analyses, estimation methods and assumptions of econometric models. The econometric methods and regime classifications used in the papers are different from each other. Thus, it creates different results. Gosh et al., (1995) insist that if a flexible exchange rate arrangement is able to reduce growth volatility, why do several countries have recourse to various forms of fixed exchange rate systems which, as aforementioned, can limit monetary autonomy in a considerable way? Credibility in exchange rates, monetary and financial policies serves sometimes as a justification to the choice of a fixed exchange rate regime. Nominal exchange rate fixity it is the argued goes enables a country to import the monetary policy credibility of the base country. This gain of credibility will guide economic agent's expectations and increase monetary policy efficiency, therefore allowing the smoothing of economic cycles. Through credibility and discipline effects on monetary and fiscal policies, fixed exchange rates help create a domestic economic environment favourable to investment and trade (see, Gosh, et al., 1995) leading to a relatively sustained and stable growth. As a result, fixed exchange rate regimes reduce the risks of instabilities coming from profligate fiscal and monetary policies observed in many developing countries such as those in Latin America in the 1980's. The existing empirical literature on terms of

trade shocks tends to corroborate the aforementioned theoretical predictions. In a sample of 96 to 100 countries over 1974-2000, Edwards and Levy Yeyati (2003) find evidence that countries with flexible exchange rate regimes adjust relatively better to terms of trade shocks than those running rigid systems of exchange rates. Broda and Tille (2003) analyze 75 developing countries over an almost similar period. Their results suggest that terms of trade fluctuations contribute to 21.3% in the short term and to 30% in the long run to real GDP growth variability in fixed exchange rates countries. These contributions fall to only 2.4% and 9.6% in countries with flexible exchange rates.

2.5 Foreign Exchange Market (FEM)

This came into being when the first and second tier markets were merged in 1987 and a unified exchange rate system emerged. The merger increased demand pressures and contributed to the persistent depreciation of the naira between July and November 1987. In 1988, the inter-bank market where banks were allowed to transact official foreign exchange business among them was separated from the official market. Subsequently, an autonomous market for privately sourced foreign exchange emerged with its inter-dependent rates.

The autonomous market rates depreciated continuously, necessitating its subsequent merger with the FEM to form the Inter-Bank Foreign Exchange Market (IFEM) in January 1989. Under IFEM, Exchange was determined by marginal rate pricing, average rate pricing, highest and lowest bid etc. to further reduce instability, the CBN modified the Inter-bank procedures in December 1990 when the DAS was re-introduced. DAS was first introduced in 1987, and after 1990, it was re-introduced again in 2002 as the retail Dutch auction system. Since 2006, the wholesale DAS has been in operation. DAS was introduced against the background of widening gaps between the parallel and official exchange. The system was introduced to enhance professionalism in FEM and prevent not outrageously high bid rate. Obadan, (1993).

2.6 Exchange Rate Management in Nigeria

The concern with exchange rate management policy in Nigeria can be traced back to 1960 when the country became politically independent, even though the Central Bank of Nigeria and the Federal Ministry of Finance had come into being two years earlier (Ogiogio, 1996). Management of exchange rate can be traced to two divisions/phases; pre-Structural Adjustment era of 1960-1985 and post-Structural Adjustment era 1986 – till date. The above binary classifications occasioned a closely historical sequence of about five phases, namely:

Phase I: Fixed parity between the Nigerian pound and the British pound (1960-1967)

There was a fixed parity of a one-to-one relationship between the Nigerian pound (N£) and the British pound sterling (B£) until the British pound was devalued in 1967.

Phase II: Fixed parity between the Nigerian pound and the American dollar (1967-1974)

This time, there was a fixed parity with the USD. As a result of the international financial crisis of the early 1970s, which constrained the US President Nixon to devalue the dollar, Nigeria then abandoned the US dollar and re-kept its currency at par with the British pound. During this stage of Nigeria's exchange rate policy, it became apparent that there were drawbacks in pegging the naira to a single currency which led to its abandonment.

Phase III: Independent exchange rate policy (1974-1976);

Neglecting the peg policy of naira to a single currency of US dollar in 1974-1976, CBN opted to an independent exchange rate management policy that pegged the naira to either the US dollar or British pound sterling, whichever currency was stronger in the foreign exchange market (Ogiogio, 1996).

Phase IV: Pegging the naira to an import-weighted basket of currencies (1976-1985)

Here, import-weighted basket experiment was carried out between 1976 and 1985. Due to oil boom of mid _70s, naira was deliberately depreciated, and, so as to ensure stability and viability of the naira, it was pegged to a basket of currencies which comprises the seven currencies of Nigeria's major trading partners; the American dollar (USD), the British pound sterling (GBP), the German mark, the French franc (CFA), the Dutch guilder, the Swiss franc (CHF), and the Japanese yen (JPY). The 1981-1985 global economic crises led to unavailability of exchange rate while naira was grossly over-valued against the US dollar and gave FGN two options; one is to continue with the overvalued naira as a result of fixed exchange rate while the second alternative is to adopt the IMF-World Bank imported SAP which enshrined market forces (free hands of DD and SS). The Federal Government of Nigeria chose the second option and introduced the Second-tier Foreign Exchange Market (SFEM) which later transformed to foreign exchange market (FEM) in September 1986 during IBB regime.

Phase V: Market determined exchange rate policy (1986 – Date)

The Nigerian fifth exchange rate management commenced during post-SAP era up to date. The first market, SFEM was established with immediate effect in September 26, 1986. The Nigerian forex market was liberalized with the introduction of an Autonomous Foreign Exchange Market (AFEM) and the Inter-bank Foreign Exchange Market (IFEM) in 1995 and 1999 respectively. The AFEM metamorphosed into a daily, two-way quote IFEM, October 25, 1999. From 16 July 2002, CBN has replaced IFEM with the Dutch Auction System (DAS) which has been in operation till date.

2.7 Theoretical Literatures

2.7.1 Exchange Rate Theories

Various theories have been proposed to explain exchange rate and its determination and this includes:

A) Purchasing Power Parity

The PPP theory can be traced all the way back to the Salamanca School in Spain in the sixteenth century. However, Cassel's work is responsible for its emergence as an exchange rate theory. PPP was first proposed by Cassel as a method for changing pre–World War I exchange rate parities.

It depicts the relationship between prices and exchange rates. The purchasing power parity (PPP) is an economic theory that uses a basket of goods to equate the currencies of various countries. A method of comparing the absolute buying power of different currencies by comparing the prices of goods in different countries. The theory is based on the premise that trade barriers and transportation barriers do not exist. We consider the PPP to be only a partial equilibrium theory, since it does not deal with assets market. Since transport costs, tariffs, and technological and preferential differences always exist and places the preconditions for absolute PPP do not hold. Absolute PPP is not accepted for most empirical surveys.

In other words, the rate at which both countries' buying power would be equal. For instance, a machine in New York and Hong Kong should be the same price. If a machine costs 500 US dollars in New York and 2000 HK dollars in Hong Kong, according to PPP theory, the exchange rate should be 4 HK dollars per 1 US dollar. It enables economists to measure economic productivity and living conditions across countries. The inflation theory of exchange rates is known as purchasing power parity (PPP).

According to this principle, the exchange rate would shift such that the price of a given product or service remains stable regardless of where it is bought.

As a result, the PPP theory referred to as the "law of one price." Expressed using the following equation:

$E = P / P^*$

Where;

E stands for nominal exchange rate.

P = Rates in the domestic currency

P* = Foreign exchange rates in local currency

B) Balance of Payment of Theory

The balance of payments theory of exchange rate holds that the free market forces of demand and supply in the foreign exchange market decide the price of foreign currency in terms of domestic money, according to the exchange rate theory. As a result, the demand for and supply of a country's currency will determine the currency's external value. According to the theory, different things in a country's balance of payments calculate the powers of demand and supply. Balance of payments deficit causes the rate of exchange to decline or depreciate, while a surplus strengthens the exchange reserves, allowing the price of the home currency to appreciate in terms of foreign currency.

A country's deficit balance of payments shows the demand for foreign exchange outnumbers supply. As a result, the price of foreign money in domestic currency must increase, implying that the domestic currency exchange rate must fall. A surplus in a country's balance of payments, on the other hand, means that demand for home currency in a foreign country exceeds supply. Consequently, the value of the home currency in terms of foreign currency increases, improving the exchange rate.

C) Optimal Currency Area Theory

The Optimal Currency Area (OCA) theory, proposed by Mundell and McKinnonas and cited by Akpan and Atan (2012) and Ufoeze et al., (2018) was the first and most important theoretical basis for exchange rate regimes . According to this theory, stabilize the business cycle and trade. Based on the concepts of shock symmetry, degree of openness, and labor market mobility. It states that a fixed exchange rate system can boost trade and production growth by lowering exchange rate risk and thus lowering hedging costs. It will also increase investment by decreasing the currency premium associated with interest rates.

Nonetheless, by ending or preventing the necessary relative price adjustment mechanism, trade and production growth were slowed. Recent exchange rate

strategies are based on monetary theory and asset market (or fund balance) balance of payments approaches. They argue that the exchange rate is purely a financial phenomenon driven by financial flows. Orthodox exchange rate theories imply that the exchange rate is determined by trade flows, which ultimately decide the exchange rate movement. Most policymakers, on the other hand, have turned their focus to more exchange rate theories. Regardless, conventional ideas are still relevant in the end.

D) Asset Market Model

The balance of payments model, including purchasing power parity, focuses primarily on tangible goods and services, ignoring the growing importance of global capital flows. In other words, capital is pursuing financial assets such as stocks and bonds, rather than only products and services. The flows from financial asset purchases go into the capital account item of the balance of payments, thus balancing the current account deficit. The asset market model arose because of the increase in capital flows.

Currency is a crucial component in deciding the equilibrium exchange rate in the asset market model. Asset prices are determined by people's ability to keep current amounts of assets, which is in turn influenced by their expectations for the

assets' future value. According to the asset market model of exchange rate determination, the exchange rate between two currencies is the price that simply balances the relative supply and demand for assets denominated in those currencies. These properties are not only restricted to consumables like groceries or vehicles. They contain investments such as currency-denominated stock and debt denominated in the currency.

E) The Portfolio Approach

When calculating exchange rate, the portfolio balance equation considers trade. Bonds and other domestic and foreign financial assets are considered imperfect substitutes. Exchange rate is determined by equilibrating or balancing the demand for and supply of financial assets, of which money is only one form.

To begin with, this strategy assumes that a rise in the home country's money supply triggers an immediate decrease in the interest rate. As a result, the asset portfolio shifts away from domestic bonds and toward home currency and international bonds. When foreign bonds are replaced with domestic bonds, the home currency depreciates immediately. This depreciation leads to an increase in exports and a decrease in imports over time. Consequently, the portfolio equilibrium principle also describes exchange overshooting.

F) Uncovered Interest Rate Parity

The relationship between the spot and planned exchange rates and nominal interest rates on bonds in two economies is known as uncovered interest rate parity. Uncovered interest parity is founded on the asset demand principle, which assumes that currency transactions between territories are free of capital mobility constraints, making foreign currency deposits a perfect replacement for domestic currency deposits. On this basis, the decision to keep foreign or domestic currency will be solely based on the rate of interest offered on bank accounts in either domestic or foreign currency. Domestic and international investors will transfer their deposits to the territory that pays a higher interest rate on their respective currency deposits. Because of the discovered interest parity situation, the exchange rate must be modified to correct any current interest rate decisions between the observed territories.

Due to the lower degree of friction in capital market interest rate determination, exposed interest rate parity is a short run equilibrium condition.

2.7.2 Theories of Economic Growth

Various theories of economic growth have been proposed and what economic growth is based on and its determination and this includes:

A) Classical Growth Theory

This theory says that a country's economic growth will decrease with an increasing population and limited resources. Classical economists believed that a temporary increase in real GDP per person leads to a population increase which would limit natural resources. If there is high population in a country, there will be limited resources for that population and because of this it decreases real GDP and leads to slowdown in economic growth.

B) Endogenous Growth Theory

This theory states that economic growth is generated internally in the economy that is through endogenous forces and not exogenous forces. These endogenous forces are;investment in human capital, increase in productivity and accumulation of knowledge. This theory is of the opinion of that the enhancement of human capital development and investment would contribute immensely to economic prosperity and technological advancement.

C) Neoclassical Growth Model

This theory of growth outlines how economic growth can be achieved when three economic forces come together these forces are: capital, technology and labor if an economy has limited resources in capital and labor the contribution of resources

from technology to growth is boundless. The theory states that short-term equilibrium results from varying amounts of labor and capital in production function and that technological change has a major influence on the economy and economic growth. Finally, this growth theory says that accumulation of capital in an economy and how the capital is used it important for economic growth. The importance of technology in this theory is to add to the productivity of labor and the increase the output capabilities of labor.

2.8 Empirical Literatures

A number of studies have been carried out on the relationship between exchange rate volatility and economic growth. In spite of the many empirical studies, on the subject, the impact of exchange rate on economic growthremains ambiguous.

According to Aliyu (2011), an increase in imports leads to a decrease in exports, while a decrease in imports leads to an increase in exports and a decrease in imports. Because of the change in terms of trade, income is diverted from importing countries to exporting countries, affecting both the exporting and importing countries' economic development. He estimated the long run behavioral equilibrium real exchange rate in Nigeria from 1986 to 2006 long run behavior of RER could be explained by terms of trade, index of crude oil, volatility, index of monetary policy

performance and government fiscal stance. Large inflows of oil revenues into the country and stable macroeconomic performance were discovered to account for undervaluation of the real exchange rate between 2003 and 2004 and over valuation in 2005 and 2006 in Nigeria. This paper sought to apply the BEER approach to analyze the behavior of real exchange rate to decompose the long equilibrium relationship into permanent and cyclical components. Applying Johannsen's vector error correction procedure, the paper estimates the long run equilibrium of real exchange rate of the naira using economic growth fundamentals. The variables used in this paper includes terms of trade shocks (TOT), net foreign assets (NFA), index of crude oil price volatility (IOV), government's fiscal spending (GOV), index of openness (OPN), index of productivity (PRO), and index of monetary policy performance (MOP). The result showed that RER in Nigeria is positively affected by foreign net assets, terms of trade, index of crude oil volatility and index of monetary policy performance, then government spending to GDP and level of foreign reserve were found to be inversely related to the RER. The policy implication is that RER in Nigeria appreciates at the positive variables positively change and depreciates with high inversely related variables.

Oriavwote and Oyovwi (2012) studied the effect of exchange rate volatility on economic growth in Nigeria. The study employed time series annual data from 1970 to 2009. A review of the literature revealed that exchange rate volatility can either have a positive or negative effect on economic growth. The empirical analysis began with testing for stationarity of the variables by applying the Augmented Dickey-Fuller (ADF) this was followed by co-integration test of the model. The unit root test result shows that all variables except exchange rate volatility is integrated at order zero. Also, the co-integration analysis indicated that the variables are co-integrated. The Generalized Autoregressive Conditional Heteroscedasticity (GARCH) technique was used to generate exchange rate volatility. The study found that in the short run, economic growth was positively and significantly related to exchange rate volatility, while in the long run, there was a negative relationship between the two variables. The long run result also indicates that the increase in oil price depress economic growth in Nigeria. Thus, the income effect of rising oil price is not felt while the output effect is evidenced in the factory closure and re-location to neighboring countries.

Obansa, Okoroafor, Aluko and Millicent (2013) also examined the relationship between exchange rate, interest rate and economic growth in Nigeria

between 1970-2010. The study adopted vector auto-regression (VAR) technique, with emphasis on impulse response factor and forecast error variance decomposition the result indicated that exchange rate has a strong impact on economic growth than interest rate They concluded that exchange rate liberalization was good to Nigerian economy as it promotes economic growth.

Azeez (2012) investigated the impact of exchange rate volatility on Nigeria's macroeconomic performance. From 1986 to 2010, secondary data was collected. The dependent variable was Real GDP, while the independent variables were Exchange Rate (EXR), Balance of Payments (BOP), and Oil Revenue (OREV). To test for short and long run effects, it used the Ordinary Least Square (OLS) and Johansen cointegration methods. EXR was positively related to GDP, OREV was also positively related to GDP, and BOP was negatively related to GDP, according to the findings. This study confirmed that the Purchasing Power Parity (PPP) provides a useful benchmark for analyzing the process of exchange rate determination in a less developed country like Nigeria.

Akinbobola (2012) aimed at providing quantitative analysis of the dynamics of money supply, exchange rate and inflation in Nigeria. The sample covers quarterly data from 1928:01 to 2008:04. The model was estimated using Vector Error

Correction Mechanism (VECM). The results confirmed that in the long run, money supply and exchange rate have significant inverse effects on inflationary pressure. It implied that the inverse effect of money supply on price level is that inflation may be due to hiccups in the chain of goods both from the domestic and foreign supply outlets but not due to aggregate demand pressure. There is also the presence of significant feedback from long run to short disequilibrium and a causal linkage between inflation, money supply and exchange rate in Nigeria.

Ajao and Igbekoyi (2013) investigated the determinants of real exchange volatility in Nigeria from 1981 to 2008. The volatility of exchange rate was obtained through the Generalized Auto Regressive Conditional Heteroscedasticity techniques and the Error Correction Model was used to determine the various determinants of exchange rate volatility in Nigeria, while the Co-integration analysis reveals the presence of a long-term equilibrium relationship between real exchange rate volatility and its various determinants. Results revealed that openness of the economy, government expenditures, real interest rate movements as well as the lagged exchange rate are among the major variables that influence real exchange rate volatility during this period. Money supply and productivity index have no significant influence on real exchange rate volatility.

Akpan and Atan (2012) determined the effect of exchange rate movements on real output growth in Nigeria based on quarterly series for the period 1986 to 2010. A Generalized Method of Moments (GMM) technique was explored. The estimation results suggest that there is no evidence of a strong direct relationship between changes in exchange rate and output growth. Rather, Nigeria's economic growth has been directly affected by monetary variables.

Ismaila (2016) ascertained exchange rate depreciation and Nigeria economic growth during the SAP and post SAP period: 1986–2012. Using the Johansen co-integration test and error correction model analyses after conducting the stationary test, the results show that broad money supply, net export and total government expenditure have significant impact on real output performance in the long run while exchange rate has direct and insignificant effect on Nigeria economic growth in both short and long run.

Oriavwote and Eshenake (2012) assessed the relationship between the real exchange rate and inflation in Nigeria. The study covered the period between 1970-2010, which encompasses the pre-SAP, SAP and post-SAP periods. The co-integration technique and its implied error correction methodology were used as well as the ARCH and Granger causality methodology. The variables used are money

supply, consumer price index and imported inflation which shows the existence of a long run relationship. The result showed that both domestic and imported inflation appreciated the real exchange rate. The ARCH result indicates that the real exchange rate in Nigeria has been susceptible to fluctuation in the rate of inflation.

Past studies also showed that exchange rate has no significant effect on economic growth performance David, Umeh and Ameh (2010) also examined the effect of exchange rate fluctuations on Nigerian manufacturing industry. They employed multiple regression econometric tools which revealed a negative relationship between exchange rate volatility and manufacturing sector performance.

Adeniran, Yusuf, Adeyemi (2014) study examined the impact of exchange rate on economic growth from 1986-2013 the result revealed that exchange rate has positive impact on economic growth but not significant.

Anyanwu, Ananwude and Okoye (2017) studied exchange rate and Nigeria's economic growth between 1986-2015 and ordinary least square estimation technique was applied in estimating the models developed the results show that a long run relationship exists between exchange rate policy and economic growth and this was revealed by Johansen co-integration analysis and also the impact assessment the pair-wise granger causality reveals that real exchange rate has significant impact on

real gross domestic product and there is a positive but insignificant relationship between real exchange rate and real gross domestic product.

Okoronta and Odomena (2016) investigated the effect of exchange rate fluctuation on economic growth of Nigeria and used the annual data for the period 1986-2012 the study used ordinary least square (OLS) techniques, the Johansen co-integration test and the error correction mechanism (ECM) to examine the relationship between exchange rate and economic growth. The result says that there is no strong relationship between exchange rate and economic growth.

Ndubuaku, Onwuka, Onyedika and Chimezie (2019) this study investigated the impact of exchange rate fluctuation on selected economic sectors of the Nigerian economy this study covered the agricultural(AGDP), manufacturing (MGDP), petroleum (PGDP) and service sector (SGDP) the petroleum sector represented the oil sector while manufacturing (MGDP), agricultural (AGDP), and service sector (SGDP) represents the non-oil sector the data was analyzed using the Auto Regressive Distributed Lagged (ARDL) model. The study concluded that there is no significant impact of exchange rate on AGDP, MGDP and SGDP respectively. But there is a positive and significant impact of exchange rate on PGDP.

Uddin, Rahman, and Quaosar (2014) used time series econometric techniques to investigate the relationship between Exchange Rate (ER) and Economic Growth (EG) proxied by Real Gross Domestic Product (RGDP) in Bangladesh for a 41-year period from 1973 to 2013. The empirical findings show that ER and EG have a substantial positive relationship. The findings also suggest that ER and EG have a long-run equilibrium relationship. Granger's Causality Test shows that there is a bi-directional causality that runs from ER to EG and from EG to ER.

CHAPTER THREE

THEORETICAL FRAMEWORK AND RESEARCHMETHODOLOGY

3.0 Introduction

This chapter presents the methodology that is used for analysis in the study. The main objective of this chapter is to investigate the impact of exchange rate volatility on economic growth inNigeria. In this chapter, the methodology adopted for this research work will be discussed, the nature and source of the data, model specification, variables description, the various techniques and methodology to be utilized in this study to gather information and test the hypothesis created from the investigation will be discussed also in this chapter.

3.1 Theoretical framework

The fundamental Solow (exogenous) growth model, which gives the growth rate as a function of the rate of technical development, labor (population), and capital stock, serves as the theoretical basis for this study (Iyoha & Okim, 2017). Consider the standard neoclassical production function:

$$Y=F(A,K,L) \quad \ldots\ldots(1)$$

Where A is the technology level, K is the stock of capital while L is the quantity of labour and Y is output (income).

Assume that the production function is twice differentiable and subject to constant returns to scale, and that technical change is Hicks-Neutral (Iyoha, 2017). Differentiating equation (1) above with respect to time, dividing by Y and rearranging the terms will result in the following specification:

$$\dot{Y}/Y = \acute{A}/A + (F_K K/Y) \cdot (\acute{K}/K) + (F_L L/Y) \cdot (\acute{L}/L) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where $\acute{Y}/Y$ is the continuous time rate of output growth, $\acute{K}/K$ is the growth rate of capital stock and $\acute{L}/L$ is the growth rate of labour force. F_K and F_L are the social marginal products of capital and labour respectively, and finally $\acute{A}/A$ is the Hicks-neutral rate of change of technological progress.

Hence, the basic Solow growth model gives the rate of growth of output (income) as a function of the growth rate of technical change, labour and stock of capital. In empirical applications, this basic Solow growth model has been modified to obtain the augmented Solow growth model, where the growth rate of output is not only a function of technical change, capital and labour but also on policy variables like real exchange rate and interest rate (Okim, 2017).

3.2 Methodology

3.2.1 Model Specification

The specification of an appropriate econometric model borders around the prevailing economic circumstance(s) and the availability of economic data relating to the variable(s) being examined, Koutusoyiannis (1997). Hence, the Solow model of economic growth yields the following specification for the determinants of economic growth in Nigeria:

$lnRGDP = f\ (lnGFCF, lnINTR, lnFDI, lnGEXP, lnEXVO)$……. (3)

The econometric form of the model above is specified as:

$lnRGDP_t = \beta_{0+} \beta_1 ln\Delta GFCF_t + \beta_2 ln\Delta INTR_t + \beta_3 ln\Delta FDI_t + \beta_4 ln\Delta GEXP_t + \beta_5 ln\Delta EXVO_t + \varepsilon$

$ECM_{t-i} + Ut$……..… (4)

Where;

RGDP = Gross domestic product at constant prices.

GFCF= Gross Fixed Capital Formation

INTR = Interest Rate

FDI= Foreign Direct Investment

GEXP= Government Expenditure

EXVO = Exchange Rate Volatility

REM= Remitances

U_t = Stochastic error term

β_0 = Intercept

β_1 to β_6 = Coefficients of the associated variables

Apriori expectation:

$\beta_0>0$, $\beta_1>0$, $\beta_2<0$, $\beta_3>0$, $\beta_4>0$, $\beta_5<0$.

3.3 Method of Analysis

The method of analysis adopted in this study is error correction mechanism (ECM). An error correction model (ECM) belongs to a category of multiple time series models most commonly used for data where the underlying variables have a long-run common stochastic trend, also known as cointegration. ECMs are a theoretically-driven approach useful for estimating both short-term and long-term effects of one time series on another. The term error-correction relates to the fact that last-period's deviation from a long-run equilibrium, the error, influences its short-run dynamics. Thus ECMs directly estimate the speed at which a dependent variable returns to equilibrium after a change in other variables. In a structural ECM, at least one linear combination of variables gradually adjusts to the long-run equilibrium level with a constant speed of adjustment. In general, the speed of adjustment

coefficient in a structural ECM is different from the speed of adjustment coefficient in its reduced form ECM.

3.3.1 Unit Root Test

The unit root test technique adopted in this study is Augmented Dickey-Fuller unit root test. In statistics and econometrics, an Augmented Dickey–Fuller test tests the null hypothesis that a unit root is present in a time series sample. The augmented Dickey–Fuller (ADF) statistic, used in a test, is a negative number. The more negative it is, the stronger the rejection of the hypothesis that there is a unit root at some level of confidence

3.3.2 Cointegration Analysis

The econometric technique of cointegration is used to evaluate the association between non-stationary time series variables. The Co-integration technique used in this study is Johansen co-integration test. Johansen's test is a way to determine if three or more time series are cointegrated. More specifically, it assesses the validity of a cointegrating relationship, using a maximum likelihood estimates (MLE) approach. The Johansen test is used to test cointegrating relationships between several non-stationary time series data.

3.3.3 GARCH

The generalized autoregressive conditional heteroskedasticity(GARCH) appr oach would be used in estimating the volatility of exchange rate. Specifically, GARCH is a statistical model that can be used to analyze a number of different types of financial data, for instance, macroeconomic data. Financial institutions typically use this model to estimate the volatility of returns for stocks, bonds, and market indices.

3.4 Source of Data

This study is based on secondary data which were sourced from Central bank of Nigeria Statistical Bulletin (2019) and World Development indicators (2019) covering the period from 1981-2019.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATIONS OF RESULTS

4.0 Introduction

The focus of this chapter is on data analysis and interpretation of results. Specifically, it includes: descriptive statisics, test for stationarity, test for co-intergration, model estimations, discussion and findings, diagnostic test, policy implications.

4.1 Preliminary Results

4.1.1 Descriptive Statistics

The table 4.1 below depicts the (mean, mode, minimum and maximum value, standard deviation, kurtosis, etc.) of the variables LNRGDP, LNGFCF, LNGEXP, LNEXR, INTR, LNFDI used in this study.

Table 4.1: Summary statistics for the variables

	LNRGDP	LNGFCF	LNGEXP	LNEXR	INTR	LNFDI
Mean	10.28892	3.445389	6.122492	3.476720	0.381937	21.29562
Median	10.07274	3.527809	6.854027	4.622001	4.310292	21.35137
Maximum	11.14221	4.492965	9.181410	5.726591	18.18000	22.90268
Minimum	9.530920	2.651037	2.265558	-0.481752	-65.85715	19.05813
Std. Dev.	0.567528	0.532434	2.284722	1.984958	14.63589	1.113535
Observations	39	39	39	39	39	39

Source: Author's Computation using Eviews 9

From the table,the mean values of LNRGDP, LNGFCF,LNGEXP, LNEXR, INTR, LNFDI are given as follows: 10.29, 3.45, 6.12, 3.48, 0.38, 21.30 respectively and their median values are given respectively as follows: 10.07, 3.53, 6.85, 4.62, 4.31, 21.35 and their standard deviation values are also shown in table as: 0.56, 0.53, 2.28, 1.98, 14.64, 1.13. The table above also shows that mean, standard deviation, median values falls between the minimum and maximum values.

4.1.2 Test For Stationarity

By Stationarity we mean that the statistical properties of a time series (or rather the process generating it) do not change over time. Using Augmented Dickey Fuller Approach, the unit root tests is given below as:

Table 4.2: Unit root test

Variables	ADF Statistics (level)	MacKinnon Critical Values at 5%	ADF Statistics (1st Difference)	MacKinnon Critical Values at 5%	Order of Integration
RGDP	-0.68	-2.94	-3.44	-2.94	I(1)
LNGFCF	-2.11	-2.94	-4.46	-2.94	I(1)
LNFDI	-1.53	-2.94	-9.83	-2.94	I(1)
INTR	-1.23	-2.94	-11.51	-2.94	I(1)
LNGEXP	-1.05	-2.94	-7.49	-2.94	I(1)
LNEXR	-2.09	-2.94	-5.21	-2.94	I(1)

Source: Author's Computation using Eviews 9

From the table 4.2 above, it can be seen that the variables of this study were all stationary at order of one i.e. at first difference at 5% significant level.

4.2 Test For Co-Integration

The test results are given below as:

TABLE 4.3a: Co-integration test(Trace statistic)

Johansen Cointegration Rank Test (Trace)				
Hypothesized		**Trace**	**0.05**	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.604452	92.89013	69.81889	0.0003
At most 1 *	0.566392	58.57326	47.85613	0.0036
At most 2	0.433736	27.65549	29.79707	0.0866
At most 3	0.141952	6.613764	15.49471	0.6229
At most 4	0.025329	0.949261	3.841466	0.3299

Source: Author's Computation using Eviews 9

In the table above 4.3a above, it can be seen that the trace test indicates 2 co-intergrating equations at 0.05 significant level. This indicates there exists a co-intergrating relationship among the variables captured by this study.

TABLE 4.3b: Co-integration test(Maxeigen statistic)

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.657060	39.59740	40.07757	0.0566
At most 1	0.550223	29.56315	33.87687	0.1503
At most 2	0.473985	23.76974	27.58434	0.1430
At most 3	0.310769	13.77063	21.13162	0.3842
At most 4	0.195048	8.027998	14.26460	0.3759
At most 5	0.045607	1.727132	3.841466	0.1888

Source: Author's Computation using Eviews 9

In the table above 4.3b above, it can be seen that the Max-Eigentest indicates no co-intergrating equations at 0.05 significant level. This indicates there exists a co-intergrating relationship among the variables captured by this study.

4.3 Regression Results

4.3.1 Error correction model Estimates

The table below shows the ECM regression results regressing LNGDP on the independent variables LNGFCF, LNGEXP, LNEXR, INTR, LNFDI. The table also shows the significance level of the impact of the independent variables on LNGDP.

Table 4.4a: Error Correction model

Dependent Variable: LNRGDP				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(LNGFCF)	-0.026219	0.040639	-0.645170	0.5249
D(INTR)	-0.000462	0.000511	-0.904495	0.3747
D(LNFDI)	0.037470	0.012735	2.942205	0.0071
D(LNGEXP)	-0.089433	0.028514	-3.136507	0.0045
D(EXVO)	-0.050314	0.020457	-2.459468	0.0215
ECM(-1)	-0.158303	0.062218	-2.544309	0.0178
C	0.575365	0.456182	1.261262	0.2193
R-squared	0.998319	Mean dependent var		10.34678
Adjusted R-squared	0.997548	S.D. dependent var		0.552064
S.E. of regression	0.027337	Akaike info criterion		-4.099950
Sum squared resid	0.017935	Schwarz criterion		-3.572110
Log likelihood	85.79910	Hannan-Quinn criter.		-3.915720
F-statistic	1295.452	Durbin-Watson stat		1.681728
Prob(F-statistic)	0.000000			

Source: Author's Computation using Eviews 9

4.3.2 Discussion and Findings

Table 4.4a shows the parsimonious error correction model (ECM). It demonstrates that about 16 percent of the discrepancy between the real and long run (equilibrium) values of Real GDP is reversed or erased each year. To put it another way, the current year corrects approximately 16 percent of the prior year's disequilibrium. It's worth noting that, as expected, the ECM's coefficient has a negative sign and is relevant at 5% with a probability value of 0.0178.

Also from the above table 4.4a, it can be seen that the level of gross fixed capital formation is negatively related to the Real GDP in the short run. This implies that one percent increase in level of gross fixed capital formation in Nigeria will result in 0.03 percent decrease in current level of Real GDP. The results above show that level of gross fixed capital formation is a statistically insignificant variable affecting the current Real GDP level in Nigeria at 5% level of significance.

Also from the above table 4.4a, it can be seen that the level of interest rate is negatively related to the Real GDP in the short run. This implies that one percent increase in level of interest rate in Nigeria will result in 0.0005 percent decrease in current level of Real GDP. The results above show that level of interest

rate is a statistically insignificant variable affecting the currentReal GDP level in Nigeria at 5% level of significance.

Also from the above table 4.4a, it can be seen that the level of foreign direct investment is positively related to the Real GDP in the short run. This implies that one percent increase in level of foreign direct investment in Nigeria will result in 0.04 percent increase in current level of Real GDP. The results above show that level of foreign direct is a statistically significant variable affecting the current Real GDP level in Nigeria at 5% level of significance.

Also from the above table 4.4a, it can be seen that the level of government expenditure is negatively related to the Real GDP in the short run. This implies that one percent increase in level of government expenditure in Nigeria will result in 0.09 percent decrease in current level of Real GDP. The results above show that level of government expenditure is a statistically significant variable affecting the current Real GDP level in Nigeria at 5% level of significance.

Also from the above table 4.4a, it can be seen that the level of exchange rate volatility is negatively related to the Real GDP in the short run. This implies that one percent increase in level of exchange rate volatility in Nigeria will result in 0.05 percent decrease in current level of Real GDP. The results above show that level

of exchange rate volatility is a statistically significant variable affecting the current Real GDP level in Nigeria at 5% level of significance.

The coefficient of determination (R^2) showed that, about 99.8% of the systematic variations in the explained variable are accounted for by the joint influence of all the explanatory variables employed in the study, while the remaining 0.2% is due to other factors captured by the error term. This further confirms that the model is correctly specified. The F-statistics indicate a rejection of the null hypothesis of joint insignificance (at 5% significance level). In other words, we are about 95% confident that the explanatory variables are simultaneously significant when addressing the various factors that influence economic growth in Nigeria. The Durbin Watson statistic which is approximately equals 2 indicating that autocorrelation is absent in the estimated model.

4.4 Diagnostic Tests

Table 4.5: Test on the Error Term

TEST	TYPE	Prob at 5 Percent Sig. Level.	CONCLUSION
Normality	Histogram Normality test	0.7984	Normally distributed
Stability	CUSUM squares test	None	Stability
Serial correlation	Breusch-Godfrey Serial Correlation LM Test	0.2754	No serial correlation
Heteroskedasticity	Breusch-Pagan Test	0.2854	Homoskedastic (equal spread)

Source: Author's Computation using Eviews 9

The table 4.5 above indicates that the distribution is normally distributed and that the model is there is absence of serial correlation and heteroscedasticity in the model.

4.5 Measuring the Volatility of the Exchange Volatility

The exchange rate volatility in this study is measured using the GARCH (1,1) model and this is represented in the table below:

Table 4.5: Test on the Error Term

Dependent Variable: LNEXR				
GARCH = C(2) + C(3)*RESID(-1)^2 + C(4)*GARCH(-1)				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	4.876207	0.014746	330.6843	0.0000
	Variance Equation			
C	0.000340	0.000835	0.406912	0.6841
RESID(-1)^2	0.906093	0.635514	1.897822	0.0577
GARCH(-1)	0.025661	0.101874	-0.251894	0.8011
R-squared	0.510171	Mean dependent var		3.476720
Adjusted R-squared	0.510171	S.D. dependent var		1.984958
S.E. of regression	2.439296	Akaike info criterion		2.188288
Sum squared resid	226.1062	Schwarz criterion		2.358910
Log likelihood	-38.67161	Hannan-Quinn criter.		2.249505

Source: Author's Computation using Eviews 9

The table 4.5 above reveals from the mean equation that the average exchange rate is 4.88 and it's statistically significant. The result also shows that the residuals(which has the ARCH coefficient) has a positive but insignificant impact on the current conditional variance of the exchange rate while the conditional variance

one-year lag (which had the GARCH coefficient) has a positive but insignificant impact on the conditional variance of exchange rate in the current period.

From the table, it can also be seen that the sum of both the ARCH and GARCH parameters is approximately 0.94 and implies that exchange rate volatility would be persistent in future. This therefore shows that past volatility will strongly influence future volatility.

4.6 Policy Implications

Interest rate was found to have a negative impact on economic growth in Nigeria and this conforms to apriori expectation. Higher interest rates tend to reduce economic growth. Higher interest rates increase the cost of borrowing, reduce disposable income and therefore limit the growth in consumer spending and hence reduce economic growth. Generally, rising interest rates are not friendly to a growing economy or to the stock market. However, in slowing the economy, it does have the effect of curbing inflation, which, if not controlled, could be much worse.

Gross fixed capital formation has also been observed to have a negative impact on GDP, which contradicts economic theory and could be attributable to a variety of factors. According to theory, rising gross fixed capital formation should lead to an increase in GDP, however this study found the opposite to be true. This

could be because capital that has been amassed over time is sometimes left idle and hence underutilized, resulting in a decline in economic output/growth in the Nigerian economy as a whole and worsening of economy.

Government expenditure was also found to have a negative impact on economic growth in Nigeria and this can be due to some economic reasons. This happens most times happens as a result of excessive government spending which often has resulted budget deficit in Nigeria. When an increase in government expenditure which is also a decrease in government revenue increases the budget deficit, the treasury must issue more bonds. This reduces the price of bonds, raising the interest rate. This could further slow economic growth over the longer run, making it more difficult for Nigeria to enjoy rising living standards and for the nation to fund government programs that our citizens find worthwhile.

Foreign direct investment was also found to have a positive impact on Nigerian economy and this conforms to theory. It should be noted that the most important factors in the economic growth processing of any country are the commercial transactions and foreign direct investments (FDI). The FDIs increase the exporting capability in the host country and lead to profit increase at a foreign exchange mostly in developing countries. FDI and economic growth are positively

interdependent. Large economic growth provides high profit opportunities attracting higher domestic and foreign direct investments. On the other hand, FDI through its spillover effect have direct positive economic growth of the host countries.

In addition, exchange rate volatility was found to have a detrimental impact on economic growth, which is consistent with theory. The exchange rate volatility creates uncertainty in the economic environment and decreases investment. The decrease in investment has a negative impact on economic performance. For instance, an increase in the exchange rate means the naira would appreciate against the dollar, slowing the economy's growth. Furthermore, a strong exchange rate can stifle economic growth since it makes exports more expensive, resulting in less demand for exports, and imports less expensive, resulting in more demand for imported goods (and therefore less demand for domestically produced goods). Volatility in exchange rates can affect the risk-taking behavior of investors in exchange rate markets negatively and can canalize the investors' portfolios into money markets and this definitely pose an an adverse effect on the economy of Nigeria at large.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary of Findings

The study examined the impact of exchange rate volatility on economic growth in Nigeria. The study tests for unit root using Augmented Dickey-Fuller (ADF) to check if the variables are stationary or non-stationary. Also, to check that long run relationship exists, the study used the Johansen Co-integration test. This shows the existence of a long-run relationship among the variables employed in the study. The work finds out that the model passed the diagnostic test such as Normality, serialcorrelation, heteroskedasticity, stability tests. The real exchange rate volatility is measured using the GARCH (1,1) model. Our findings support the existence of a long-run and short-runrelationship between economic growth and public expenditures in Nigeria over the period of the study. The variables were also found to have an overall significant effect on Real GDP from F-statistic obtained in the model. The study found that the level of gross fixed capital formation negatively but insignificantly affects economic growth in Nigeria and also the level of interest rate negatively but insignificantly affects economic growth in Nigeria and the level of foreign direct investment positively and significantly affects economic growth in

Nigeria and the level of government expenditure posiively and significantly affects economic growth in Nigeria and then finally level of exchange rate volatility which is the key independent variable in the study was found to a negative and significant impact on economic growth in Nigeria.

5.2 Recommendations

On this basis of the emanating findings, this study proffered the following recommendations:

1. The government should diversify the economy as well as increase industrialization and manufacturing activities , which will help reduce the pressure on the currency as the dependency effect would be reduced
2. In order to also stabilize exchange rate so as to prevent the tendencies of exchange rate volatility, the government can an either adopt either expansionary and contractionary monetary policies when needful depending on the exchange rate situation at hand. For instance, expansionary monetary policy causes an increase in GNP and a depreciation of the domestic currency in a floating exchange rate system in the short run while contractionary monetary policy causes a decrease in GNP and an appreciation of the domestic currency in a floating exchange rate system in the short run.

3. Seeing that FDI has a positive impact on the Nigerian economy as revealed by the study, the government should encourage FDI through financial incentives; well-established infrastructure; desirable administrative processes and regulatory environment; educational investment; and political, economic, and legal stability.
4. The government should also reduce restrictions on FDI. Provide open, transparent and dependable conditions for all kinds of firms, whether foreign or domestic, including: ease of doing business, access to imports, relatively flexible labour markets and protection of intellectual property rights.

5.1 Conclusion

The conclusion to be drawn from this study is that the exchange rate volatility has a negative and significant impact on economic growth in Nigeria. From the sum of GARCH and ARCH item obtained in the study it is very obvious that exchange rate volatility tends to be persistent in Nigeria and this indeed calls for serious attention from government. The exchange rate is a key macroeconomic factor that affects international trade and the real economy of Nigeria. The development of international trade creates conditions where volatility comes with the exchange rate and the findings of this study suggests that exchange rate volatility is harmful to the

growth of the Nigerian economy. The study therefore concludes that the impact of exchange rate volatility on economic growth is negative and more pronounced in Nigerian economy. These results have important implications for the design of exchange rate policies in Nigeria. Given the importance of international trade and investment in the process of economic growth, Nigeria must try to follow an exchange rate policy that principally seeks to stabilize exchange rates. A relatively stable and predictable exchange rate seems to be fundamental to enhance economic growth so as to reverse the adverse effects of exchange rate volatility on the economy of Nigeria.

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APPENDIX ONE

DESCRIPTIVE STATISTICS

UNIT ROOT

AT LEVEL

LNRGDP

Null Hypothesis: LNRGDP has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=0)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			0.684775	0.9902
Test critical values:	1% level		-3.615588	
	5% level		-2.941145	
	10% level		-2.609066	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNRGDP)				
Method: Least Squares				
Date: 06/20/21 Time: 19:29				
Sample (adjusted): 1982 2019				
Included observations: 38 after adjustments				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRGDP(-1)	0.008924	0.013033	0.684775	0.4979
C	-0.052339	0.133997	-0.390599	0.6984
R-squared	0.012858	Mean dependent var		0.039287
Adjusted R-squared	-0.014563	S.D. dependent var		0.043917
S.E. of regression	0.044235	Akaike info criterion		-3.347391
Sum squared resid	0.070443	Schwarz criterion		-3.261202
Log likelihood	65.60042	Hannan-Quinn criter.		-3.316725
F-statistic	0.468917	Durbin-Watson stat		0.958520
Prob(F-statistic)	0.497871			

LNGFCF

Null Hypothesis: LNGFCF has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=0)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.110461	0.2418
Test critical values:	1% level		-3.615588	
	5% level		-2.941145	
	10% level		-2.609066	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNGFCF)				
Method: Least Squares				
Date: 06/20/21 Time: 19:30				
Sample (adjusted): 1982 2019				
Included observations: 38 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGFCF(-1)	-0.078056	0.036985	-2.110461	0.0418
C	0.236271	0.129137	1.829610	0.0756
R-squared	0.110101	Mean dependent var		-0.033094
Adjusted R-squared	0.085382	S.D. dependent var		0.126664
S.E. of regression	0.121136	Akaike info criterion		-1.332612
Sum squared resid	0.528260	Schwarz criterion		-1.246423
Log likelihood	27.31962	Hannan-Quinn criter.		-1.301946
F-statistic	4.454048	Durbin-Watson stat		1.604477
Prob(F-statistic)	0.041832			

LNFDI

Null Hypothesis: LNFDI has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=0)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.527093	0.5093
Test critical values:	1% level		-3.615588	
	5% level		-2.941145	
	10% level		-2.609066	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNFDI)				
Method: Least Squares				
Date: 06/20/21 Time: 19:40				
Sample (adjusted): 1982 2019				
Included observations: 38 after adjustments				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFDI(-1)	-0.122237	0.080045	-1.527093	0.1355
C	2.662109	1.704334	1.561965	0.1270
R-squared	0.060837	Mean dependent var		0.062882
Adjusted R-squared	0.034749	S.D. dependent var		0.550338
S.E. of regression	0.540692	Akaike info criterion		1.659260
Sum squared resid	10.52450	Schwarz criterion		1.745449
Log likelihood	-29.52595	Hannan-Quinn criter.		1.689926
F-statistic	2.332013	Durbin-Watson stat		2.954827
Prob(F-statistic)	0.135477			

INTR

Null Hypothesis: INTR has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=0)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.231695	0.1560
Test critical values:	1% level		-3.615588	
	5% level		-2.941145	
	10% level		-2.609066	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(INTR)				
Method: Least Squares				
Date: 06/20/21 Time: 19:34				
Sample (adjusted): 1982 2019				
Included observations: 38 after adjustments				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTR(-1)	-0.749798	0.103682	-7.231695	0.0000
C	2.075850	1.512873	1.372125	0.1785

R-squared	0.592287	Mean dependent var	1.928347
Adjusted R-squared	0.580962	S.D. dependent var	14.40548
S.E. of regression	9.325127	Akaike info criterion	7.354498
Sum squared resid	3130.488	Schwarz criterion	7.440687
Log likelihood	-137.7355	Hannan-Quinn criter.	7.385163
F-statistic	52.29741	Durbin-Watson stat	1.664431
Prob(F-statistic)	0.000000		

Null Hypothesis: LNGEXP has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=0)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.045165	0.7270
Test critical values:	1% level		-3.615588	
	5% level		-2.941145	
	10% level		-2.609066	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNGEXP)				
Method: Least Squares				
Date: 06/20/21 Time: 19:35				
Sample (adjusted): 1982 2019				
Included observations: 38 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGEXP(-1)	-0.015737	0.015057	-1.045165	0.3029
C	0.272626	0.096967	2.811523	0.0079
R-squared	0.029450	Mean dependent var		0.177542
Adjusted R-squared	0.002490	S.D. dependent var		0.207126
S.E. of regression	0.206868	Akaike info criterion		-0.262277
Sum squared resid	1.540595	Schwarz criterion		-0.176088
Log likelihood	6.983267	Hannan-Quinn criter.		-0.231612
F-statistic	1.092369	Durbin-Watson stat		2.477402
Prob(F-statistic)	0.302914			

LNEXR

Null Hypothesis: LNEXR has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=0)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.090932	0.2493
Test critical values:	1% level		-3.615588	
	5% level		-2.941145	
	10% level		-2.609066	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNEXR)				
Method: Least Squares				
Date: 06/20/21 Time: 19:42				
Sample (adjusted): 1982 2019				
Included observations: 38 after adjustments				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNEXR(-1)	-0.048543	0.023216	-2.090932	0.0437
C	0.329275	0.091351	3.604502	0.0009

R-squared	0.108293	Mean dependent var	0.163377
Adjusted R-squared	0.083523	S.D. dependent var	0.291543
S.E. of regression	0.279103	Akaike info criterion	0.336722
Sum squared resid	2.804339	Schwarz criterion	0.422911
Log likelihood	-4.397716	Hannan-Quinn criter.	0.367387
F-statistic	4.371998	Durbin-Watson stat	1.863828
Prob(F-statistic)	0.043655		

AT FIRST DIFF

LNRGDP

Null Hypothesis: D(LNRGDP) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=0)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.440705	0.0157
Test critical values:	1% level		-3.621023	
	5% level		-2.943427	
	10% level		-2.610263	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNRGDP,2)				
Method: Least Squares				
Date: 06/20/21 Time: 19:45				
Sample (adjusted): 1983 2019				
Included observations: 37 after adjustments				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNRGDP(-1)	-0.492243	0.143065	-3.440705	0.0015
C	0.020351	0.008481	2.399733	0.0219
R-squared	0.252751	Mean dependent var		0.000491
Adjusted R-squared	0.231401	S.D. dependent var		0.043109
S.E. of regression	0.037794	Akaike info criterion		-3.660814
Sum squared resid	0.049993	Schwarz criterion		-3.573737
Log likelihood	69.72506	Hannan-Quinn criter.		-3.630115
F-statistic	11.83845	Durbin-Watson stat		1.969429
Prob(F-statistic)	0.001518			

LNGFCF

Null Hypothesis: D(LNGFCF) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=0)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.455380	0.0011
Test critical values:	1% level		-3.621023	
	5% level		-2.943427	
	10% level		-2.610263	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNGFCF,2)				
Method: Least Squares				
Date: 06/20/21 Time: 19:46				
Sample (adjusted): 1983 2019				
Included observations: 37 after adjustments				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGFCF(-1)	-0.820913	0.184252	-4.455380	0.0001
C	-0.025436	0.022488	-1.131111	0.2657
R-squared	0.361901	Mean dependent var		0.008899
Adjusted R-squared	0.343669	S.D. dependent var		0.158621
S.E. of regression	0.128506	Akaike info criterion		-1.213152
Sum squared resid	0.577978	Schwarz criterion		-1.126075
Log likelihood	24.44330	Hannan-Quinn criter.		-1.182453
F-statistic	19.85041	Durbin-Watson stat		1.806166
Prob(F-statistic)	0.000082			

INTR

Null Hypothesis: D(INTR) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=0)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-9.831798	0.0000
Test critical values:	1% level		-3.621023	
	5% level		-2.943427	
	10% level		-2.610263	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(INTR,2)				
Method: Least Squares				
Date: 06/20/21 Time: 19:47				
Sample (adjusted): 1983 2019				
Included observations: 37 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INTR(-1)	-1.173719	0.119380	-9.831798	0.0000
C	0.662132	1.735270	0.381573	0.7051
R-squared	0.734172	Mean dependent var		-1.619105
Adjusted R-squared	0.726577	S.D. dependent var		20.00475
S.E. of regression	10.46045	Akaike info criterion		7.585619
Sum squared resid	3829.739	Schwarz criterion		7.672696
Log likelihood	-138.3340	Hannan-Quinn criter.		7.616318
F-statistic	96.66425	Durbin-Watson stat		2.183762
Prob(F-statistic)	0.000000			

LNFDI

Null Hypothesis: D(LNFDI) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=0)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-11.50121	0.0000
Test critical values:	1% level		-3.621023	
	5% level		-2.943427	
	10% level		-2.610263	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNFDI,2)				
Method: Least Squares				
Date: 06/20/21 Time: 19:47				
Sample (adjusted): 1983 2019				
Included observations: 37 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNFDI(-1))	-1.579098	0.137298	-11.50121	0.0000
C	0.104376	0.075864	1.375840	0.1776
R-squared	0.790767	Mean dependent var		0.012861
Adjusted R-squared	0.784789	S.D. dependent var		0.989239
S.E. of regression	0.458916	Akaike info criterion		1.332640
Sum squared resid	7.371141	Schwarz criterion		1.419716
Log likelihood	-22.65384	Hannan-Quinn criter.		1.363338
F-statistic	132.2779	Durbin-Watson stat		1.913004
Prob(F-statistic)	0.000000			

LNGEXP

Null Hypothesis: D(LNGEXP) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=0)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-7.497812	0.0000
Test critical values:	1% level		-3.621023	
	5% level		-2.943427	
	10% level		-2.610263	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNGEXP,2)				
Method: Least Squares				
Date: 06/20/21 Time: 19:48				
Sample (adjusted): 1983 2019				
Included observations: 37 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGEXP(-1)	-1.227298	0.163688	-7.497812	0.0000
C	0.221268	0.044526	4.969460	0.0000
R-squared	0.616300	Mean dependent var		0.004705
Adjusted R-squared	0.605338	S.D. dependent var		0.328103
S.E. of regression	0.206122	Akaike info criterion		-0.268163
Sum squared resid	1.487013	Schwarz criterion		-0.181087
Log likelihood	6.961020	Hannan-Quinn criter.		-0.237465
F-statistic	56.21719	Durbin-Watson stat		1.869033
Prob(F-statistic)	0.000000			

LNEXR

Null Hypothesis: D(LNEXR) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=0)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-5.205070	0.0001
Test critical values:	1% level		-3.621023	
	5% level		-2.943427	
	10% level		-2.610263	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LNEXR,2)				
Method: Least Squares				
Date: 06/20/21 Time: 19:48				
Sample (adjusted): 1983 2019				
Included observations: 37 after adjustments				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNEXR(-1))	-0.875918	0.168282	-5.205070	0.0000
C	0.144645	0.056421	2.563665	0.0148
R-squared	0.436327	Mean dependent var		-0.002264
Adjusted R-squared	0.420222	S.D. dependent var		0.390277
S.E. of regression	0.297169	Akaike info criterion		0.463506
Sum squared resid	3.090826	Schwarz criterion		0.550582
Log likelihood	-6.574854	Hannan-Quinn criter.		0.494204
F-statistic	27.09275	Durbin-Watson stat		1.993196
Prob(F-statistic)	0.000009			

COINTERGRATION

Date: 06/20/21 Time: 19:54						
Sample (adjusted): 1983 2019						
Included observations: 37 after adjustments						
Trend assumption: Linear deterministic trend						
Series: LNRGDP LNGFCF LNGEXP LNEXR INTR LNFDI						
Lags interval (in first differences): 1 to 1						
Unrestricted Cointegration Rank Test (Trace)						
Hypothesized		Trace	0.05			
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**		
None *	0.657060	116.4560	95.75366	0.0009		
At most 1 *	0.550223	76.85865	69.81889	0.0123		
At most 2	0.473985	47.29550	47.85613	0.0564		
At most 3	0.310769	23.52576	29.79707	0.2212		
At most 4	0.195048	9.755130	15.49471	0.3001		
At most 5	0.045607	1.727132	3.841466	0.1888		
Trace test indicates 2 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		Max-Eigen	0.05			
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**		
None	0.657060	39.59740	40.07757	0.0546		
At most 1	0.550223	29.56315	33.87687	0.1503		
At most 2	0.473985	23.76974	27.58434	0.1430		
At most 3	0.310769	13.77063	21.13162	0.3842		
At most 4	0.195048	8.027998	14.26460	0.3759		
At most 5	0.045607	1.727132	3.841466	0.1888		
Max-eigenvalue test indicates no cointegration equ(s) 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):						
LNRGDP	LNGFCF	LNGEXP	LNEXR	INTR	LNFDI	
5.064225	1.600359	-1.241935	1.261198	-0.110657	-0.572636	
-2.336655	-1.932077	-3.405276	3.203540	0.086140	1.897359	
1.314038	-3.469528	-0.341022	0.475680	0.024645	-2.135642	
-4.481999	-6.355783	-0.707548	0.674858	-0.047848	-0.945052	
-9.264143	-8.064296	0.849604	-0.807565	-0.039779	1.299535	
0.535464	-3.920269	-2.261528	0.498255	0.010819	1.640999	
Unrestricted Adjustment Coefficients (alpha):						
D(LNRGDP)	-0.006131	0.012826	-0.000242	0.003591	0.009397	-0.003340
D(LNGFCF)	0.008478	-0.019157	0.053084	0.010984	0.012044	0.014865
D(LNGEXP)	-0.025353	0.024699	-0.036796	0.081973	-0.018300	0.014242
D(LNEXR)	-0.164891	-0.063581	0.023175	0.059207	-0.053463	0.007838
D(INTR)	2.424894	-4.309641	-2.221813	1.879518	2.326153	-0.167648
D(LNFDI)	0.117953	0.049395	0.127765	0.122006	-0.060462	-0.035645
1 Cointegrating Equation(s):		Log likelihood	-15.62441			

Normalized cointegrating coefficients (standard error in parentheses)						
LNRGDP	LNGFCF	LNGEXP	LNEXR	INTR	LNFDI	
1.000000	0.316013	-0.245237	0.249041	-0.021851	-0.113075	
	(0.19363)	(0.11678)	(0.09663)	(0.00411)	(0.09049)	
Adjustment coefficients (standard error in parentheses)						
D(LNRGDP)	-0.031047					
	(0.03058)					
D(LNGFCF)	0.042934					
	(0.10567)					
D(LNGEXP)	-0.128394					
	(0.16846)					
D(LNEXR)	-0.835043					
	(0.21018)					
D(INTR)	12.28021					
	(8.76971)					
D(LNFDI)	0.597343					
	(0.35267)					
2 Cointegrating Equation(s):		Log likelihood	-0.842836			
Normalized cointegrating coefficients (standard error in parentheses)						
LNRGDP	LNGFCF	LNGEXP	LNEXR	INTR	LNFDI	
1.000000	0.000000	-1.298461	1.251210	-0.012563	0.319286	
		(0.23647)	(0.21239)	(0.00933)	(0.20613)	
0.000000	1.000000	3.332855	-3.171295	-0.029390	-1.368176	
		(0.57398)	(0.51554)	(0.02264)	(0.50034)	
Adjustment coefficients (standard error in parentheses)						
D(LNRGDP)	-0.061016	-0.034591				
	(0.03095)	(0.01392)				
D(LNGFCF)	0.087698	0.050581				
	(0.11467)	(0.05158)				
D(LNGEXP)	-0.186107	-0.088294				
	(0.18375)	(0.08266)				
D(LNEXR)	-0.686476	-0.141041				

	(0.22191)	(0.09982)				
D(INTR)	22.35036	12.20726				
	(8.56498)	(3.85272)				
D(LNFDI)	0.481923	0.093332				
	(0.38501)	(0.17319)				
3 Cointegrating Equation(s):		Log likelihood	11.04204			
Normalized cointegrating coefficients (standard error in parentheses)						
LNRGDP	LNGFCF	LNGEXP	LNEXR	INTR	LNFDI	
1.000000	0.000000	0.000000	0.028805	-0.018671	-0.414087	
			(0.03931)	(0.00391)	(0.06858)	
0.000000	1.000000	0.000000	-0.033659	-0.013712	0.514227	
			(0.06862)	(0.00683)	(0.11971)	
0.000000	0.000000	1.000000	-0.941426	-0.004704	-0.564802	
			(0.06491)	(0.00646)	(0.11325)	
Adjustment coefficients (standard error in parentheses)						
D(LNRGDP)	-0.061334	-0.033751	-0.035978			
	(0.03180)	(0.02376)	(0.02020)			
D(LNGFCF)	0.157452	-0.133594	0.036603			
	(0.10339)	(0.07726)	(0.06569)			
D(LNGEXP)	-0.234458	0.039370	-0.040071			
	(0.18468)	(0.13799)	(0.11734)			
D(LNEXR)	-0.656023	-0.221447	0.413391			
	(0.22665)	(0.16936)	(0.14401)			
D(INTR)	19.43081	19.91590	12.42164			
	(8.47597)	(6.33338)	(5.38539)			
D(LNFDI)	0.649811	-0.349953	-0.358266			
	(0.37146)	(0.27756)	(0.23601)			
4 Cointegrating Equation(s):		Log likelihood	17.92735			
Normalized cointegrating coefficients (standard error in parentheses)						
LNRGDP	LNGFCF	LNGEXP	LNEXR	INTR	LNFDI	
1.000000	0.000000	0.000000	0.000000	-0.102736	-0.388452	
				(0.01928)	(0.17757)	

0.000000	1.000000	0.000000	0.000000	0.084519	0.484272	
				(0.01902)	(0.17515)	
0.000000	0.000000	1.000000	0.000000	2.742757	-1.402628	
				(0.63043)	(5.80522)	
0.000000	0.000000	0.000000	1.000000	2.918404	-0.889954	
				(0.66869)	(6.15753)	
Adjustment coefficients (standard error in parentheses)						
D(LNRGDP)	-0.077427	-0.056573	-0.038519	0.035663		
	(0.04007)	(0.04222)	(0.02043)	(0.01950)		
D(LNGFCF)	0.108223	-0.203405	0.028832	-0.018015		
	(0.13042)	(0.13739)	(0.06649)	(0.06347)		
D(LNGEXP)	-0.601862	-0.481634	-0.098071	0.084966		
	(0.20666)	(0.21771)	(0.10536)	(0.10058)		
D(LNEXR)	-0.921387	-0.597751	0.371500	-0.360664		
	(0.27641)	(0.29118)	(0.14092)	(0.13452)		
D(INTR)	11.00681	7.970095	11.09179	-10.53630		
	(10.4571)	(11.0158)	(5.33126)	(5.08930)		
D(LNFDI)	0.102980	-1.125397	-0.444592	0.450115		
	(0.44186)	(0.46547)	(0.22527)	(0.21504)		
5 Cointegrating Equation(s):		Log likelihood	21.94135			
Normalized cointegrating coefficients (standard error in parentheses)						
LNRGDP	LNGFCF	LNGEXP	LNEXR	INTR	LNFDI	
1.000000	0.000000	0.000000	0.000000	0.000000	-1.142148	
					(0.20723)	
0.000000	1.000000	0.000000	0.000000	0.000000	1.104327	
					(0.20081)	
0.000000	0.000000	1.000000	0.000000	0.000000	18.71890	
					(6.08608)	
0.000000	0.000000	0.000000	1.000000	0.000000	20.52017	
					(6.47494)	
0.000000	0.000000	0.000000	0.000000	1.000000	-7.336242	
					(1.96274)	

Adjustment coefficients (standard error in parentheses)						
D(LNRGDP)	-0.164479	-0.132350	-0.030535	0.028075	0.001232	
	(0.06155)	(0.05813)	(0.01988)	(0.01897)	(0.00081)	
D(LNGFCF)	-0.003351	-0.300528	0.039064	-0.027741	-0.002285	
	(0.20953)	(0.19789)	(0.06768)	(0.06460)	(0.00276)	
D(LNGEXP)	-0.432333	-0.334061	-0.113619	0.099744	0.000832	
	(0.33222)	(0.31377)	(0.10731)	(0.10242)	(0.00438)	
D(LNEXR)	-0.426096	-0.166608	0.326077	-0.317489	0.012634	
	(0.43201)	(0.40801)	(0.13955)	(0.13319)	(0.00570)	
D(INTR)	-10.54300	-10.78869	13.06810	-12.41482	-0.876783	
	(16.1493)	(15.2523)	(5.21657)	(4.97875)	(0.21304)	
D(LNFDI)	0.663105	-0.637817	-0.495960	0.498942	-0.009081	
	(0.70312)	(0.66406)	(0.22712)	(0.21677)	(0.00928)	

MEASURING VOLATILITY

Dependent Variable: LNEXR				
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)				
Date: 06/29/21 Time: 15:44				
Sample: 1981 2019				
Included observations: 39				
Convergence achieved after 43 iterations				
Coefficient covariance computed using outer product of gradients				
Presample variance: backcast (parameter = 0.7)				
GARCH = C(2) + C(3)*RESID(-1)^2 + C(4)*GARCH(-1)				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	4.876207	0.014746	330.6843	0.0000
	Variance Equation			
C	0.00030140	0.000835	0.406912	0.6841
RESID(-1)^2	0.906093	0.635514	1.897822	0.0577
GARCH(-1)	0.025661	0.101874	-0.251894	0.8011
R-squared	0.510171	Mean dependent var		3.476720
Adjusted R-squared	0.510171	S.D. dependent var		1.984958
S.E. of regression	2.439296	Akaike info criterion		2.188288
Sum squared resid	226.1062	Schwarz criterion		2.358910
Log likelihood	-38.67161	Hannan-Quinn criter.		2.249505

SHORT RUN EFFECT

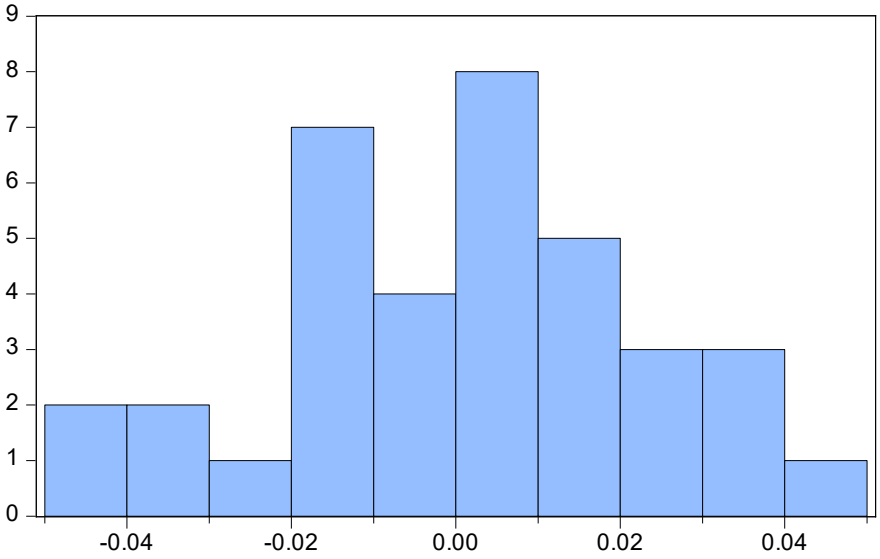
lnrgdp c (lngfcf) D(intr) D(lnfdi) D(lngexp) D(exvo) ECM(-1)

Dependent Variable: LNRGDP				
Method: Least Squares				
Date: 06/29/21 Time: 15:27				
Sample (adjusted): 1984 2019				
Included observations: 36 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGFCF)	-0.026219	0.040639	-0.645170	0.5249
D(INTR)	-0.000462	0.000511	-0.904495	0.3747
D(LNFDI)	0.037470	0.012735	2.942205	0.0071
D(LNGEXP)	-0.089433	0.028514	-3.136507	0.0045
D(EXVO)	-0.050314	0.020457	-2.459468	0.0215
ECM(-1)	-0.158303	0.062218	-2.544309	0.0178
C	0.575365	0.456182	1.261262	0.2193
R-squared	0.998319	Mean dependent var		10.34678
Adjusted R-squared	0.997548	S.D. dependent var		0.552064
S.E. of regression	0.027337	Akaike info criterion		-4.099950
Sum squared resid	0.017935	Schwarz criterion		-3.572110
Log likelihood	85.79910	Hannan-Quinn criter.		-3.915720
F-statistic	1295.452	Durbin-Watson stat		1.681728
Prob(F-statistic)	0.000000			

LONG RUN EFFECT

Dependent Variable: LNRGDP				
Method: Least Squares				
Date: 06/29/21 Time: 15:20				
Sample (adjusted): 1982 2019				
Included observations: 38 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.877191	1.088939	9.070471	0.0000
LNGFCF(-1)	-0.639432	0.111130	-5.753898	0.0000
INTR(-1)	-0.000710	0.001528	-0.464632	0.6453
LNFDI(-1)	0.069783	0.043512	1.603770	0.1186
LNGEXP(-1)	0.162723	0.052221	3.116050	0.0039
EXVO(-1)	-0.115678	0.042471	-2.723675	0.0104
R-squared	0.966090	Mean dependent var		10.30619
Adjusted R-squared	0.960791	S.D. dependent var		0.564671
S.E. of regression	0.111812	Akaike info criterion		-1.400055
Sum squared resid	0.400062	Schwarz criterion		-1.141489
Log likelihood	32.60104	Hannan-Quinn criter.		-1.308059
F-statistic	182.3321	Durbin-Watson stat		1.740940
Prob(F-statistic)	0.000000			

DIAGONISTICS



Series: Residuals
Sample 1984 2019
Observations 36

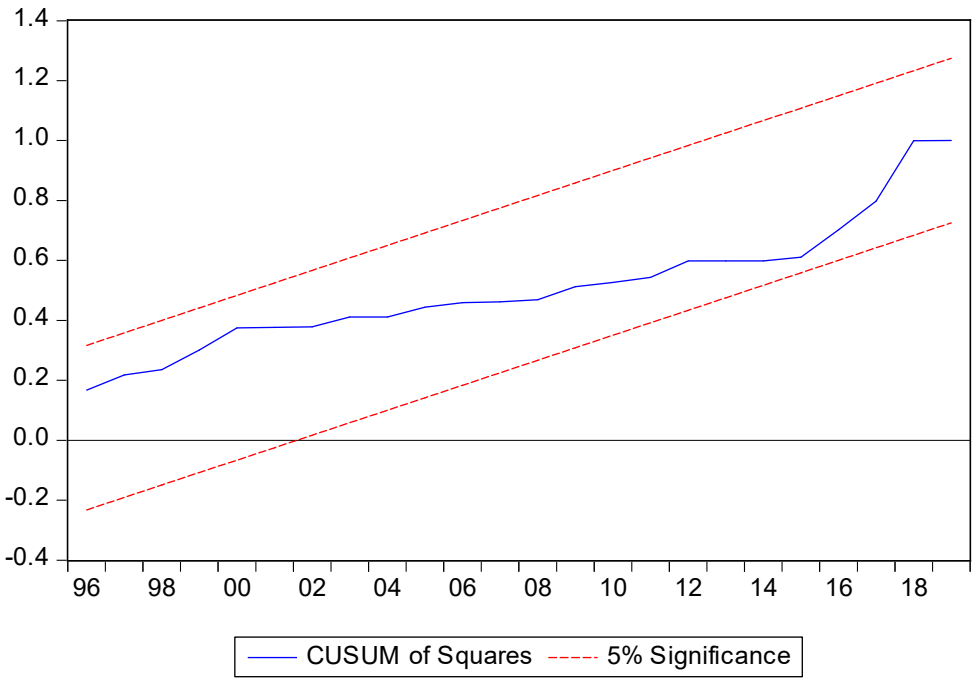
Mean	-3.28e-15
Median	0.000962
Maximum	0.044029
Minimum	-0.048600
Std. Dev.	0.022637
Skewness	-0.143869
Kurtosis	2.533680
Jarque-Bera	0.450371
Probability	0.798368

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.248589	Prob. F(1,23)	0.2754
Obs*R-squared	1.853684	Prob. Chi-Square(1)	0.1734

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.297308	Prob. F(11,24)	0.2845
Obs*R-squared	13.42380	Prob. Chi-Square(11)	0.2665
Scaled explained SS	4.575070	Prob. Chi-Square(11)	0.9500


1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
96
98
00
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12
14
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18
CUSUM of Squares
5% Significance

APPENDIX TWO

year	RGDP	GEXP	EXR	GFCF	FDI	INTR
1981	15258	11.4137	0.6177	89.38612615	542327289.1	-65.8571
1982	14985.08	11.9232	0.6735	85.94140115	430611256.5	-4.58618
1983	13849.73	9.6365	0.7245	75.75651206	364434580.2	-8.02239
1984	13779.26	9.9276	0.7665	58.95628791	189164784.9	4.342493
1985	14953.91	13.0411	0.8938	46.39544698	485581320.9	2.343231
1986	15237.99	16.2237	1.7545	54.94827038	193214907.5	4.310292
1987	15263.93	22.0187	4.0164	50.04988787	610552091.5	-4.76964
1988	16215.37	27.7495	4.5371	43.75477314	378667097.7	-2.96268
1989	17294.68	41.0283	7.3647	52.48744487	1884249739	-6.61241
1990	19305.63	60.2682	8.0383	53.12219353	587882970.6	17.46624
1991	19199.06	66.5844	9.9095	48.40018216	712373362.5	0.990847
1992	19620.19	92.7974	17.2984	43.77439439	896641282.5	-14.9872
1993	19927.99	191.2289	22.0654	44.47636408	1345368587	-7.05247
1994	19979.12	160.8932	21.9961	42.06783621	1959219858	-15.9202
1995	20353.2	248.7681	21.8953	37.20593267	1079271551	-31.4526
1996	21177.92	337.2176	21.8844	36.58167005	1593459222	-5.26078
1997	21789.1	428.2152	21.8861	38.42226127	1539445718	12.12661
1998	22332.87	487.1134	21.8861	40.55340148	1051326217	11.48467
1999	22449.41	947.69	92.3381	38.278001	1004916719	6.047248
2000	23688.28	701.0509	101.6973	34.04928497	1140167556	-1.14089
2001	25267.54	1017.997	111.2313	30.03794342	1190618644	12.1387
2002	28957.71	1018.178	120.5782	26.76865607	1874070753	3.023542
2003	31709.45	1225.988	129.2224	28.37089582	2005353563	9.935713
2004	35020.55	1426.2	132.888	26.06325442	1874060887	-2.60485
2005	37474.95	1822.1	131.2743	24.96612489	4982533930	-1.59368
2006	39995.5	1938.003	128.6517	26.1664999	4854353979	-5.62797
2007	42922.41	2450.897	125.8081	20.18003679	6036021405	9.187171
2008	46012.52	3240.82	118.5667	18.85976721	8195499253	6.684909
2009	49856.1	3452.991	148.8801	21.11545461	8554740717	18.18
2010	54612.26	4194.577	150.2975	16.81501324	6026232041	1.067736
2011	57511.04	4712.062	153.8625	15.67631067	8841113287	5.68558
2012	59929.89	4605.391	157.5001	14.21112008	7069934205	6.224809

2013	63218.72	5185.318	157.3117	14.16872621	5562873606	11.20162
2014	67152.79	4587.385	158.5526	15.08353336	4651465948	11.35621
2015	69023.93	4988.864	192.4403	14.82717543	3137318700	13.59615
2016	67931.24	5858.558	253.4921	14.72495522	4445102771	6.686234
2017	65177.22	6456.698	305.7901	14.71561664	7453789218	5.790567
2018	67888.9	7813.741	306.0837	19.01838355	4629361892	6.055977
2019	67898.09	9714.843	306.9211	25.41589099	5915729516	7.420047

Source: I. World Development indicators (2019).

II. CBN statisical bulletin (2019).