



# BULLION

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Nigeria's Experience with the Unholy Trinity  
**Moses Kpughur Tule**

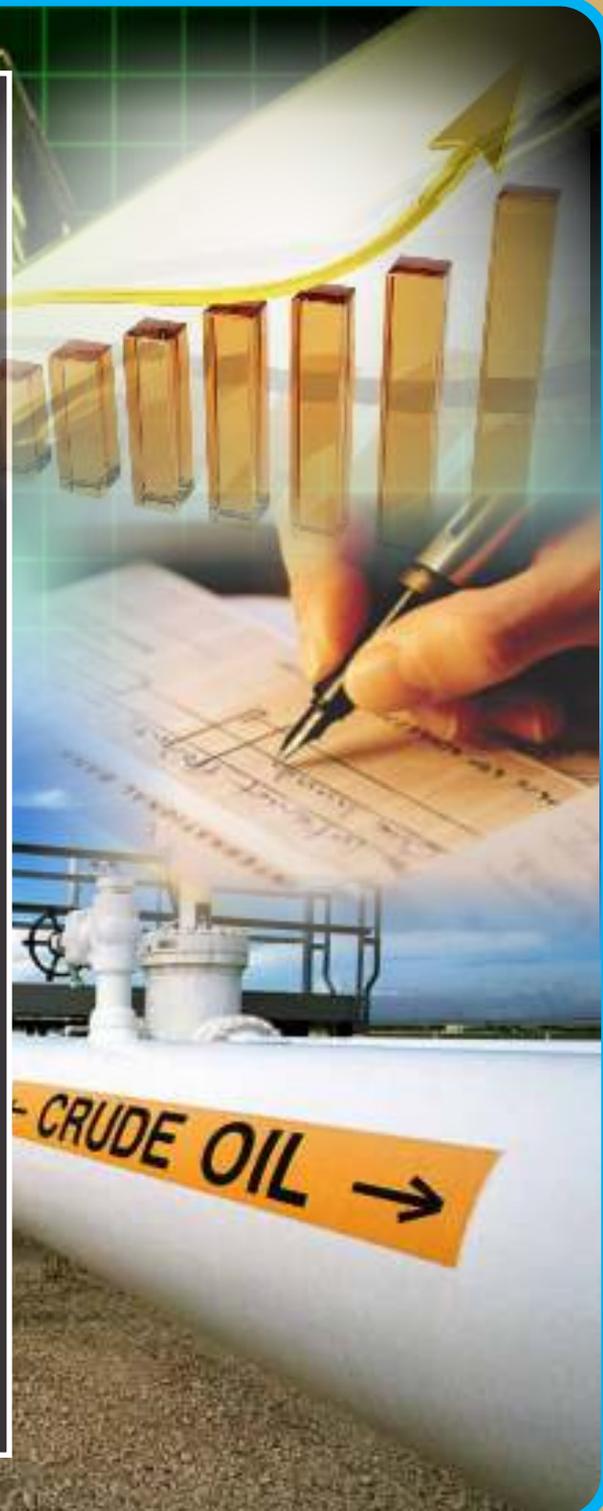
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## FOREIGN EXCHANGE MANAGEMENT: NIGERIA'S EXPERIENCE WITH THE UNHOLY TRINITY



**Moses Kpughur Tule**

*Director, Monetary Policy Department  
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### 1.0 INTRODUCTION

Foreign exchange management is a major component of monetary policy in many central banks in developing and emerging market economies. This is because maintaining price stability is a key mandate of many central banks in ensuring overall macroeconomic stability. Other components of macroeconomic policy are fiscal policy, prices and incomes policy, as well as growth and development policy. From the literature, the basic macroeconomic policy objectives usually include promoting a high rate of growth of real output; maintaining a low and stable rate of inflation; ensuring a low level of unemployment; and promoting balance of payments equilibrium (Ojo, 2013).

As may be expected, the objectives of monetary policy may vary from country to country. These objectives are often contained in the laws establishing the central bank. Thus, while some central banks pursue a single objective, others pursue multiple objectives. In the developing countries, central banks are usually saddled with multiple objectives. In Nigeria,

the major objectives of monetary policy include the attainment of price stability, sustainable economic growth and employment, and achieving external balance. In pursuing these objectives, the CBN recognizes the existence of conflicts among objectives, necessitating some sort of trade-offs. The pursuits of multiple objectives are difficult to manage, because they sometimes complicate policy design and are often the source of policy slippages. At times, concerns over the exchange rate or the level of credit take precedence over price stability considerations. It is for this reason that the conduct of monetary policy in many developing countries experience episodes of excessive accommodation or tightening which could contribute to inflation and output volatility. As observed by IMF (2015), while these challenges may be present in all central banks, they are particularly common in some developing countries that do not have a clear framework for the conduct of monetary policy. Thus, where such conflicts and multiple objectives exist, monetary policy becomes more effective using a combination of standard and unconventional monetary policy instruments.

The main target of Monetary Policy is price stability, while Fiscal Policy is aimed at accomplishing the other objectives of macroeconomic policy. The focus of monetary policy essentially derives from the mandate of the monetary authority, which may vary but usually informed by the laws establishing the central bank of the country. While some central banks pursue a single objective, others pursue multiple objectives.

Aside maintaining price stability, some central banks like the Central Bank of Nigeria, are saddled with the responsibility of issuing legal tender currency, maintain external reserves to safeguard the value of the currency, promote a sound financial system and provide economic and financial advice to the Federal Government.

Exchange rate policy is very important to achieve positive external balance and external reserves with the ultimate goal of macroeconomic stability. An effective exchange rate policy compliments the objectives of monetary policy. In recent times, there have been extensive discussions and debates on the appropriate and most effective exchange rate policy for Nigeria. The debates derive from the fact that exchange rate volatility have severe consequences on output, inflation and some other components of aggregate demand. All these have a direct impact on the welfare of the ordinary man especially in an import dependent economy like that of Nigeria.

To put our discussions in context, we observe that, the relationship between monetary policy and the exchange rate can be explained in three different channels namely; income channel, price channel and interest rate channel. According to the Income channel, an expansionary monetary policy characterized by an increase in money supply and an increase in domestic gross domestic product will subsequently lead to an increase in imports of goods and services to the country, thereby causing exchange rate depreciation (See Figure 1). A contractionary monetary policy on the other hand is vice-versa.

In explaining the relationship between monetary policy and exchange rate through the price channel, an increase in money supply is reflected in an increased demand of goods and services leading to an increase in price of domestic goods and decrease in exports, which causes currency

depreciation (Figure 2). The exact opposite occurs when there is a decrease in money supply.

Furthermore, on the interest rate channel of the relationship between monetary policy and exchange rate, an increase in

domestic interest rates will attract inflows to the economy leading to an increase in the balance of payment position and subsequently an exchange rate appreciation (Figure 3). However, the reverse occurs when there is a decrease in domestic interest rates.

Figure 1: Monetary Policy and Exchange Rate (Income Channel – Expansionary Monetary Policy)

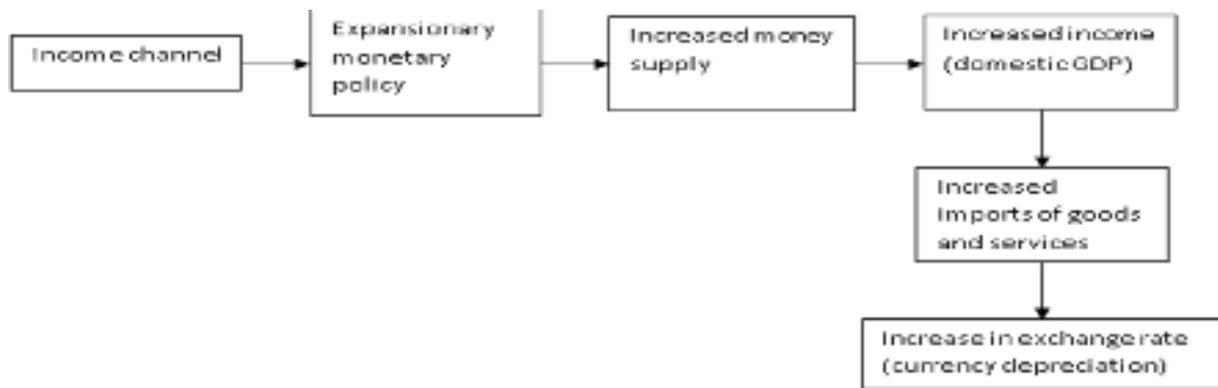


Figure 2: Monetary Policy and Exchange Rate (Price Channel)

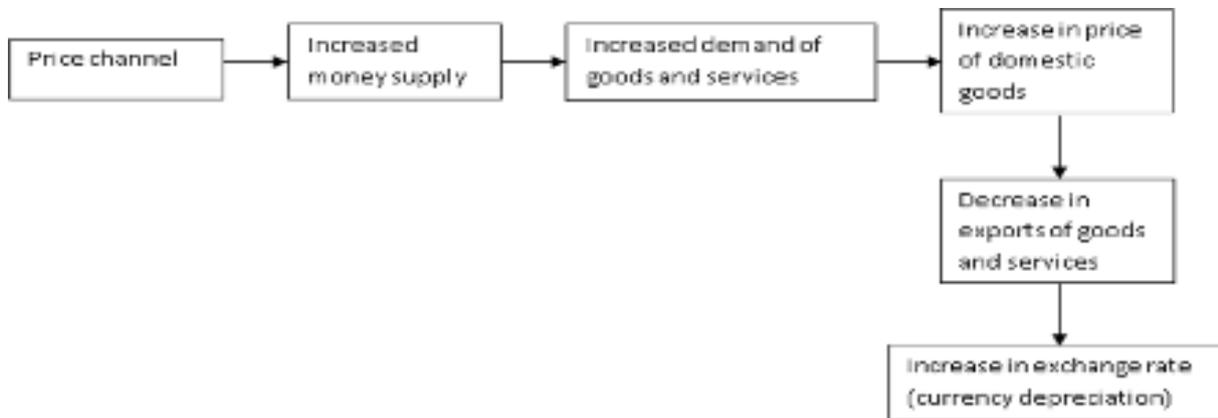


Figure 3: Monetary Policy and Exchange Rate (Interest Rate Channel)



## 2.0 Appraisal of the Exchange Rate Management Regime

Foreign Exchange Rate Management is classified majorly into two : namely; the fixed and flexible regimes, while the managed float regime exists in between. In a flexible exchange rate regime, forces of

demand and supply largely determine the exchange rate, while a fixed exchange rate regime is one where a domestic currency is anchored to a precious metal or another currency. A managed floating exchange rate is a regime where the domestic currency is allowed

to float although the monetary authority (usually the central bank) regularly intervenes in the foreign exchange market to stabilize the rate around a predetermined path or band. Table 1 shows the exchange rate regimes adopted in Nigeria over the years.

Figure 1: Monetary Policy and Exchange Rate (Income Channel – Expansionary Monetary Policy)

Period	Regime	Remark
1958 - 1972	Fixed Parity with British Pound Sterling	Nigerian Pound in Fixed Parity with GBP, Administered ER
1973 - Sept. 1986	Exchange Control	The Naira was fixed to a basket of currencies (in 1973), Import licensing & prescription of eligible transactions, FX rationing and administered ER
Sept. 1986 - July 1987	Dual Exchange Rate System	1st Tier/Official: fixed rate, 2nd Tier/Market: FX rate by Dutch auction system, Spurious and multiple bidding by economic agents
July 1987 - 1988	Unified / Autonomous ER System	1st and 2nd tier merged - unified rate, Banks transacted among themselves, Demand pressures; depreciation of the naira
1989	Inter-Bank FX Market	CBN - major supplier, Demand pressures, BDCs licensed
March 5, 1992 - 1994	Deregulated Exchange Rate System	FX rate was floated, Parallel market premium narrowed
1994	Fixed Exchange Rate System	FX Allocation Committee was set up, Allocation by Pro-rata, Parallel premium widened
1994 - 1998	Re-introduction of Dual Exchange Rate Regime	Official rate for government; AFEM others, market forces; BDCs allowed to trade in autonomous funds; Exchange Control Act of 1962 and the Enterprises Promotion Decree of 1989 were abrogated
Jan 1999 - July 2002	Re-introduction of InterBank FX Market System	Daily trading, CBN intervened as a buyer/seller, Demand pressures
Aug. 2002 - Jan. 2006	Retail Dutch Auction System (RDAS)	Trades: twice a week (Monday and Wednesday), Bids: customer-based, Unutilized balance: repurchased by the CBN
Feb. 2006 - Dec. 2008	Wholesale Dutch Auction System (WDAS)	Auction conducted twice a week, Banks buy on own account & sold to customers, Funds were transferable among banks, Unutilized balance was sold to the CBN
Feb. 2009 - July 2009	RDAS	Partial suspension of trading at the inter-bank, Sale of FX to BDCs suspended, Oil companies and MDAs mandated to sell to the CBN, Demand pressures moderated by end Q2 2009
July 2009 - Oct. 2013	WDAS	Oil companies free to sell at the interbank, Demand pressures moderated further by end Q4 2009, FX Forwards introduced, March 2011 with 1-, 2-, 3- month tenors
Oct. 2013 - Feb. 2015	RDAS	Authorized dealers could sell FX to BDCs at prevailing interbank rate, and margin not exceeding 1.0 per cent, FX borrowing by banks: limited to 75.0% of shareholders' funds, New capital requirements for BDCs: N35.0 million; cautionary deposit of N35.0mn; and multiple ownership of BDCs banned, Guidelines for Int'l Money transfer services introduced, 41 items for imports excluded from the FX market
Feb. 2015 - 14 June, 2016	Interbank FX Market	RDAS / WDAS windows closed, CBN intervention in the market when necessary only, FX sales trade based
15 June, 2016 - Date	Flexible FX Rate Regime	The ER to be determined by the forces demand and supply, Introduction of the Investors' and Exporters' (I&E) FX window.

The fixed exchange rate regime was the mechanism for foreign exchange management in Nigeria in the period 1959 – 1973. The policy was in line with the Bretton Woods system. However, the domestic currency was pegged to a basket of currencies during the period 1974 – 1985. Owing to several dynamics including institutional changes and market developments, the flexible exchange rate regime became effective in 1986 with the introduction of the structural adjustment programme (SAP). The Naira was liberalized and market forces were allowed to determine the direction of economy. However, the liberalization of the foreign exchange market had some challenges in the years after, thus necessitating some re-adjustments and reforms. The need for reforms in the foreign exchange market led to the adoption of a managed float exchange rate regime which divided the market into three segments namely, the official market (through the whole and retail Dutch auction systems), interbank market and Bureau de change. In this period, authorized dealers were allowed to purchase foreign exchange from the Central Bank of Nigeria through a competitive bidding process.

In addition, a more flexible exchange rate system came into effect in June 2016 in order to move the market away from the sticky exchange rate around ₦197.00/US\$ to a more market determined rate. The Nigerian external sector became weakened due to external shocks in the third quarter of 2014 following the sharp decline of over 70 per cent in the price of crude oil, which contributes the largest share to foreign Earnings of Government. This was in addition to the general slowdown in global growth and geopolitical tensions along critical trading blocks in the world. For Nigeria,

the slump in global oil prices slowed the economy further, as it receded with a negative 2.24 per cent slump in Gross Domestic Product (GDP) in the third quarter of 2016. Nigeria's GDP in the second quarter of 2016, declined by -2.06 percent (year-on-year) in real terms compared with the growth rate of 0.36 per cent in the previous quarter (NBS, 2016)

Consequently, the managed exchange rate regime was no longer suitable to contain the volatility in the exchange. Thus, the emphasis shifted to how the central bank can fine-tune its strategy to stabilize the exchange rate and steer the country out of recession. The new foreign exchange regime operates as a unified inter-bank system having two main segments – the interbank and the autonomous segments. The participants in this market include the CBN, FMDQ, foreign exchange primary dealers (FXPDs), nonFXPDs, corporate treasuries, and end users.

Thus, beginning from February 2017 to date, the CBN took series of actions to boost liquidity, accommodate all FX obligations and deepen the foreign exchange market in order to allow for price discovery. Some of the actions taken include:

1. Provision of funding for Invisible transactions for a fair and veritable exchange rate
  - PTA/BTA (24 hours), school fees and medical bills (48 hours)

Enforcement: utilisation report and market intelligence  
Buying and selling in all banks' branches with the rates displayed
2. Secondary Market Intervention Sales (SMIS)
  - Intervention in various sectors of the market through forward sales of tenors from between 7 days

3. Sale of foreign exchange to Bureau-de-change
  - US\$20,000 twice weekly to BDCs
4. Payment for Small-scale Importation
  - SMEs : US\$20,000/quarter via telegraphic transfer for eligible transactions
  - Form 'Q' easier documentation process
  - Banks expected to send utilisation report
  - Erring banks sanctioned and disqualified from all FX transactions with the Bank
5. Establishment of Investors' and Exporters' Window
  - Invisibles obligations, bills for collection and other trade-related
  - At the NAFEX, portfolio Investors and exporters sell their proceeds to the banks for onward sale to buyers, e.g. exporters
  - The CBN is a market participant at the window.

In terms of outcome and feedbacks from the markets, it was agreed that, the steps taken by the CBN enjoyed a remarkable success. For instance, the Bank cleared all outstanding foreign exchange demand of about \$4.14 billion in June 2016. In addition, the practice of front-loading of foreign exchange demand and inventory disappeared. This development significantly improved business judgment and planning. More so, the import substitution and expenditure switching measures (including the exclusion of 41 items from the CBN foreign exchange window) had positive effects on domestic production, being a motivation for increased

production in the non-oil sector and reduction of imports. In addition, the existence of 'fair' rates by the various users based on demand and supply led to appreciation in the BDC segment (from N480/US\$ to N390/US\$), thus, reducing the arbitrage premium.

### 3.0 The Unholy Trinity

#### 3.1 The Macroeconomic Trilemma

The whole idea of the macroeconomic trilemma seeks answers to whether the central bank can control inflation, reduce interest rates and stabilize the exchange rate, simultaneously. From theory, we know that monetary policy even when aimed primarily at stabilizing key prices (consumer price, exchange rate and interest rate) can be challenging, requiring difficult trade-offs. For the trilemma doctrine, the substance is that "Monetary policy makers would like to achieve all three goals simultaneously if it were so simple but, there are challenges. Economists generally refer to the difficulty with pursuing the three goals simultaneously as the 'Macroeconomic Trilemma'. This problem was formalised in the economic literature by some economists led by Mundel (1963) and Flemming (1962).

The macroeconomic trilemma, also called the "impossible Trinity" represents to the classical challenge for monetary policy involving an attempt to control inflation (monetary policy independence), interest rate (perfect capital mobility), and exchange rate (fixed exchange rate policy). According to the proponents, a central bank cannot simultaneously maintain the three goals of free capital flows, a fixed exchange rate and an independent monetary policy.

A central bank can reach only two out of the three highly desirable policy objectives at any point. A number of economies opt for corner solution, that is either they give up fixed exchange rate in order to run an open economy, or have a fixed exchange rate and forgo an independent monetary policy. Policy direction towards achieving all three objectives have often led to crisis as experienced in Russia, Mexico and Argentina (Puckelwald, 2012). Thus, three possible policy options are at the disposal of the monetary authorities. Countries in the Euro Area have chosen free capital mobility and fixed exchange rates, but no monetary policy independence because the ECB is responsible for setting the monetary policy for the countries in the zone (Chang, 2000; Krugman, 1999). The US on the other hand have adopted free capital mobility and an independent monetary policy but has to trade off exchange rate, hence the US has a flexible exchange rate purely determined by the open market. Lastly, some other countries have chosen the option to pursue a fixed exchange rate regime with monetary policy independence, which implies the existence of capital controls as practiced by China.

#### 3.2 Nigeria Monetary Policy: Stylized Facts

The CBN is mandated to stabilize the three key macro- prices – low and stable consumer prices, low and stable interest rate and a stable naira exchange rate. This has remained challenging as ever. Until 1974, the CBN implemented an exchange rate-based monetary policy framework. Following the collapse of the gold standard by 1974, exchange rate targeting (monetary policy tied to a foreign currency) was no longer fashionable, hence, CBN moved

on to the target monetary aggregates.

Monetary targeting is based on the conviction that the supply of money can be reasonably controlled by the central bank through an operating target to then influence consumer prices and domestic output. The choice of the operating target (i.e. reserve money/base money) is founded on the principle of fractional reserve banking. The central bank uses its instruments like open market operation (OMO), cash reserve requirement (CRR), and discount window operations, to influence the stock of money, which then determine the path of inflation, economic growth, and other macro-aggregates. The CBN has used this approach since 1974 and refined it in 2006 with the introduction of a largely signaling tool, the monetary policy Rate (MPR), under a new monetary policy implementation framework. The figure 4 illustrates the relationship between foreign exchange rate and lending rate in Nigeria.

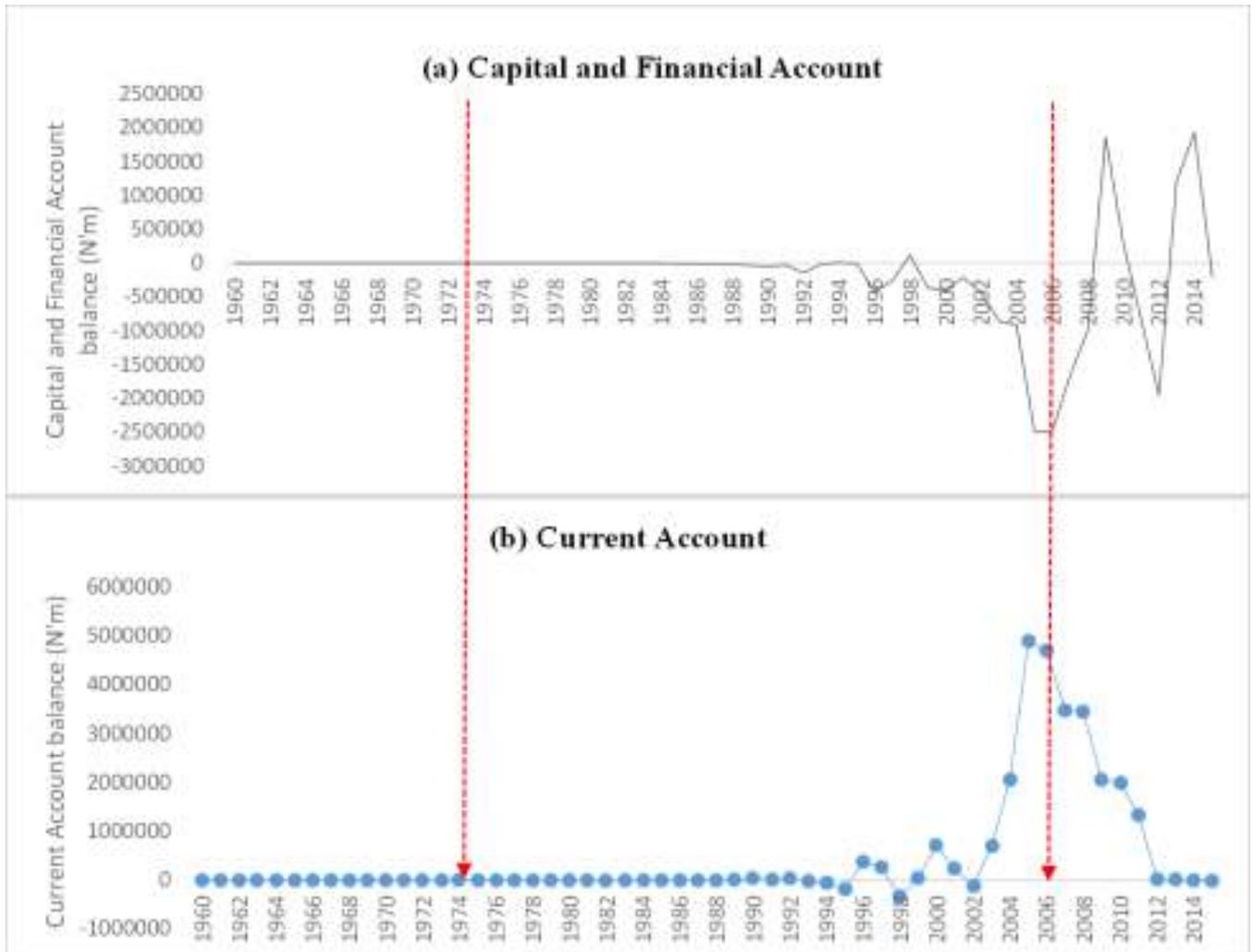
Foreign exchange and lending rates remained stable during the period of exchange rate targeting in 1959 – 1974, but trended upwards in the period of monetary targeting with an MPR as anchor in 1974 – 2007. The introduction of the MPR as anchor and closure of the WDAS/RDAS in the period from 2008 to date led to a stable exchange rate, but prime lending rate trended upwards.

During the period of fixed exchange rate regime, the trade balance (capital and current), particularly the capital & financial account balance was near zero (See Figure 5).

Figure 4: Performance of Macroeconomic Fundamentals



Figure 5: Capital and Financial Account, Current Account

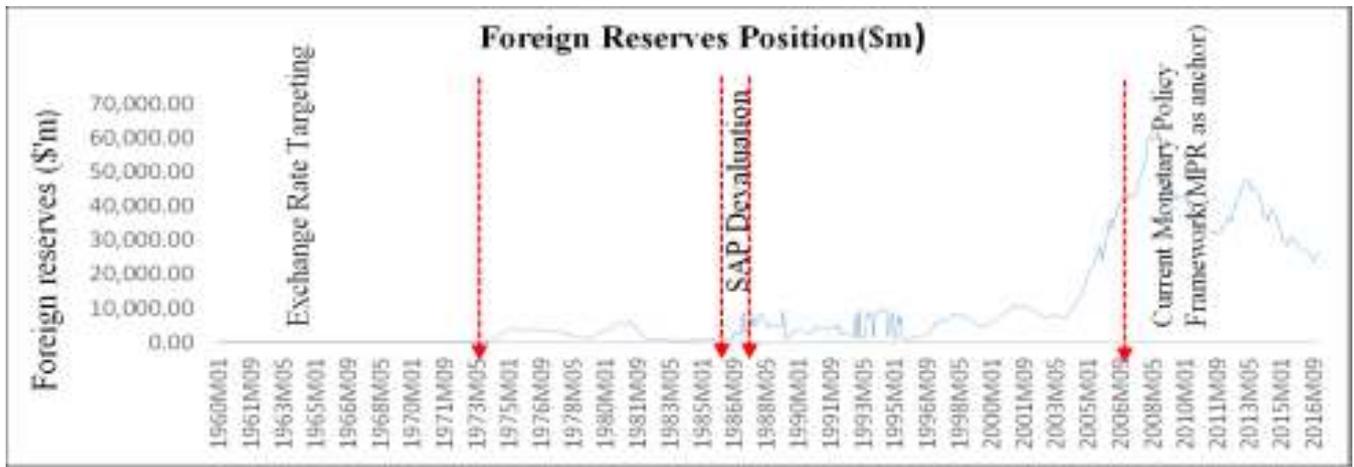


The external reserves was low and stagnant, but with the introduction of monetary targeting, and in particular with

MPR as the anchor rate, both the reserves and current account balance became more robust,

while the capital account entered deeper into deficit (See Figure 6).

Figure 6: Foreign Reserves Position.

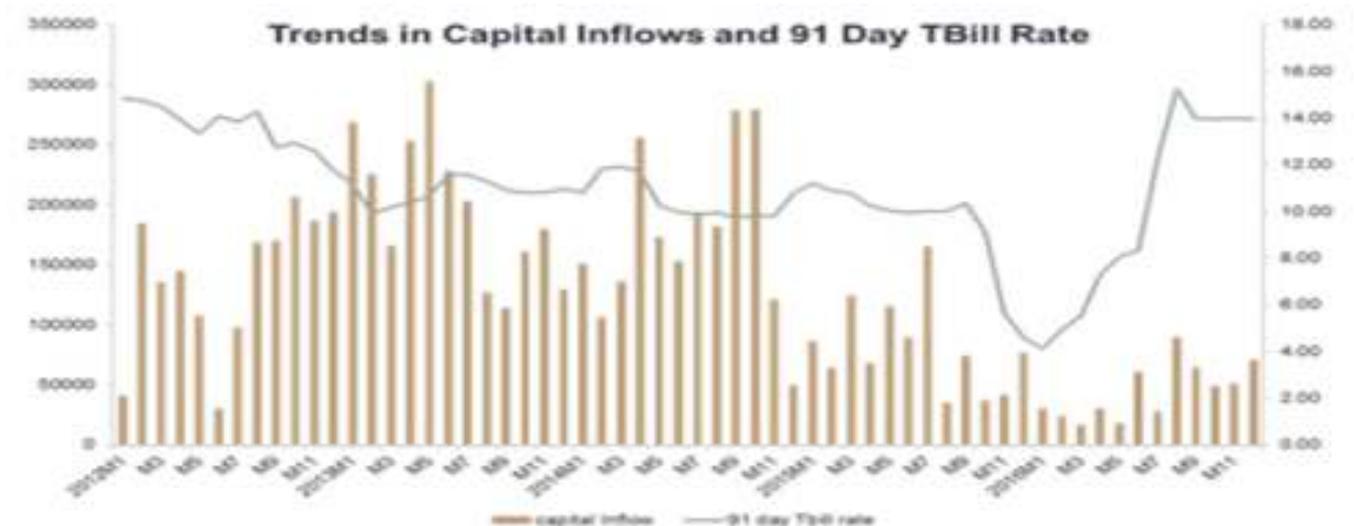
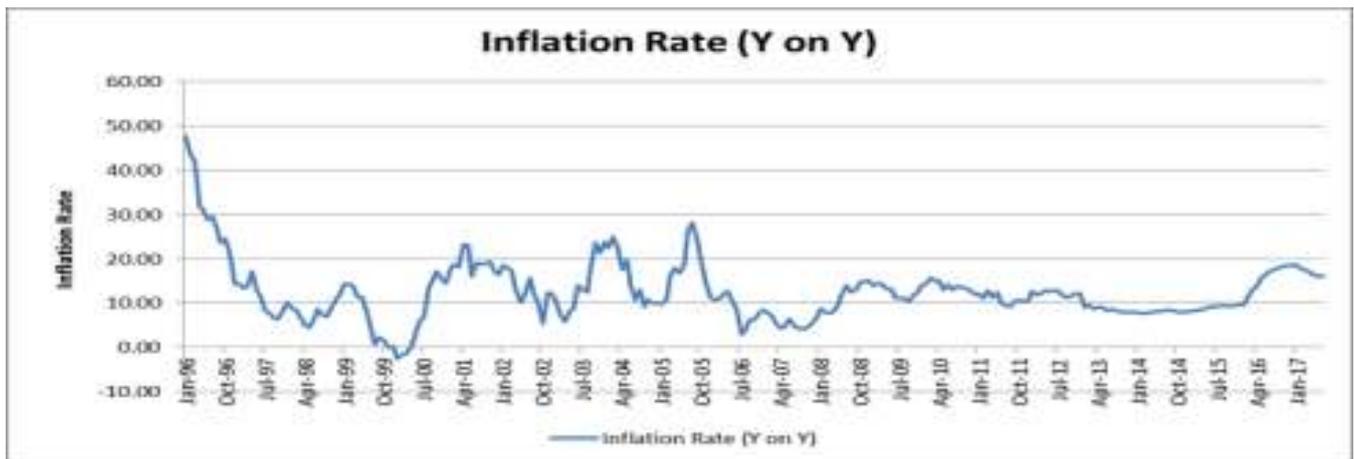


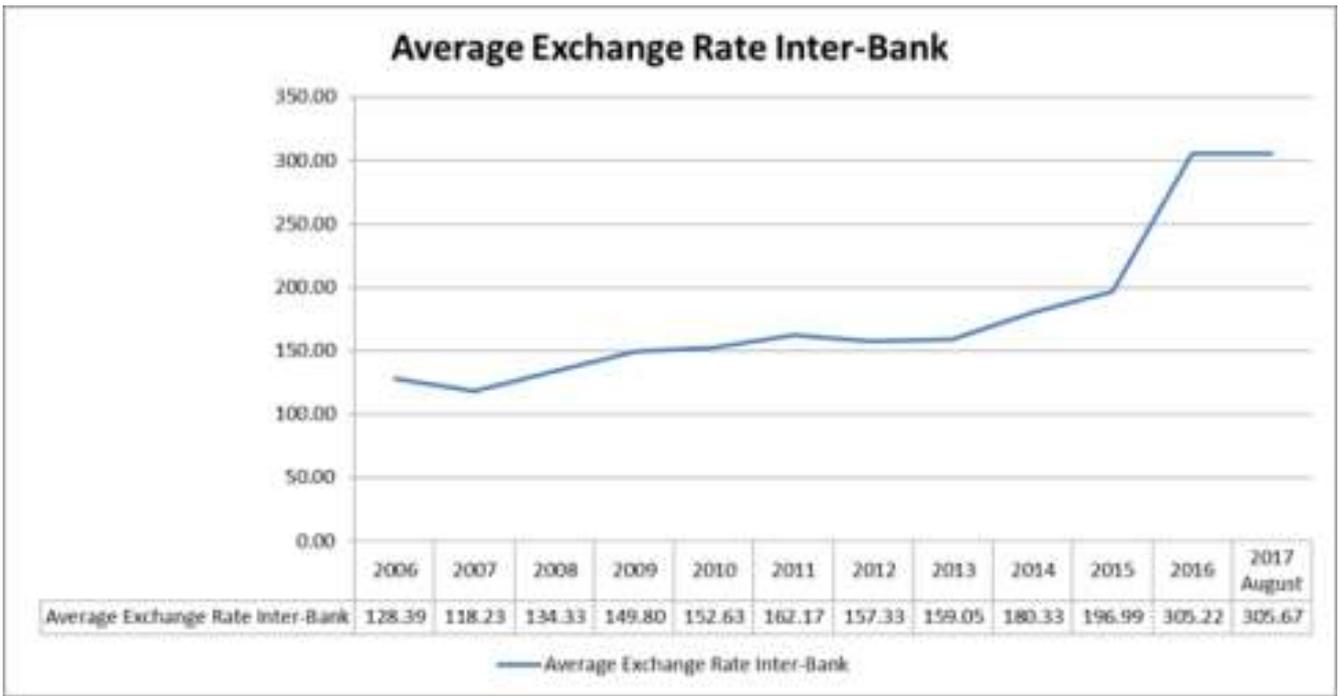
### 3.3 Trends in inflation, GDP, Capital Inflows and Fiscal Operations

Nigeria's Inflation was one of the highest in the world, around 48 per cent (year-on-year) in the 1990s. However, it moderated with the introduction of MPR and

the implicit targeting of inflation at the lower and upper bands of 6.0 and 9.0 percent. Inflation remained stable, until February 2016 when the economy entered the period of stagflation and recession in 2016 partly accounted for by global surge in

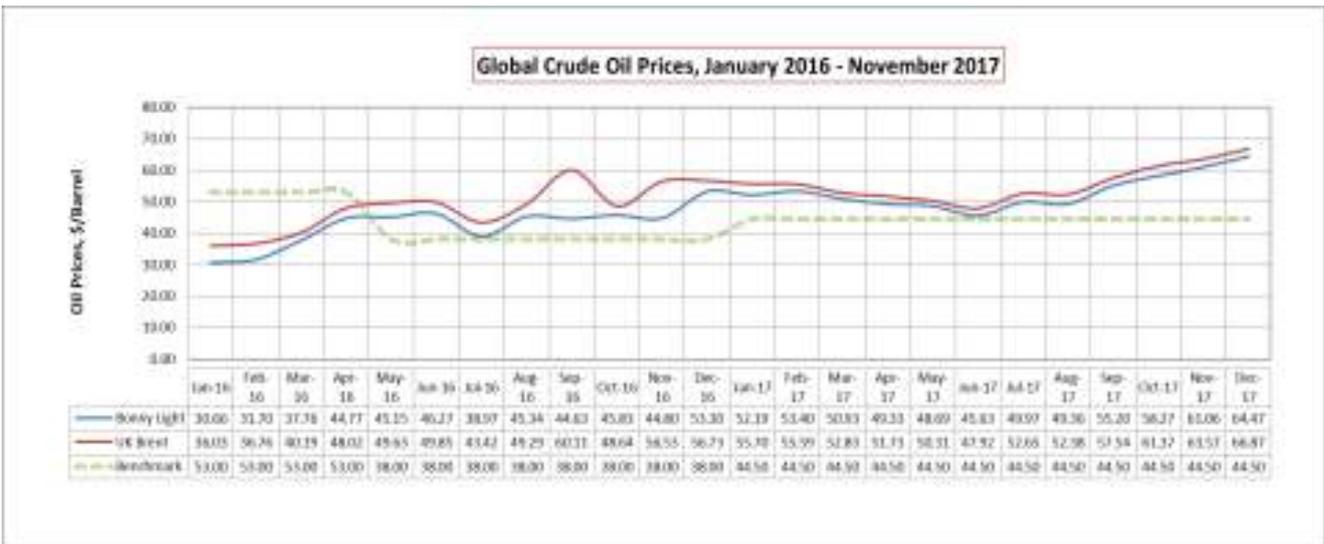
commodity prices, which affected the revenue from oil. This also affected the exchange rate and the reserves, given the pressure on the country's reserves as it was becoming increasingly difficult to defend the naira (Figure 7).

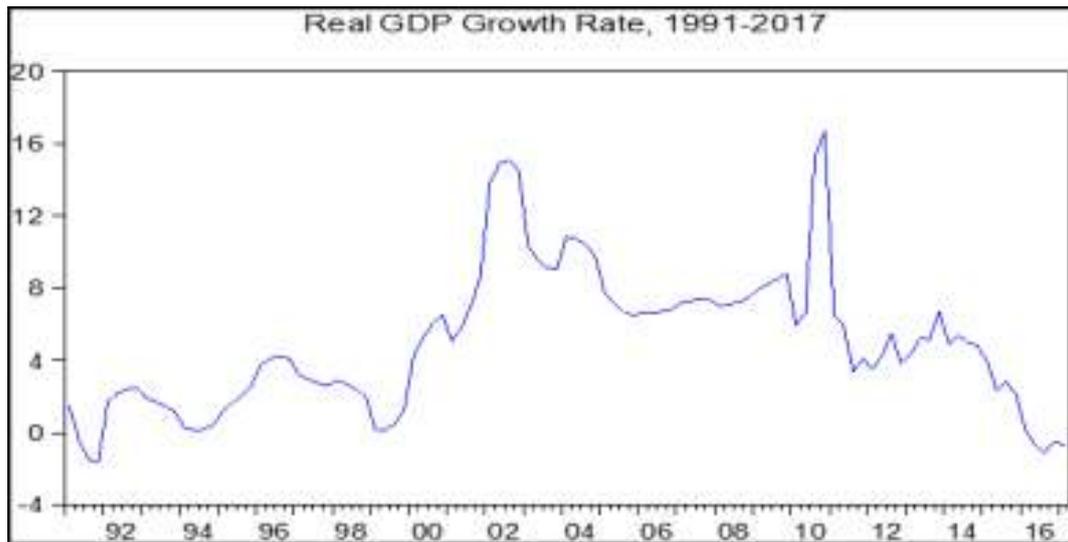




Internal and external Shocks – global economic and financial crisis, oil price decline, high energy costs, militancy, etc., leading to stagflation and eventual recession in 2016 (See Figure 8).

Figure 8: Real GDP and Crude Oil Price





### 3.4 Navigating the Policy Trilemma

Dealing with the policy trilemma remains a major challenge for monetary policy in Nigeria just like in other jurisdictions. More so, as in recent times, key parameters are out of their long term trends leading to stagflation and recession, thereby further complicating the macroeconomic trilemma. Likewise, increased international financial integration further complicates the monetary policy environment. Yet, the society (the Public) demands and expects the CBN to deliver all 3 goals: control inflation, reduce interest rate and stabilize the exchange rate, simultaneously.

How feasible is a corner solution in the case of Nigeria? This entails at least one of three evils! Float the exchange rate, on the other hand, loose monetary policy independence, or establish capital controls? According to Krugman (1999), "the point is that you can't have it all: A country must pick two out of three even though none of the options is optimal. A country can fix its exchange rate but only by maintaining controls on capital flows (like China today). It can choose to leave capital movement free but retain

monetary autonomy, but only by letting the exchange rate fluctuate (like Britain - or Canada); or choose to leave capital free and stabilize the currency, but only by abandoning any ability to adjust interest rates to fight inflation or recession (like Argentina)". Different situation calls for some innovation since none is exactly optimal. Therefore, CBN monetary policy adopts what may be termed 'a middle of the road solution' by giving up some flexibility on all three goals for macroeconomic stability, allowing the exchange rate to be largely market determined but the Bank intervenes to reduce volatility. Capital account is slightly open- investors can come into the equity and debt markets but with limits on the quantum of money that can be taken out. Hence, some monetary policy independence is lost.

### 4.0 Recent Policy Actions by the CBN and outcomes

#### Interest Rate Policy:

- MPC raised rate from 12 to 14 percent in 2016. Policy rate has been held at that level since then to maintain a 'tight monetary policy' stance. Objective is to anchor inflation expectations; reduce domestic demand to slow

widening Current Account Deficit (CAD) and reverse the flow of capital out of the country.

- However, because of recession rate was not aggressively raised - consequently, inflation remains high, but not increasing.
- Capital inflows is very slow but current account has turned slightly positive.

#### Exchange Rate Policy:

- Managed float to maintain stability in exchange rate; Currency allowed to move in line with market forces but Central Bank intervenes to avoid excessive volatility. Some reforms are ongoing to sustain stability of the naira exchange rate - I & E window, NAFEX, etc.
- Capital flow needed to finance current account deficit.
- Capital flows needed to be properly managed on account of global uncertainty.
- Stable naira exchange rate is important for both inflation and capital inflow. Exchange rate pass-through to consumer prices.

Figure 9: Growth and Inflation Balance

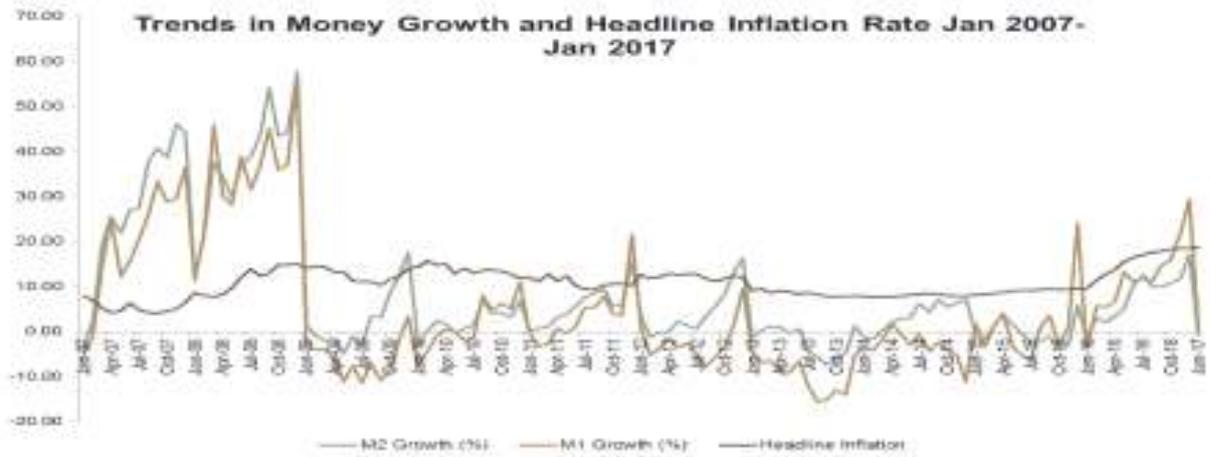
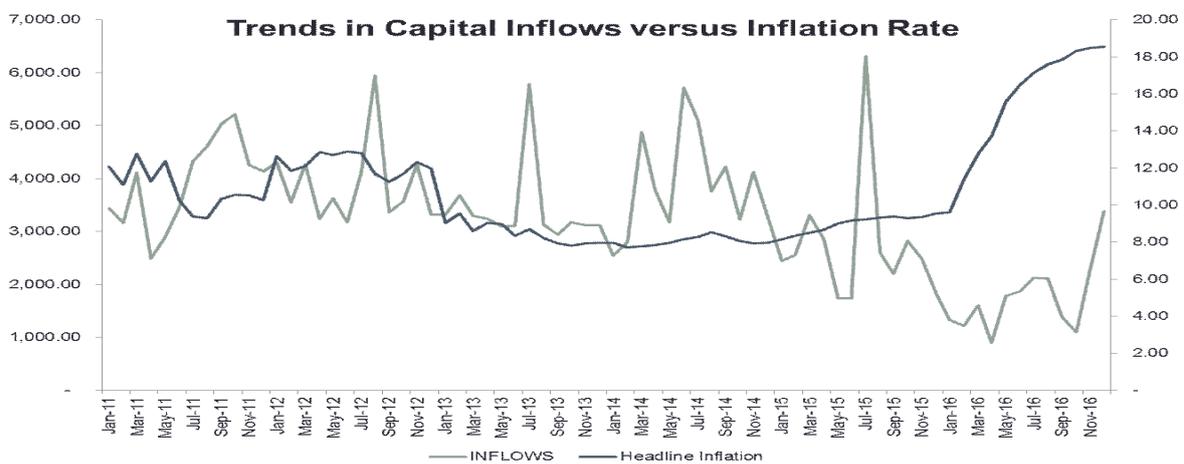


Figure 10: Capital Inflows versus Inflation Rate



4.1 Managing the Growth and Inflation Balance

Inflation hurts the poor and increases poverty, while increasing growth reduces poverty. High Interest rate affects inflation by reducing domestic demand. It is worthy of note that higher growth is possible only with price stability. An increase in interest rate will provide incentive to save and invest, which will lead to growth, reduce cost of uncertainty and encourage long term planning. Hence, positive interest rate encourages savings and investment and brings more capital into the system. Further monetary expansion by lowering interest rate will increase inflationary pressure and reduce capital flows. Therefore,

continuous pumping of liquidity into the system will increase demand for foreign exchange and leads to increased cost of mopping up. Figures 9 and 10 illustrates trends in money growth and headline inflation rate, and capital inflows versus inflation rate, respectively.

5.0 Conclusion

The CBN deployed various approaches over the years, leading to the current flexible exchange rate regime. The Bank achieved some milestones from the implementation of the current policy; however, there are expectations of further improvement. There is however no doubt that, sustaining flexibility in the foreign exchange market remains the most viable option in

the light of dwindling external reserves and the motivation to drive exports and support the import-substitution policy of government. Therefore, foreign exchange management shall remain a major tool of the CBN to influence economic activities and achieve the desired goal of achieving a stable price system. While developed economies may choose to allow floating exchange rate, developing economies like Nigeria may find it difficult to do so. These economies face a dilemma between financial openness and exchange rate stability without losing monetary policy independence. Hence, central banks in developing economies like Nigeria need monetary independence in order to stimulate domestic growth with

interest rate. They also, need to ensure exchange rate stability in order safeguard the value of the currency, and preserve their foreign reserves, but at the same time, they require foreign capital flow, which may be difficult with capital controls. Consequently, given instrument limitations and other constraints, central banks

in developing economies must aim to navigate the trilemma nightmare innovatively.

The CBN has continued to design and implement policies to ensure macroeconomic stability while confronting constraints in the policy environment as well as

prolonged structural issues in the economy. Monetary policy alone cannot stabilize the economy; it requires coordination with fiscal and other structural policies and the active support of all relevant stakeholders in order to bring about enduring stability.

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## THE RELEVANCE OF GARCH-FAMILY MODELS IN FORECASTING NIGERIAN OIL PRICE VOLATILITY



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### INTRODUCTION

The importance of crude oil to the daily life of every society and nations cannot be over emphasised. In fact, nearly two-third of the world's energy consumptions comes from crude oil and natural gas (Sharma, 1998, Wang *et. al.* 2005, Xie *et. al.* 2006, Lam, 2013 and Behmiri and Manso, 2013). Specifically, crude oil accounted for 33.0 percent of all the energy consumed in the world in 2013. It is the largest and most actively traded commodity accounting for about 10.0 per cent of the overall world trade. Wang *et. al.*, (2005) asserted that the consumption of crude oil globally exceeds \$500 billion, approximately 10.0 percent of USA GDP. As early as 2015 IEA estimated that world daily consumption of oil and liquid fuels reached an average of 93.0

million barrels. However, in January 2015 alone total world oil production was over 94.0 million barrels per day equivalent to more than 34.0 billion barrel a year. Nevertheless, it is not a hidden knowledge that energy and financial markets are generally characterised by high level of price volatility (Sharma 1998, Shojaeddini and Golestani, 2013). In particular, the volatile nature of crude oil price has become disturbing to governments and policy-makers all over the world.

The volatility of oil prices has serious implications on the economy of most oil producing nations. This is because oil prices play an important role in determining the revenue and expenditure programmes as well as sharpening the overall economy of most oil dependent economy like Nigeria. Abiola and Okafor (2013) observed that the prices and the volume of crude oil sales have a close relation with the Nigerian government revenue generation over the years. The fact remains that crude oil is an important factor in the fiscal operations, and the quantity of crude oil sold at the prevailing market price is the basis to understand the flow of the overall revenue earned from oil. For quite sometimes international crude oil price has become very unstable due to its volatile tendencies and this volatile nature of oil price has affected the Nigerian government expected revenue and spending, which in turn affects other major macroeconomic variables. For that reason IMF (2013) affirmed that sustain declined in oil prices by 25.0 per cent would weaken the Nigeria current account and reserve positions.

Therefore, oil price volatility has become an important topic of discussions among journalists,

academicians and policy makers in both developed and developing countries for many decades. Historically, oil price change or volatility is not a new phenomenon; in fact oil price is always volatile. According to Sharma (1998), Zamani (2004), Wang *et. al.* (2005), Xie *et. al.* (2006) and Kulkarni and Haidar (2009), the fluctuations in energy market particularly crude oil price is basically originated from an imbalance between supply and demand, resulted from events such as wars, changes in political regime, weather changes, speculations in financial market, economic crisis, formation or breakdown of trade agreements, and unanticipated weather patterns as well as other predictable and unpredictable factors affecting supply and demand among others. ADB (2009) further confirmed that increase in global demand especially by China and Asia was what has caused high oil price in 2004, rather than the supply-side factors. Nonetheless, supply-side factors such as the war in Iraq, policy development in Venezuela and conflicts in Nigeria had contributed also to increased crude oil prices in 2004.

Barsky and Kilian (2004), Nkomo (2006) and Hamilton (2009) argued that most of the crude oil price fluctuations experienced in the past was caused by political events rather than market forces. The studies cite an example of most of the previous price increases and cut back in production to be associated with the political instabilities in the Middle East, following which the oil market responded to this sudden short-fall of supply caused by the political factors. Even the most historical oil price shocks such as the Yom Kippur war and Arab oil embargo of 1973, Iranian revolution of 1979, Iraq inversion

to Kuwait in 1990, US fears of an Iraq invasion in 2003 were related to political events. However, Barsky and Kilian (2004) maintained that most oil spikes during 1999-2000 and beyond were related to the influence of other factors such as rising fear about the future oil supply other than the political events in the Middle East, therefore, concluded that not all price shocks had followed similar patterns. Hamilton (2009) on the other hand, observed that unlike the previous oil prices which were caused by the supply disruption, the oil price fluctuations in 2007-2008 were due to excess demand at the period of declined world production. Engdahl (2008) observes that about 60 per cent change in crude oil prices is determined by financial institutions speculations and major Anglo-American oil companies.

Therefore, due to its impact on the overall economy in the world, there exists plethora of literatures which attempted to explain how best to model and forecast crude oil prices volatility. Although, there is no general consensus about the most reliable approach to forecast oil price, despite the efforts and valuable time being devoted by economists (Behmiri and Manso, 2013). However, modeling and forecasting the dynamics of crude oil is very important, yet proved to be the most difficult task, considering the fact that price move from time to time in an unpredictable manner which may also depends upon a lot of factors (Zamani 2004, Wang et. al. 2005, Xie 2006, Lam 2013, Shabri 2013, Baumeister and kilian, 2013). Despite that, most empirical studies acknowledged that linear and non-linear time series models such as ARCH/GARCH have proved to generate most reliable and convincing results. Hence, Alyousef (2015) asserted that GARCH and its variants are generally believed to produce better forecast than other techniques.

Some studies conducted in relation to modeling and forecasting crude oil price volatility with the application of GARCH family models are Sharma (1998), Gileva (2010), Wei et. al., (2010), Musaddiq (2012), Salisu and Fasanya (2012), Herrera et. al., (2014), and Olowe (2009). The studies that combined GARCH-family model with non-GARCH models in forecasting oil prices volatility included: Duffie and Gray (1995), Moshiri and Foroutan (2006), Shojaeddin and Golestani (2013), Ahmed and Shabri (2014), Mustapha and Sulaiman (2015). However, one common feature of these studies is that they were mainly concerned with applying different GARCH and non GARCH models in forecasting price volatilities of Brent and West Texas Intermediaries as a benchmark for the global oil market. Even though WTI and Brent represent different grades of crude oil, but traded in different locations (Baumeister and Kilian, 2013). Very little research were carry out in relation to forecasting other varieties of crude oil price volatility using GARCH family models, most especially the OPEC reference basket which comprises of the Nigeria bonny light. Thus, Bacon and Tordo (2004) observed that long-term forecast are frequently published for key crudes namely; Brent Blend, West Texas Intermediate and Dubai, but no forecast available for other crudes. This study aims at investigating the relevancy of GARCH-family models in measuring the Nigeria bonny light crude oil price volatility. The study also compares the forecasting power of different GARCH models with the aim of identifying the best forecasting model. Subsequently, the study uses the best GARCH family model to predict the future bonny light oil prices. The paper is structured into five sections. First section is introduction and second section is the literature review. The third section highlight the methodology while section four analyses the result and gives discussions of findings. Conclusion

and recommendations are the last section.

#### LITERATURE REVIEW

In spite of the growing number of literatures, however studies about forecasting crude oil price volatility are rather very scanty until 2000s. In addition, global financial and economic crisis of 2008 which affected the crude oil prices in the international oil market has raised a lot of interest on how best to improve on volatility and oil price forecasts. Thus, an increase number of studies on crude oil price forecast around the world have recently been developed and the results obtained are mixed with no consensus. While some studies found the symmetric GARCH to be more superior to asymmetric GARCH (EGARCH, TARCH, PARCH, GJR-GARCH, CGARCH etc), other studies established that both symmetric and asymmetric GARCH are less superior to non-GARCH models in modeling oil price volatility and forecasting oil prices vice versa.

Among studies who appreciated the forecasting abilities of GARCH-family models compared to other forecasting models are: Sharma (1998) that attempted to compare different models for forecasting oil price volatility in the future crude oil market of WTI traded at New York Mercantile Exchange (NYMEX), using daily observations from November 14, 1986 to March 31, 1997. Implied volatility, a simple historical volatility estimator, GARCH (1, 1) and EGARCH (1, 1) models are applied. The study found that for a shorter period (two weeks forecast) forecast, GARCH models yield more accurate prediction result than historical volatility. Also Rizvanoghlu and Aghayev (2014) used different techniques of forecasting Azerbaijan Azeri light crude oil prices movements. The study was able to compared the in-sample and out-of-sample volatility forecasting performance of

GARCH (1, 1), TGARCH (1,1) and EWMA (Exponentially Weighted Moving Average) models. Daily time series data on Azeri crude oil prices ranged from June 17th 2002 to June 18th 2013 was used. The finding from the study further reveal that GARCH (1, 1)-GED (Generalized Error Distribution) models performed better in forecasting the in-sample estimates compared with EWMA model. However, there was no significant difference between the two models with regards to the out-of-sample estimation. Moreover, Yaziz et. al., (2011) proposed a comparative study of the forecasting performance of Box-Jenkins approach and GARCH models on daily WTI spot crude oil prices for the period of January 2, 1986 to September 30, 2009. The study reveals that GARCH model is the best forecasting model than ARIMA.

However, studies that show GARCH-family models less superior compare to other forecasting methods are: Duffie and Gray (1995) who evaluated the forecasting performance of several GARCH family (GARCH, EGARCH, bi-variate<sup>1</sup> GARCH) and non-GARCH family models (regime switching, implied volatility, and historical volatility predictors) in forecasting prices volatility in three different markets, namely: the crude oil, heating oil, and natural gas markets from May 1988 to July 1992. The result indicates that, implied volatility produces the best forecasts in both the in-sample and out-of-sample forecast. However, in more relevant out-of-sample case, historical volatility forecasts are superior to GARCH forecasts. Similarly, Wei et. al., (2010) investigated the forecasting ability of nine GARCH-type models based on their performance. The result turned out that none of the models are able to consistently outperform each other. Lux et. al., (2015) further extended the Wei et. al.,

(2010) models by incorporating a new type of volatility model namely Markov-Switching Multi-fractal model (MSM) in analysing the forecasting performance of two different groups of volatility models (GARCH family and MSM). The result from the study shows that on the average MSM model performed better in forecasting oil price volatility than any of the GARCH models.

There are several studies that established that asymmetric GARCH are the best forecasting models for oil price volatility among these are: Gileva (2010) who compared the forecasting performance of several models for dynamic and volatility of crude oil prices for both daily spot prices of WTI and Brent from January 2, 1995 to March 11, 2010. GARCH family models employed are GARCH (1, 1), EGARCH (1, 1), GJR-GARCH (1, 1), APARCH (1, 1) and ARMA (1, 1). The result indicates that GJR-GARCH is the best fit in WTI and Brent return series, because it outperformed other models for forecasting accuracy. Musaddiq (2012) attempted to model and forecast light sweet crude oil futures prices volatility for the daily future prices extended from June 23, 1998 to July 16 2009. The study employed variants of ARCH family models such as GARCH (1, 1) EGARCH (1, 2), GJR-GARCH (1, 2) and TGARCH (1, 2). The study finds that GJR-GARCH (1, 2) is the most suitable model to forecast oil prices futures market. Salisu and Fasanya (2012) examined crude oil price volatility modeling performance on the daily return of WTI over the period of January 4, 2000 to March 20, 2012, using a combination of symmetric and asymmetric GARCH models. The study captures the period before, during and after global financial crisis. The results show that asymmetric GARCH models (EGARCH [1, 1], TGARCH [1, 1]) appeared to be superior to symmetric GARCH models (GARCH [1, 1], GARCH-M [1, 1]) in

measuring the volatility of crude oil price over the three sample periods. Musoglu and Gencer (2014) applied both linear (GARCH, ARCH-M) and non-linear (EGARCH, APGARCH and CGARCH) GARCH family models to study the dynamic volatility of Istanbul Gold exchange market. Daily observations on spot prices of gold exchange from January 4, 2006 to November 20, 2013 were used. The out-of-sample forecast result shows that EGARCH (1,1) and CGARCH (1, 1) are the best performing models to make a forecast, since they yield the lowest forecast error among other form of models.

Furthermore, Olowe (2009) investigated weekly crude oil average spot price volatilities of some selected crude oil prices which comprises of the Nigerian Bonny light and Forcados average spot prices, OPEC and Non-OPEC countries average spot prices, as well as the average spot price of United States crude oil from January 2, 1997 to March 6, 2009. EGARCH (1, 1) modeling approach was employed. The result from the study shows that oil prices returns series exhibit a high persistence in volatility clustering and asymmetric properties. In particular, Nigerian Forcados oil price has the highest volatility persistence. The study further found that the asymmetric and leverage effects were rejected in all selected crude oil prices. Herrera et. al., (2014) evaluated the forecasting performances of various volatility models on crude oil daily WTI spot prices from January 2, 1986 to April 5, 2013. Specifically, the research tests the effectiveness of Markov-Switching GARCH (MS-GARCH) in relation to other GARCH modeling specifications such as GARCH (1, 1), EGARCH (1, 1), and GJR-GARCH (1, 1). The result obtains show that the non-switching GARCH models (EGARCH) have more power in predicting volatility in the short-

<sup>1</sup> The bi-variate GARCH model includes volatility information (returns, conditional variance)

run when using out-of-sample forecast. While in the long run the better models for forecasting WTI daily spot oil price is switching GARCH models. Lama et. al., (2015) forecast the three oil prices series on a monthly basis, namely; domestic and international edible oil price indices, and international cotton price from April 1982 to March 2012. The study used ARIMA, GARCH and EGARCH models. The finding from the study shows that EGARCH outperformed ARIMA and GARCH models in forecasting international cotton prices, due to its ability to capture the asymmetric volatility pattern.

The superiority of symmetric GARCH is acknowledged by Sadorsky (2006) who compared the effectiveness of GARCH, by employing different univariate and multivariate models of ARCH type. The study recognised the excellent performance of the GARCH model in forecasting oil price volatility. The study further observed that a single equation GARCH performed better than even more sophisticated models.

**METHODOLOGY**

This research work uses monthly bonny light crude oil prices from

April 1986 to December 2015. The data set is obtained from OPEC bulletin of various years and Central Bank of Nigeria (CBN) website. The study begins by conducting stationarity test of the series using Augmented-Dickey Fuller (ADF), Phillips Perron (PP) and Kwiatkowski, Phillips, Schmidt and Shin (KPSS). Considering the fact that prices in financial markets especially oil, gas and petrochemical products are highly dynamic and volatile, and since they generally assumed a common pattern of behaviours and framework, then the use of the Generalized Autoregressive Conditional<sup>2</sup> Heteroskedastic (GARCH) for modeling and forecasting such type of markets are very common in literatures in econometrics (Delavari et. al., 2013). Thus, the method adopted in this study which is widely and commonly applied in numerous researches related to modeling and forecasting crude oil prices volatility is the combination of linear or symmetric Generalized Autoregressive Conditional Heteroskedasticity (GARCH)<sup>3</sup> and non-linear or asymmetric GARCH modeling approaches such as the exponential GARCH (EGARCH), Power ARCH (PARCH), and Threshold ARCH (TARCH). Since these models provide a good

prediction especially when the time series data is linear or near linear and stationary (Shabri, 2013). A uniqueness of these approaches is that they are capable of capturing features such as volatility clustering, fat tails and possible asymmetric effects (Herrera et. al., 2014). These models proved to have shown a good out-of-samples performances when forecasting for the short time crude oil price volatility (Mohammadi and Su, 2010, Hou and Suardi, 2012). Although, in the past several studies on econometrics modeling and forecasting oil prices were conducted, but recently the increasing importance of crude oil in the world and the desperate need to model, forecast and measure oil prices volatility led to the development of more sophisticated techniques widely applied in many studies. The starting point was the view that there exist certain variables which have not only affected by other exogenous variables but by themselves from their past values or behaviors, based on this theoretical foundation autoregressive models are formulated (Ali, 2013).

*Model specification*

*Symmetric GARCH model*

The GARCH model is in the following form:

and 
$$y_t = \mu_t + \varepsilon_t \dots \dots \dots (1)$$

$$\varepsilon_t = v_t \sqrt{\sigma_t}, v_t \sim N(0,1)$$

i.e  $v_t$  are iid random variable with  $E[v_t]=0$  and  $Var [v_t]=1$ . Hence,  $v_t \sim N(0,1)$ .

The general GARCH process {GARCH (p,q)} is stated in the following form:

$$\sigma_t^2 = \omega + \sum_{i=1}^q \alpha_i \varepsilon_{t-i}^2 + \sum_{i=1}^p \beta_i \sigma_{t-i}^2 \dots \dots \dots (2)$$

<sup>2</sup>The word 'conditional' entails the degree of association of the previous sequence of the observations  
<sup>3</sup>The GARCH model has originated from Autoregressive Conditional Heteroskedasticity (ARCH) proposed by Engle (1982), this model offers a systematic framework for volatility modelling. GARCH as a modified version of ARCH was introduced by Bollerslev (1986).

The model is expanded as:

$$\sigma_t^2 = \omega + \alpha_1 \varepsilon_{t-1}^2 + \dots + \alpha_q \varepsilon_{t-q}^2 + \beta_1 \sigma_{t-1}^2 + \dots + \beta_p \sigma_{t-p}^2 \dots \dots \dots (3)$$

While  $\alpha_0 > 0$ ,  $\alpha_i \geq 0$  for  $i > 0$  and  $\beta_j \geq 0$  for  $j > 0$ , also  $\sum_{i=1}^p \alpha_i + \sum_{j=1}^q \beta_j < 1$

A simple GARCH model [GARCH (1, 1)] is written as:

$$\sigma_t^2 = \omega + \alpha \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2 \dots \dots \dots (4)$$

The first set is a mean equation consisting two parts: The first part  $\mu_t$  is the appropriate structure explaining the mean equation, and the second part is  $\varepsilon_t$  which shows residuals of the function. It is the residuals that has heteroscedasticity, and it comprises of two normal elements  $v_t$  and the conditional standard deviation in form of  $\sigma_t$ . The  $\sigma_t^2$  is the conditional variance equation which is to be estimated along with the mean equation to remove the problems associated with heteroscedasticity  $\varepsilon_t$ . In the second set of equation represents the average values of  $\sigma_t^2$ , the  $\alpha_{t-1}$  is the coefficient explaining the effects of ARCH, and  $\beta_{t-1}$  is the coefficient showing the effects of GARCH. The above GARCH model has a unit root and the presence of unit root implies that values of  $\alpha + \beta$  will be very close to one. This model stated that the conditional variance is a deterministic linear function of not only of its previous values but of the past squared innovations.  $\alpha$  and  $\beta$  are the parameters to be estimated,  $q$  is the number of lags for past square residuals,

while  $p$  is the number of lags for past variance. This indicates that GARCH allows both autoregressive and moving average components in heteroskedastic variance (Musaddiq, 2012).  
The coefficient  $\alpha$  measures the degree to which volatility shocks that occur now pass on to the next period's volatility feeds. Also if  $\alpha$  coefficient is high, volatility can said to be persistent in such a case. If  $\alpha$  becomes high, it then concludes that the response of volatility to oil price movements is intense. Similarly, if  $\beta$  is high and  $\alpha$  is low, it indicates that volatility is sharp, however the sum of  $\alpha$  and  $\beta$  measure the rate at which this effect dies out overtime. Therefore, if the sum of  $\alpha$  and  $\beta$  is close to one, it shows that a shock at time  $t$  will persist for a long time in the future. In order words, if the sum of  $\alpha$  and  $\beta$  is high, is a signal that there is long memory. Again, if their sum is equal to one, it means that any shock would lead to a permanent change in all future values (Kalyanaraman, 2014). These parameters are estimated using the method of maximum likelihood estimation.

However, one major lacuna identified with regards to ARCH and GARCH models are their inability to differentiate the effects of positive and negative shocks on volatility, because the two are presumed to have similar effects on volatility. That is they assumed that positive and negative shocks have the same effect. In order words, GARCH model deals only with the magnitude not the positivity or the negativity of shocks.

*Asymmetric GARCH models*

To remedy the identified weakness of GARCH model, a number of extensions in form of asymmetric GARCH models have been developed subsequently, which take into account the skewness or asymmetry effect. The earlier extension was Nelson (1991) who proposed the exponential GARCH model (EGARCH). The model permits for asymmetric effect between positive and negative financial asset returns. In this model, the conditional variance is stated in the following process:

$$\varepsilon_t = \sigma_t v_t \dots \dots \dots (5)$$

$$\text{Log } \sigma_t^2 = \omega + \sum_{i=1}^p (\alpha_i |z_{t-i}| + \gamma z_{t-i}) + \sum_{j=1}^q \beta_j \text{log } \sigma_{t-j}^2 \dots \dots \dots (6)$$

Where  $z_t = \varepsilon_t / \sigma_t$ , and  $\varepsilon_t$  is an error term

However, the specific EGARCH [EGARCH (1, 1)] is expressed as:

$$\text{Log } \sigma_t^2 = \omega + \alpha_1 |z_{t-1}| + \gamma z_{t-1} + \beta_1 \text{log } \sigma_{t-1}^2 \dots \dots \dots (7)$$

For positive shock  $z_{t-1} > 0$ . Hence equation 6 becomes:

$$\text{Log } \sigma_t^2 = \omega + z_{t-1} (\alpha + \gamma) + \beta_1 \log \sigma_{t-1}^2 \dots \dots \dots (8)$$

For negative shock  $z_{t-1} < 0$ . Equation 6 is given as:

$$\text{Log } \sigma_t^2 = \omega + z_{t-1} (\alpha - \gamma) - \beta_1 \log \sigma_{t-1}^2 \dots \dots \dots (9)$$

The existence of a leverage or asymmetric effects can be tested using the stated hypothesis as  $\alpha_i = 0$ , is asymmetric if  $\alpha_i \neq 0$ , if  $\alpha_i > 0$  volatility tends to rise (fall) when the lagged standardized shock  $z_{t-i} = \epsilon_{t-i} / \sigma_{t-i}$  is positive (Negative). The persistence of the shocks is given by  $\sum_{i=1}^q \alpha_i$  where  $i=1, \dots, q$ . However, diagnostic test is conducted to

ensure that the standardised and squared standardised residuals are white noise. Otherwise, a higher-order EGARCH model can be tested to ensure that the chosen EGARCH model is parsimonious.

The log-conditional variance is applied to relax the positiveness constraint of model coefficient.

The model is able to respond asymmetrically to positive and negative lagged values of shocks  $\epsilon_t$ . This model differs from the GARCH variance structure due to the log of variance.

**TARCH**  
Threshold ARCH (TARCH) is also a modified version of GARCH. TARCH is generally specified as:

$$\sigma_t^2 = \omega + \sum_{i=1}^p \alpha_i (|\epsilon_{t-i}| - \gamma_i \epsilon_{t-i}) + \sum_{j=1}^q \beta_j \sigma_{t-j}^2 \dots \dots \dots (10)$$

Specific TARCH [TARCH (1,1)] is given as:

$$\sigma_t^2 = \omega + \alpha \epsilon_{t-1}^2 + \beta \sigma_{t-1}^2 + \gamma \epsilon_{t-1}^2 d_{t-1} \dots \dots \dots (11)$$

The negative and positive movements are observed separately using the coefficients of  $\alpha_i$  for good news and  $\alpha_i + \gamma_i$  for the bad news. Thus, if found that  $\alpha_i$  is significant and positive ( $\alpha_i > 0$ ), it means that bad news increases volatility of crude oil prices, hence there exist a leverage effect for the  $i$ -th order<sup>4</sup>. In other word, negative shocks of

oil price have a larger effect on  $\sigma_t^2$  than the positive shock (Carter et. al., 2007). However, if  $\alpha_i = 0$ , the model collapses to the standard GARCH forms.

**PARCH**  
Another version of GARCH models is the Power ARCH (PARCH) proposed by Ding,

Granger and Engle (1993). The model has unique advantage over the other version, because it estimates a power coefficient which the other models restrict to either 1 or 2. Therefore, this model is more flexible than the others (Gileva, 2010).

General PARCH is also specified as follows:

$$\sigma_t^\delta = \omega + \sum_{i=1}^p \alpha_i [|\epsilon_{t-i}| - \gamma_i \epsilon_{t-i}]^\delta + \sum_{j=1}^q \beta_j \sigma_{t-j}^\delta \dots \dots \dots (12)$$

However PARCH (1, 1) is:

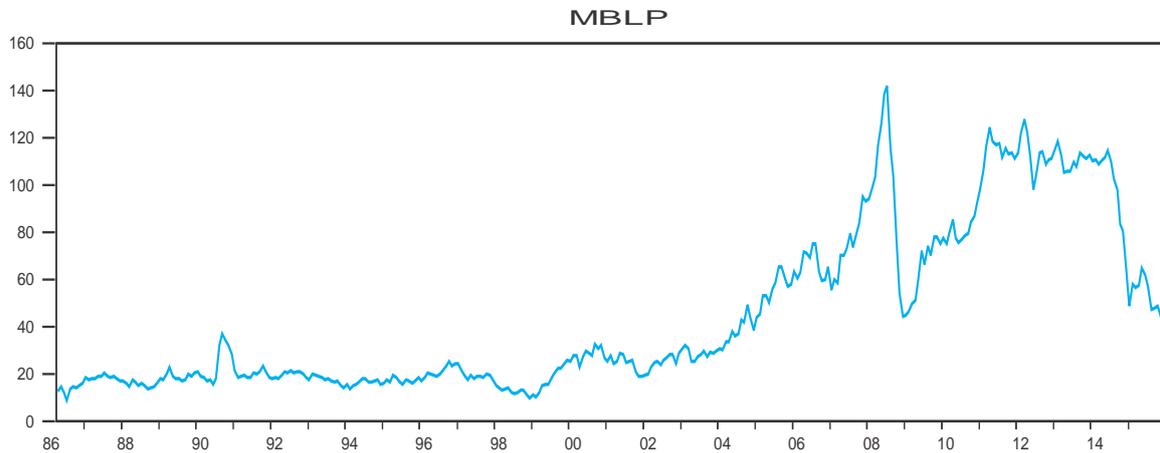
$$\sigma_t^\delta = \omega + \alpha (|\epsilon_{t-1}| - \gamma \epsilon_{t-1})^\delta + \beta \sigma_{t-1}^\delta \dots \dots \dots (13)$$

The forecasting performance of each model is evaluated for accuracy using the root mean square error (RMSE) criterion. A model that produced a smallest forecasting error is considered as best forecasting model

<sup>4</sup>That is if  $\alpha_i > 0$ , it implies that there is asymmetric news impacts, in this case the coefficient  $\alpha_i$  represents the asymmetric or leverage parameter

RESULT AND DISCUSSIONS

Figure 1: Monthly prices of Nigerian Bonny light crude oil (US Dollar/Barrel) from April, 1986 to December, 2015.



Source: Researcher's computation using Eviews 8

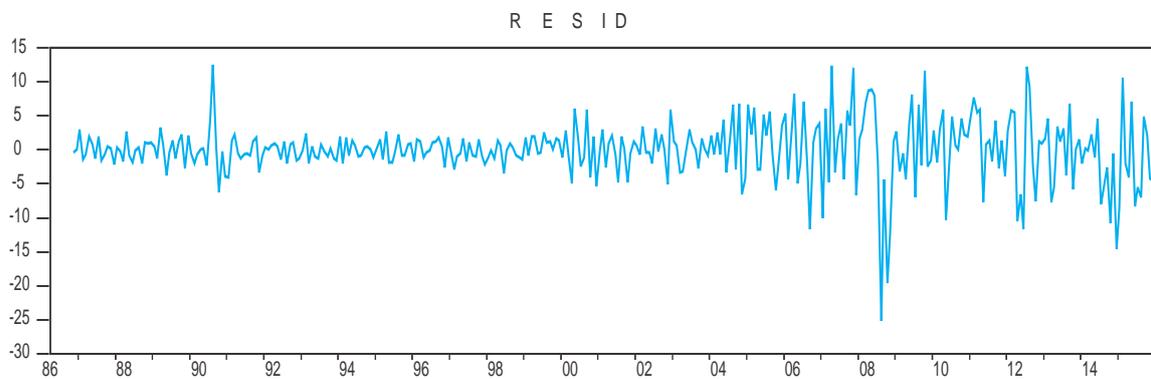


Figure 2: residual plot for monthly Bonny light crude oil prices (MBLP)

The monthly bonny light prices are plotted in figure1. The figure has shown evidences of high rising and falling oil prices, clearly revealing that the bonny light price just like other world oil prices is volatile. The graph shows that there was relatively oil price

stability from April 1986 to July 1990 and December 1991 to December 1998, this was followed by substantial upward trend from 1999 to 2008. But toward the end of 2008 a sharp fall in oil price was witnessed, before an upward trend of the

series from 2011, and subsequently, between 2014 to 2015 a downward trend of the series was also observed. The existence of trends in the series provide evidence of non-constant mean over time.

Table 1: Descriptive statistics for mblp

mblp (April 1986 to December, 2015)			
Mean	44.63359	Jarque-Bera	65.25931
Median	25.77000	Probability	0.000000
Maximum	141.8600	Sum	15934.19
Minimum	8.750000	Sum Sq.	
Std. Dev.	35.03456	Dev.	436961.6
Skewness	1.034511	Observations	357
Kurtosis	2.673925		

Source: Researcher's computation using Eviews 8

The average monthly prices of bonny light (mblp) stood at US\$44.63p/b, the lowest and highest price recorded were US\$8.75 p/b and US\$141.86p/b. We observed that standard deviations value is 35.03 which implied that mblp was highly volatile. Skewness measures the asymmetric distribution of the series around its mean. Positive skewness of mblp showed evidence of a long right tail or heavy tailed distribution and evidence of symmetric return. The kurtosis was positive and less

than 3(Kurt=2.674) indicating that the distribution is flat relative to the normal, thus, there is an absence of fat tails in the distribution. The computed values of Jarque-Bera is 65.259 with significant p-value (prob=0.000). Thus, the normality assumption is rejected under 1% significant levels, and we conclude that mblp is not normally distributed. This suggests that other inferential statistics that follows non-normality distributions can be more applicable and

relevant. These include the student-t distribution and Generalized Error Distribution (GED). This has been taken into consideration in estimating GARCH family models.

*Unit root tests result*

The stationarity tests using Augmented-Dickey-Fuller (ADF), Phillips Perron (PP) and Kwiatkowski-Philips-Schmidt-Shin (KPSS) were conducted. The results from the test are presented below:

Table 2: Unit root tests result

VARIABLE	ADF				PP				KPSS			
	Intercept		Trend and Intercept		Intercept		Trend and Intercept		Intercept		Trend and Intercept	
	level	1 <sup>st</sup> Diff	Level	1 <sup>st</sup> Diff	Level	1 <sup>st</sup> Diff	Level	1 <sup>st</sup> Diff	Level	1 <sup>st</sup> Diff	Level	1 <sup>st</sup> Diff
MBLP	-1.8395	-13.5307*	-2.4380	-13.5283*	-1.7539	-13.5766*	-2.2207	-13.5742*	1.7750	0.1039*	0.3132	0.0926*

Source: Researcher's computation using Eviews 8  
 \* Denoted the series is stationary at 1% probability level.

The ADF, PP and KPSS tests result indicated that mblp is non-stationary at level, but stationary at first difference at 1% significant level.

*Results from GARCH-family models*

We estimate both the symmetric and asymmetric GARCH models, namely GARCH (1, 1), EGARCH (1, 1), PARCH (1, 1) and TAR (1, 1). In each of the model we report the result from Student's t and Generalized Error Distribution (GED) innovations, since the conditional distribution of our error terms has shown that the null hypothesis of normality distribution is rejected. In addition, Bollerslev (1987)

observes that conditional student's distribution is much perfect in approximating the fat tailed characteristics of some data. Similarly, Sharma (1998), Zivot (2008), Aghyev and Rizvanoglu (2014) viewed that normality distributions assumption are not capable of tracking the leptokurtic and fat-tailed properties of oil prices concurrently. Thus, they recommend the use of Student's t and Generalized Error Distributions which can adequately capture these facts, because they gave chance for the fatter tails<sup>5</sup> in the conditional distribution. Therefore, we consider the use of the two innovations mentioned (Student's

t and GED).

*Result of the symmetric GARCH (1, 1) Model*

We examine the behaviour of the past shock and past conditional variance on the current conditional variance. The GARCH (1, 1)-t and GARCH (1,1)-GED results in table 3 below has shown both the lagged square disturbance and lagged conditional variance have positive<sup>6</sup> and statistical significant (at 1% level) impact on the current conditional variance ( 2t). This implies that news about volatility from the past periods explain or possess information on current volatility.

<sup>5</sup>Normality distribution gave little chance for fatter tails in the conditional distribution  
<sup>6</sup> and have positive and significant values

Table 3: GARCH (1, 1) model results

Parameters	GARCH-t	GARCH-GED
	0.059 (0.1094)	0.062 (0.1110)
	0.271 (0.1795)	0.307 (0.2065)
$\alpha_1$	0.345* (0.0904)	0.400* (0.0997)
$\beta_1$	0.696* (0.0696)	0.660* (0.0737)
$\nu$	8.256* (2.4991)	1.489* (0.1258)
Log L	-906.870	-909.706
AIC	5.1229	5.1388
SIC	5.1773	5.1932
HQC	5.1445	5.1604
Obs	356	356

Source: Researcher's computation using Eviews 8.  
 Note: Values in parenthesis are the standard errors for the coefficients

For the conditional mean equation, the study finds that the conditional mean in t and GED are statistically insignificant at 5% level. The high values of  $\alpha_1^7$  [(0.696) in t and (0.660) in GED] for the conditional variance equation signals that shocks to conditional variance dies after a long time period. Thus, Nigerian bonny light crude oil price volatility is persistence, meaning that past volatility shock has a persistent effect on future

volatility. While, the values of 1 [(0.345) or (0.400) for t and GED] implies that the responses of the volatility to bonny light oil price movements is high. Again the sum of  $\alpha_1$  and  $\beta_1^8$  in all the two models exceed 1, suggesting that any shock to bonny light oil prices would result in a permanent change in all future oil prices<sup>9</sup>. This means that persistence oil prices volatility for bonny light is quite explosive. Similar finding is reported in the

works of Gileva (2010), ThankGod and MaxWell (2013). The  $\nu$  values which represent the estimated coefficient of the degree of freedoms for GARCH-t and GARCH-GED are all found to be significant at 1% level, suggesting that t and GED are most appropriate error distribution. The GARCH (1, 1) models for t and GED can be written as the conditional mean and conditional variance equations:

GARCH (1, 1)-t is express as:

$$y_t = 0.059 + \varepsilon_t \dots \dots \dots (14)$$

$$\sigma_t^2 = 0.271 + 0.345\varepsilon_{t-1}^2 + 0.696 \sigma_{t-1}^2 \dots \dots (15)$$

GARCH (1, 1)-GED is given as:

$$y_t = 0.062 + \varepsilon_t \dots \dots \dots (16)$$

$$\sigma_t^2 = 0.307 + 0.400\varepsilon_{t-1}^2 + 0.660 \sigma_{t-1}^2 \dots \dots (17)$$

<sup>7</sup> measures the degree of persistence in volatility  
<sup>8</sup>  $(\alpha_1 + \beta_1)$   
<sup>9</sup>It means that shock to oil price volatility is persistent.

A diagnostic test is conducted to check for the accuracy of the specified standardised residuals for GARCH-t and GARCH-GED models. The result is presented in table 4 below:

Table 4: GARCH (1, 1) diagnostic testing for serial correlation and remaining ARCH effect.

	GARCH-t	GARCH-GED
Q (36)	45.957 (0.124)	45.413 (0.135)
Q <sup>2</sup> (36)	17.676 (0.996)	19.202 (0.990)
ARCH- LM <sup>10</sup>	0.0916 (0.7621)	0.2706 (0.6029)

Source: Researcher's computation using Eviews 8. Note that Values in parenthesis are the p-values

Q(36) represents Ljung-Box Q-statistics result of the correlogram view for autocorrelation and partial autocorrelation of the standardised residuals up to lag 36. All Q-statistics are expected to be insignificant, in order to show that the mean equation is correctly specified. Thus, p values (0.124 and 0.135) of Q-statistics (45.957 and 45.413) at lag 36 are found to be insignificant, indicating that our mean equation is correctly specified. This result proves that there is no serial correlation in the standardised residuals both for t and GED. Similarly, the specification of variance equation is also checked using the correlogram view of AC and PAC functions of the squared

standardized residuals up to lags 36. Interestingly, all the Q-Statistics from first lag to lag 36 are statistically insignificant, suggesting that the variance equation is also correctly specified and no serial correlation in the squared standardised residuals.

Next is to conduct ARCH-Lagrange Multiplier (LM)<sup>11</sup> test in order to ascertain whether the standardised residuals have an additional ARCH effect. We expect to find that no remaining ARCH should be left in the standardized residuals. From the table 4 above, the chi-square p values for t and GED are 0.7621 and 0.6029 respectively. This indicates that the

standardised residuals are not significant, hence no remaining ARCH effect was left. Therefore, the null hypothesis of homoscedasticity is not rejected. The overall diagnostic tests reveal that no serial correlation in the standardised and squared residuals and there was no any remaining ARCH effect<sup>12</sup> that needed to be model using higher<sup>13</sup> order GARCH. Thus, GARCH (1, 1) model is found to be parsimonious, because it is able to capture the GARCH effects and the errors or residuals are found to be white noise. The graphs of the conditional variance and conditional standard deviation are plotted in figure 3 and figure 4 below:

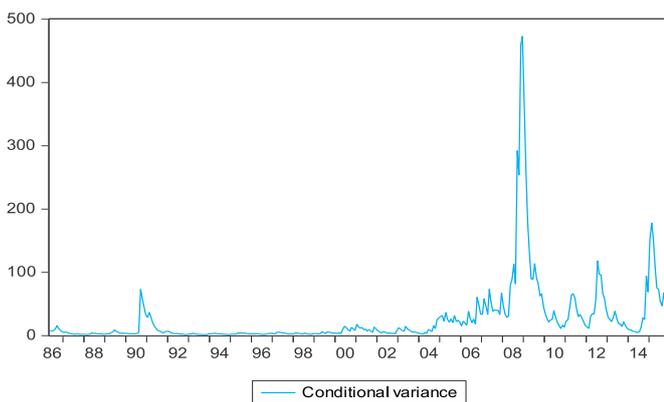


Figure 3: Conditional variance

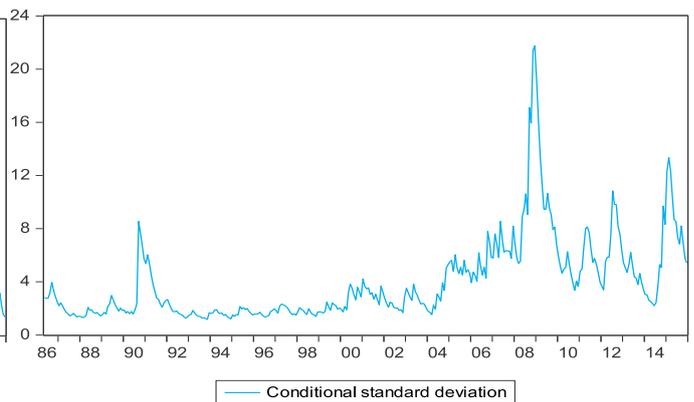


Figure 4: Conditional standard deviation

**Results from asymmetric GARCH family model**

The standard GARCH model takes into account the possible size of the coefficients ( and ) of the GARCH terms. However, an extension of GARCH model which consider not only the size of the parameters, but the sign as well, is refer to as asymmetric GARCH models. These include EGARCH, PARCH and TARCh.

<sup>10</sup> Heteroscedasticity test using ARCH LM is carryout. The ARCH test regresses the squared residuals on lagged squared residuals and a constant  
<sup>11</sup> ARCH-LM test is developed by Engle (1982) to test for the existence of heteroscedasticity, it aims at identify the possible occurrence of ARCH effects in the residuals  
<sup>12</sup> It means no more autocorrelation left in the model. In order word, autocorrelation is adequately captured in the model  
<sup>13</sup> Such as GARCH (1,2), GARCH (2, 2) etc

Table 5: Results from asymmetric GARCH family models

Coefficients	EGARCH (1,1)		PARCH (1, 1)		TARCH (1,1)	
	EGARCH- $t$	EGARCH-GED	PARCH- $t$	PARCH-GED	TARCH- $t$	TARCH-GED
	0.100698 (0.113886)	0.118177 (0.115426)	0.128983 (0.111341)	0.143769 (0.112173)	0.127310 (0.111901)	0.143790 (0.113661)
	-0.284263* (0.0687259)	-0.340907* (0.095362)	0.689044 (0.442595)	0.728172 (0.503564)	0.266754 (0.163657)	0.338606 (0.205177)
1	0.485406* (0.104948)	0.594045* (0.119604)	0.347311* (0.103679)	0.430339* (0.115360)	0.403412* (0.128387)	0.549994* (0.148279)
1	0.961271* (0.021181)	0.950208* (0.025589)	0.619685* (0.076952)	0.567234* (0.077028)	0.729656* (0.070479)	0.650377* (0.075177)
1	-0.035382 (0.110524)	0.061771 (0.100968)	-0.136678** (0.076379)	-0.162861** (0.071670)	-0.028744 (0.232202)	-0.227031 (0.235179)
2	0.103307 (0.100312)	0.012858 (0.012858)			-0.172844 (0.164175)	-0.052639 (0.155210)
$V$	7.647092* (2.299567)	1.484436* (0.155917)	8.454815* (2.736027)	1.512054* (0.138350)	7.569992* (2.287226)	1.497538* (0.146738)
LOG L	-906.317	-909.613	-905.538	-907.970	-904.603	-907.675
AIC	5.1310	5.1495	5.1210	5.1347	5.1214	5.1386
SIC	5.2072	5.2257	5.1863	5.2000	5.1976	5.2148
HQC	5.1613	5.1798	5.1470	5.1606	5.1517	5.1689
Obs	356	356	356	356	356	356

Source: Researcher's computation using Eviews 8

Notes: \* and \*\*significant at 1% and 5 %, the standard errors are given in parentheses.

The result for EGARCH (1, 1) model with asymmetric order one is estimated, but the white noise test of the standardised residuals up to lag 36 when tested using Q-statistics are found not be white noise<sup>14</sup>. Thus, we increased the asymmetric order term to two (2), and holding the order of ARCH and GARCH terms to one (1) each. Ultimately, the result obtains show that the standardised residuals are white noise. To have a significant asymmetric effect the coefficient  $\alpha_1$  needs to have a negative sign. The result presented in table 5 above shows negative and positive asymmetric coefficients (-0.035382 and 0.103307) for EGARCH (1, 1)-t. Unlike EGARCH (1, 1)-GED that show positive values of the asymmetric order one and two. The negative coefficient of the first asymmetric order implies that decline oil price has more impact than rising oil price on the conditional variance. While, asymmetric order 1 and 2 for EGARCH-GED are positive and statistically insignificant. The positive coefficients indicate that rising oil

price has high impact than the decline oil price. However, considering that the two-lag period has less standard error than lag 1, we concentrate on the value of asymmetric coefficient under lag two, which shows evidence that rising oil price is more destabilising than the decline oil price. This means that positive news (shocks) has more serious impact than the negative news (shocks). This finding is consistent with the theory of storage and study by ThankGod and Maxwell (2013). However, it is slightly difference to study by Olowe (2009) who found the negative and insignificant value of asymmetric coefficient  $\alpha_1$ , and base on the average value he rejected the asymmetric and leverage effect. The coefficients of constant terms, past shocks and past volatility are positive and statistically significant at 1% level. Thus, the current conditional variance is positively affected by past shocks and past volatility both in EGARCH-t and EGARCH-GED, similar result is also reported in Olowe (2009) and Gileva (2010). The diagnostic test result

presented in table 5, shows that EGARCH-t model is correctly specified, because there is no serial correlation in both the standardised and squared residuals and no remaining ARCH effects<sup>15</sup>. In contrast, EGARCH-GED has shown evidence that a serial correlation exist in the conditional mean given by the significant p value of the q-statistics.

For PARCH unlike EGARCH, if the asymmetric term ( $\alpha_1$ ) is positive and statistically significant, it implies that decline oil price is more dominant than rising price. If however, the coefficient is negative and significant, it means that rising price (positive news) is greater than the decline oil price (negative news). First order lags are used in the past errors, past volatility and asymmetric terms, however, three (3) power terms are selected before arriving at the parsimonious PARCH model that satisfy the white noise and no ARCH effect conditions. The PARCH-t and PARCH-GED results show that both the past shock and past volatility have positive

<sup>14</sup>The q-statistics for the square standardized residuals are insignificant, implying that conditional variance is correctly specified

<sup>15</sup>All values are statistically insignificant

and significant effect on the current volatility of the Nigerian bonny light crude oil prices. Moreover, the negative and statistical significant (5% level) values of the asymmetric parameter for the PARCH-t and PARCH-GED reveal that the positive news (increase oil price) has more influence on the current volatility than the negative news (decline oil price). Therefore, PARCH (1, 1) results support EGARCH (1, 1) model in term of signs and the absence of asymmetric effect. The diagnostic test suggests that both the standardised and squared standardised residuals are statistically insignificant, which indicate no serial correlation of the error terms. While, ARCH-LM test further show the p value of chi-square is also statistically insignificant, meaning that there was no remaining ARCH effects both in PARCH-t and PARCH-GED.

In estimating TARARCH model two-period-lag on the threshold term and one single lag both in the past errors and past conditional variance are used to have correctly specified conditional mean and variance equations, showing that there is no serial correlation in the error terms. The coefficients of the past residuals and past conditional variance (  $\alpha_1$  and  $\beta_1$  ) are found to be positive and statistically significant at 1% level, which is consistent with the result of both EGARCH and PARCH models. The coefficient of asymmetric terms for TARARCH-t and TARARCH-GED like in PARCH model have negative and insignificant values, suggesting that bonny light price increases have a larger effect on the conditional variance than the price decrease. We conclude that positive oil price shock increases volatility of bonny light crude oil prices. However, the result contradicts Salisu and Fasanya (2012) who observed

that negative oil price shocks reduces volatility more than the positive shocks. The sum of the coefficients  $\alpha_1 + \beta_1$  of the TARARCH-t and TARARCH-GED, points to the existence of high volatility of the Nigeria bonny light oil prices.

*Performance evaluation of GARCH family models*

The performance evaluation of each model selected for the monthly bonny light crude oil prices are ascertain, in order to identify the best fitted model. The best performing model is the one with maximum log-likelihood, lowest Akaike Information criterion (AIC), Schwarz information Criterion (SIC) and Hannan-Quinn criterion (HQC). From table 3 and 5 above, the best GARCH family model in terms of maximum log likelihood is GARCH (1, 1)-GED model. Thus, the study supports the earlier result from Salisu and Fasanya (2012) and Kuper (2002).

Table 6: Diagnostic testing for GARCH family models Fig 1.

P values	EGARCH (1, 1)		PARCH (1, 1)		TARCH (1, 1)	
	EGARCH-t	EGARCH-GED	PARCH-t	PARCH-GED	TARCH-t	TARCH-GED
Standardized residuals@ lag 36	0.128	0.096	0.115	0.114	0.139	0.110
Square standardized residuals@ lag 36	1.000	0.994	1.000	0.965	0.999	0.985
ARCH LM test (p for Chi-square)	0.8733	0.6709	0.8166	0.6302	0.6702	0.5838

Source: Researcher's computation using Eviews 8 Note: Null hypothesis: Errors are white noise

Table 7: Performance evaluation of GARCH family models at estimation stage

Model	Log L	AIC	SIC	HQC
GARCH (1,1)-t	-906.8704	5.1229	5.1773	5.1445
<b>GARCH (1,1)-GED</b>	<b>-909.706</b>	<b>5.1388</b>	<b>5.1932</b>	<b>5.1604</b>
EGARCH (1,1)-t	-906.317	5.1310	5.2072	5.1613
EGARCH (1,1)-GED	-909.6131	5.1495	5.2257	5.1798
PARCH (1,1)-t	-905.5375	5.1210	5.1863	5.1470
PARCH (1,1)-GED	-907.9698	5.1347	5.2000	5.1606
TARCH (1,1)-t	-904.6031	5.1214	5.1976	5.1517
TARCH (1,1)-t	-907.6750	5.1386	5.2148	5.1689

Source: Researcher's Compilation using Eviews8 software

*Forecasting evaluation of the GARCH models*

From table 8 below the model with the least forecast error based on RMSE is GARCH (1, 1)-GED. The model has a smaller RMSE<sup>16</sup> and minimum bias proportion<sup>17</sup> compare to any other GARCH family models. Therefore, we conclude that

symmetric GARCH-GED model performs better in terms of forecasting monthly Nigerian bonny light crude oil prices compare with asymmetric GARCH models. This result conforms to the study by Cheong et. al., (2011) and Rizvanoglu and Aghayev (2014), but contradict studies by Akincilar et. al., (2011), Herrera et. al., (2014), Musoglu and Gencer (2014).

*Forecasting using GARCH (1, 1)-GED*

We use the entire data set of 356 monthly observations covering the period between April, 1986 and December 2015 in estimating the selected GARCH (1, 1)-GED, then January 2016 to December, 2016 is used as out of sample forecast period. The forecast result is presented below:

Table 8: Performance evaluation of GARCH family models at estimation stage

Models	RMSE
GARCH (1, 1)- <i>t</i>	4.694821
<b>GARCH (1, 1)-GED</b>	<b>4.694815</b>
EGARCH (1, 1)- <i>t</i>	4.694898
EGARCH (1, 1)-GED	4.695041
PARCH (1, 1)- <i>t</i>	4.695162
PARCH (1, 1)-GED	4.695368
TARCH (1, 1)-GED	4.695368

Source: Researcher's computation using Eviews 8

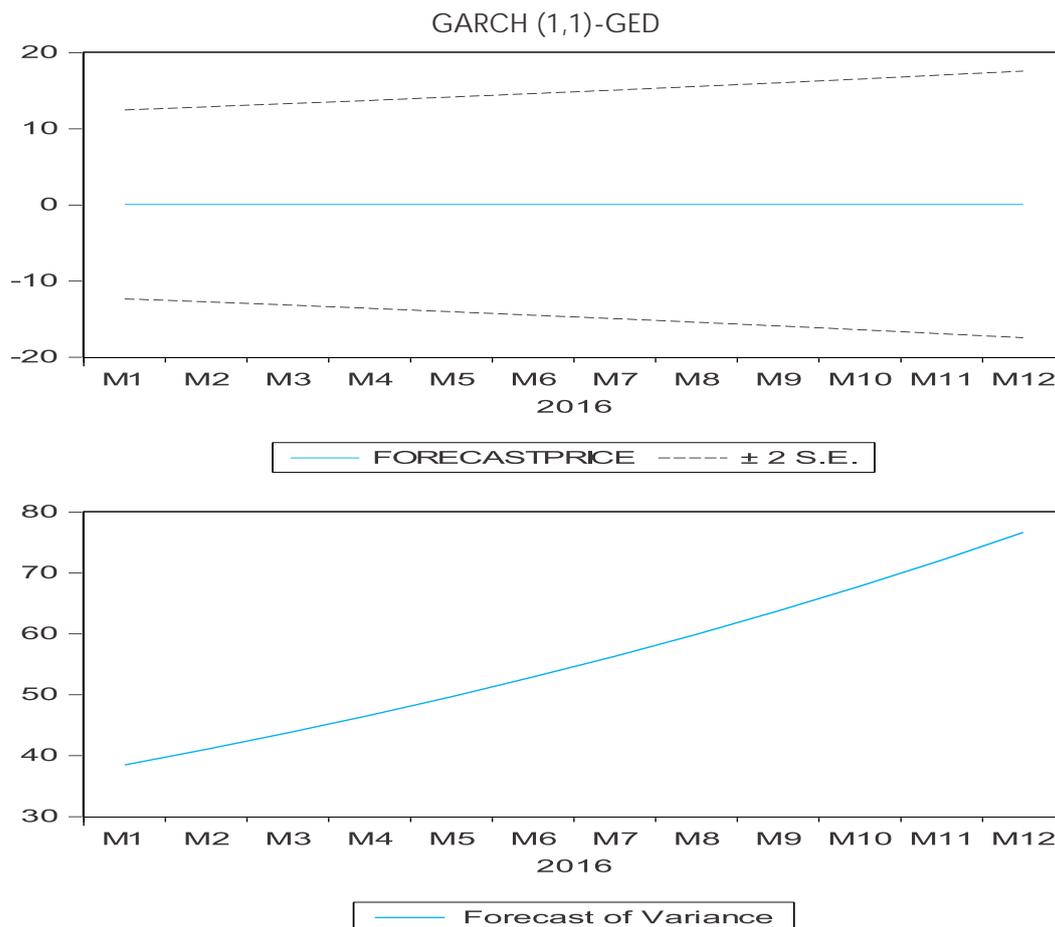


Figure 5: Mean and variance forecasts for GARCH-GED

<sup>16</sup>RMSE is the most popular, acceptable and widely use forecast evaluation method

<sup>17</sup>Equivalent to 0.000004

The solid lines represent the forecast of the conditional mean<sup>18</sup> which is observed to be approximately equal zero. The dotted lines stand for the forecast prices of bonny light crude oil prices with  $\pm 2$  standard errors. Using standard errors the twelve months out-of sample forecast period, bonny light crude oil prices is observed to hover between \$25.8 to \$55.8. This result has captured the actual bonny light oil prices as observed from the CBN data over the sample periods, the conditional variances is shown not be constant, because of an upward trend or movement.

### Conclusion and recommendations

One interesting thing about the overall estimated results from the GARCH family models is that, although both the symmetric and asymmetric GARCH models employ different approaches to capture volatility of the Nigerian bonny light crude oil prices, yet they are able to produce a consistent result. In particular, the parameters of both the ARCH and GARCH terms are found to be positive and statistically significant. In particular, parameter  $\alpha_1$  is shown to be statistically significant at 1% level in all the models. This is evident that there is presence of volatility clustering for the series. In EGARCH, PARCH and TARARCH the value of  $\alpha_1 + \alpha_2$  are greater than

1, this shows that shock to oil prices volatility is extremely high, indeed explosive and will remain forever. The high value of  $\alpha_1$  reveals that shocks to conditional variance dies after a long time period. Therefore, Nigeria bonny light crude oil price volatility is persistence, meaning that past volatility shock has a persistent effect on future volatility. In addition, the asymmetric models (EGARCH, PARARCH, TARARCH) prove that rising oil price has much impact than decline oil price on the conditional variance, which implies the existence of positive asymmetric effects for crude oil price. This result tallies with studies by ThankGod and Maxwell (2013), who also observe that good news create high volatility than bad news on the Nigerian crude oil market. The result has further corroborates our earlier descriptive statistics result which equally shows that the distribution of Nigeria bonny Light crude oil prices has positive skewness, an evidence of long right tail. This also means that the series has symmetric and not asymmetric returns, in sharp contrast to the study by Salisu and Fasanya (2012). Moreover, GARCH (1, 1)-GED is found to have a better forecasting performance. Based on this we conclude that symmetric GARCH-GED model performs better in terms of forecasting monthly Nigerian bonny light crude oil prices compare with asymmetric GARCH models. Thus, GARCH

family models are relevant in forecasting bonny light oil price volatility.

The study recommends that conventional approach to forecasting oil price benchmark for the Nigerian budget projection should be review, so that benchmarking would be based on a more scientific method that would yield the most desirable forecast result. Similarly, since the study found that the Nigerian bonny light oil price is highly volatile and any shock to oil price would have a permanent change on the future oil prices, then emphasis should be given to non-oil exporting commodities which are more predictable and less volatile. In addition, oil price volatility in Nigeria is caused not only by external factors, but also internal factors particularly; output shocks resulting from oil theft, pipeline vandalisation and unrest in the Niger-Delta oil region, with effects on decline oil production below the projected budget benchmark and decline in oil revenue to the Nigerian government. Therefore, considering the importance of the region sustainable economic growth in the Nigerian economy, adequate and special attention need to be given to the region, in order to have smooth and uninterrupted oil production, this would stimulate private investment in the oil sector.

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<sup>18</sup>Conditional mean forecast is the monthly forecast of the bonny light oil prices

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## EXPLORING STARTUP FUNDING FOR SMALL BUSINESS SECTOR GROWTH, JOB CREATION AND REDUCTION OF YOUTH UNEMPLOYMENT IN NIGERIA



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### 1. INTRODUCTION

**S**MEs play critical roles in economic growth and development of both developed and developing countries. Globally, small business sector represents a significant proportion of all businesses, and creates notable number of jobs (Ghobakhloo, Zulkifli & 2010). Okpara and Kabongo (2009) posited that developing countries recognize the importance of private businesses, in generating employment, and stimulating growth. For most societies small business is the driving force behind the economy and a major employer of labor (Akaeze & Akaeze, 2016). In developing economies, businesses are

### ABSTRACT

Unemployment generates welfare loss from lowered output, income, and wellbeing which impedes social progress in a nation. Youth unemployment is a major problem currently confronting Nigeria (Nwogwugwu & Irechukwu, 2015). However, in developing economies jobs are created through small businesses. Nevertheless, unemployed youths with small business ideas experience financial constraints and lack access to startup capital. The intent of this study was to explore the experiences of some owners who succeeded with small business initiatives despite challenges from lack of access to formal and informal sources of capital. Semi-structured interviews with 15 successful small business owners located in Lagos who started as unemployed youths, yielded data for the study. Participants were purposefully selected while data was analyzed thematically and the results showed that : (a) inability to provide collaterals, (b) reliance on insufficient private funds and short term overdrafts, and (c) bureaucracy, were the critical challenges facing small business owners. The results may become a basis for future interventions and support programs by governments and leaders of youth organizations.

### Keywords

Youth unemployment, credit market, startup capital

dominated by SMEs, which provide most employment opportunities along with significant earnings. The SME sector's role in providing goods and services are prominent in developing economies. Nigeria is as a developing economy is not exempted from this development. Odunuga (2015) suggested that informal sector contributes about 57.9 per cent of Nigeria's Gross Domestic Product (GDP). SMEs contribute more than 46.54 per cent to GDP and approximately 25 per cent to employment respectively (Ndumanya, 2013; SMEDAN, 2012). The National Population Commission (NPC) found that youths constitute more than 60 per cent of workforce population in Nigeria (NPC, 2002). An estimated 1.8 million youth enter the labor market in Nigeria every year (NPC, 2013). Eresia-Eke & Shagamu,( 2011), suggested that optimal working age

population ranges between 18-65 years , as youths constitute the core of the working population in any society . Odunuga (2015) argued that young people can become game changers by strengthening the informal sector in Nigeria.

According to Schaie and Willis (2002) adolescent populations are often resourceful because of their optimism and desire for success in any developmental project undertaken. They commonly possess strength-based dimensions, such as projecting a positive attitude for development, and these strengths are hard to undermine (Bundick, 2010). One significant measure of macroeconomic performance of a nation is the unemployment rate. In Nigeria, the desire of many young people is to be educated and get employed after graduation (Schineller, 2002).

Notwithstanding, youth unemployment is a critical issue with far-reaching implications for the stability of the Nigerian economy. The global economic crisis revealed that youth unemployment is more sensitive than adult unemployment and results in lack of earnings which in turn affects spending and wealth creation that negatively impacts the national economy. High rate of youth unemployment contributes to crippling the economy and could generate other recurrent problems.

Furthermore, firms suffer business losses due to loss in spending, and are sometimes forced to lay off employees, resulting to rise in unemployment rate with overall spending plunging even deeper. To show how unemployment affects economy growth of nations, Okun's Law addressed relationship between unemployment and gross national product (GNP). Okun's study in 1962 determined that when unemployment is reduced by 1 percentage point, GNP increases by approximately 3 per cent while a percentage increase in unemployment causes a 2% fall in GDP (Abu, 2017). In addition, the effects of unemployment on families include poverty and hardship, strained relationships, poorer health, housing stress potential harm to children's future development and employment (Frasquilho, de Matos, Neville, Gaspar & de Almeida, 2016).

In 2009 youth unemployment for persons between ages 15 and 24 years was up to 41.6% while 17% of persons between 25 and 44 years, were unemployed in Nigeria according to National Bureau of Statistics (NBS, 2010). In addition, about 21.0 per cent of youth with post-secondary education, were unemployed (NBS, 2010). Since youth unemployment has impact on both today and future

economies, it is of a priority to focus on youth unemployment. Increase in youth unemployment creates a hopeless generation and an army of unemployed, thus harming economies deeply, now and in the future.

Indeed, youth unemployment may also predispose individual to engage in crime and delinquency. The goal of full employment is that every member of the labor force who wants to work is able to find some type of job. Successful small business owners employ more youths with accompanying earnings which results to increased spending that positively impact national economy. However, it is unclear to what extent government interventions have decreased youth unemployment rate, therefore there is need to consider effective policies that deliver on stated objectives. All efforts by both previous and present governments to mitigate unemployment through different programs such as National Directorate of Employment (NDE), Family Economic Program (FEP), National Poverty Eradication Program (NAPEP), Structural Adjustment Program (SAP) and others have yielded minimal result. Therefore, creating the opportunity for small business initiatives to develop and succeed may help inhibit youth unemployment situation. Nevertheless, a critical factor for successful small business ownership is access to capitals. SMEs financing has significant positive relationship with their growth. Capital is important to operation and survival of any business. Performance of SMEs is largely dependent on the firm's ability to generate internal finance and secure external finance (Demir & Caglayan, 2012; Wiklund & Shepherd, 2005). Similarly, Mazanai and Fatoki (2012) indicated that access to finance has direct relationship with SMEs performance. Tagoe,

Nyarko, and Anuwa Amah, (2005) identified challenges confronting the SME sector growth and development to include difficulty in accessing funds. Koop, de Reu, and Frese (2000) suggested that amount of start-up capital positively correlates with business success. Therefore, shortage of start-up capital is a major constraint to formation of business enterprise. The purpose of this study was to explore experiences of some youths who were unemployed in sourcing initial capital from formal and informal sources to develop their startup small business initiatives. According to Aborampah (2012) SME sector needs support to address financial challenges and enable firms play their crucial roles in the economies of developing countries.

Following the significant roles of SMEs in developing economies, international bodies such as American government agency's Overseas Private Investment Corporation (OPIC) and World Bank's International Finance Corporation (IFC), have provided financial support in form of loans and private equity to private sectors. These bodies were established to stimulate investment in risky economic environments where private insurance is unavailable and SMEs play critical roles of accelerating growth (Hendrickson, 2012; Zoellick, 2010). The SME sector needs support to continue its vital roles in the Nigerian economy. However, SMEs continue to confront diverse challenges notwithstanding the significant role they play in economic development. Constraints which are prevalent in developing countries include lack of access to finance.

Individuals find it increasingly difficult to have easy access to funds required to start and grow SMEs in Nigeria. The difficulty

faced by SME owners in gaining access to funds arises from lack of access to capital markets for raising additional equity finance. Owners of SME therefore, resort to earnings generated internally or additional equity invested by owners, which may not be adequate for business growth. Regardless, SME owners resort to borrowing from other informal sources including friends and family members, cooperatives, credit associations, and professional money lenders. Funds from these sources are usually not adequate for supporting the growth objectives of SMEs (Aryeetey, 2005). The trouble of financing SMEs development and growth is a significant problem. Owners of SMEs lack access because of exposure to financing at high-interest rates, double taxation and poor financial services by financial institutions (SMEDAN, 2012). Exploring the experiences of owners in accessing initial capitals to develop businesses is relevant towards facilitating important roles of small businesses in Nigerian economy. Insufficient financial capital affects the growth of SME businesses. Therefore, this study explored effect of lack of access to initial capital on formation, growth and development of small businesses.

### 1.1 Problem Statement:

Out of 80 million youths representing 60% total population of Nigeria up to 64 million are unemployed (Awogbenle & Iwuamadi, 2010). Among youth with post-secondary education unemployment is approximately 21.0% (Adejimi & Ogunode, 2015). According to Nigerian Institute of Social and Economic Research, in 2012, over 11 million youth population in Nigeria were unemployed with the number rising from 2.9 million in 2008 to about 5.9 million for rural areas (NISER, 2013). Youth

unemployment is a rising critical challenge confronting the stability of Nigeria economy (Adejimi & Ogunode, 2015). The general problem is that youths, often embark on small business initiatives without adequate knowledge, information and support. This results to lack of growth in SME sector which stalls contribution to development of the economy leading to high youth unemployment. The specific problem is that some unemployed youths lack techniques and experiences required for accessing adequate startup capital to support formation, growth, and development of small business initiatives in Nigeria.

### 1.2 Purpose Statement

The purpose of this qualitative multiple case study was to explore experiences of some successful unemployed youths regarding techniques used for accessing initial startup capital from formal and informal sources, and the influence on business success in Nigeria. The population for this study was 15 successful small business owners located in Lagos. Participants were selected because they have post-secondary degrees, have never worked with governments or other business establishments and have sustained their business for a minimum of 5 years.

The study may contribute to economic and social change by increasing success of aspiring small business owners, improve youth employment and provide insight into strategies that contribute to economic growth. Data from this study may also have implications to help potential owners start, sustain and succeed in small business. Positive social change may include reduction in youth unemployment rates resulting from increase in viability of small businesses, increase in jobs, increase in revenue, and a

reduction of the unemployment rate.

### 1.3 Nature Of The Study

We selected qualitative research method because data collection for this study was detailed and rich in form of comprehensive written descriptions. Researcher may utilize qualitative method for understanding social condition of people, group, or organization (Trotter, 2012). Qualitative method was suitable because of the flexibility and facilitation of open-ended questions, observation, interviews, and analysis of documents (Hunt, 2014). Researchers may also use qualitative method to gain insight into issues, claims, and concerns from identifying views, opinions, and perceptions of participants (Akaeze & Akaeze, 2017). Unlike qualitative research, quantitative and mixed methods were not suitable for studying objects in their natural environments or discussing and understanding divergent individuals and phenomena. Qualitative methods require the use of smaller study samples, which are not random selection (Borrego, Douglas, & Amelink, 2009). We selected case study design to facilitate researcher's observation of participant's objectively, while examining the meaning of the case.

Case study involves direct observation and data collection in a natural setting where researchers consider contextual aspects of a phenomenon without experimental controls or manipulations (Alex, Näslund, & Jasmand, 2012). Case study design was appropriate in this study for clarifying findings. Case studies facilitate the collection of rich details that is not easily obtained using other research designs. Yin (2009) suggested that case-study method is suitable for "how" and "why"

questions. Beneficial features of case study inquiries includes flexible data collection that creates wider perspectives and improved guarantee about what is important in the setting rather than central examination. Researchers may use qualitative case study designs rather than quantitative designs to explore how participants interprets phenomenon (Saxena, Gupta, & Ruohonen, The goal of this qualitative case study was to explore the experiences of some unemployed youths on how to access initial startup capital from formal and informal sources in Nigeria. 2012). For this study the choice of multiple case designs was to improve external validity and guard against observer bias.

#### 1.4 Research Question

Lack of financing is a major barrier to making profitable investments in changing economies. Business investment may depend on financial factors, which includes availability of finance, access to new debt or equity finance, or functioning of particular credit market. Masso (2014) found that finance played a major role for small firm's investments decisions. Overarching research question for this study was: What are the experiences of unemployed youths regarding access to initial capital and its influence on success of startup small business initiatives in Nigeria?

#### 1.5 Conceptual Framework

The conceptual framework for this study was Theory of Constraints (TOC) introduced in 1984 by Dr. Eiyahu Goldratt (Pi-Fang & Miao-Hsueh, 2005). The TOC is a methodology for identifying the most significant factor (i.e. constraint) inhibiting achievement of a goal for systematic improvement until that constraint is no longer the limiting factor (Goldratt & Cox, 1984). A constraint is anything

that might prevent a system from achieving its goal. The internal constraints which business leaders confront include lack of knowledge, financial skills and marketing skills (Hassan, 2013). The TOC helps leaders decide:

1. What to change;
2. What to change it to; and
3. How to cause the change.

Core concepts of TOC includes that every process has a single constraint and total outcome which improved only when the constraint is improved (Ifandoudas & Gurd, 2010). The TOC concept revealed that constraints are major impediments to achievement of business A significant corollary is that only improvements to constraint will advance the goal of the business. Business leaders may manage these constraints to achieve organizational goal (Dehkordy, Shakhshian, Nawaser, Vesal, & Kamel, 2013; Hakkak, Hajizadeh Gashti, & Nawaser, 2014). The TOC concept proposes a rationale for business ownership founded on the concept that individuals can identify weakest point in organizations to improve achievement processes (Simsit et al., 2014).

The fundamental constructs of TOC management philosophy includes knowledge management and financial management skills (Aborampah, 2012). The underlying power of TOC flows from its ability to generate a tremendously strong focus towards a single goal and to removing the principal constraint to achieving more of that goal (Tastan & Demircioglu, 2015). The TOC includes a sophisticated problem solving methodology called the Thinking Processes. The Thinking Processes are designed to first identify the root causes of undesirable effects, and then remove such undesirables without creating

new ones (Rhee, Cho & Bae, 2010). The principle of TOC is a basis for conceptualizing youth's financial experiences, skills and practices in this study. Thinking Processes are useful for answering the three questions, which are essential to TOC: (a) what needs to be changed? (b) What should it be changed to? (c) What actions will cause the change?

Thinking Processes were used to answer the three questions that are essential to TOC. The TOC Thinking Processes are designed to effectively work through the questions and resolve constraints in existing policies. There are five steps to follow in applying the TOC as a process:

1. Identify the constraint. Employ an audit process to pinpoint the obstacles.
2. Decide how to exploit and eliminate the constraint. By systematically looking at the problems and applying a process of improvement. All efforts should be focused primarily on the constraint.
3. Subordinate everything else to the constraint. The actions to fix the bottleneck must take priority.
4. Elevate the constraint. In practice, this normally means adding resources including money.
5. Evaluate and check if the constraint is lifted. While monitoring initial constraint make an assessment and then return to step one and repeat if there is a new bottleneck.

#### 1.6 Operational Definitions

Bootstrap finance: Bootstrap finance is the use of methods by practitioners for meeting business resources need without relying on long-term external

finance from debt holders or new owners (Winborg & Landstrom, 2001).

**Constraints:** Constraints are anything that prevents the organization from making progress towards its goal (Simsit et al., 2014).

**Small business:** Small businesses are independently owned, privately held business that varies in annual revenue, sales and employs up to 1,500 individuals (Farrington, 2012; Small Business Administration, 2014).

**Small and Medium-sized Enterprise (SME):** Small and medium-sized enterprises are organizations of a small scale and flexible mode of operation, with ability to adapt to rapidly changing market environment (Cheng & Tang, 2015).

**Unemployment:** Unemployment is a condition where qualified individuals willing to work cannot find the work (Matouskova, 2016).

**Small businesses:** Small businesses are generally regarded as the driving force of economic growth, job creation, and poverty reduction in developing countries (Akaeze & Akaeze, 2017)

**Youths:** individuals between 15 and 35 years of age constituting approximately the population in Nigeria (Ajuwon, Ikhide & Akotey, 2017; NPC, 2013).

### 1.7 Assumptions

### 1.8 Limitations

Limitations are external conditions which regulates scope of a research with ability to influence the result (Bloomberg & Volpe, 2012). Patton (2014) suggested that limitations explain the inherent weaknesses of a research. For this study locations prompted a

limitation to a sample of convenience from mainly heterogeneous high populations and results may not generally apply to other populations. Second, data collection for this study was limited to responses from questionnaires and as such, triangulation of information using other means like field notes or follow up questioning may not apply. Third, participants may have relied on their recollections and such information could reflect participant's adjudged truth. The interpretation of the results and analysis should be made taking account of these limitations.

### 1.9 Significance of the Study

The SMEs are vehicles for development of any economy and have contributed enormously to employment creation and household income in Nigeria. Specifically, small businesses are the most significant source of employment in the Nigerian economy (Birch, 1979; Ajuwon et al., 2017). SMEs contribute 20-45% of all full-time business and 30-50% of rural household earnings (Nik & Nnabuike, 2017). Small business startups are vital in increasing per capita income, increasing employment, and equalizing financial and social circumstances (Mellish, 2016). Nigeria's unemployment rate increased from 23.9% in 2011 to 25.9% in 2013 and projected to rise approximately 27% by the end of 2014 (NBS, 2013, Nwogwugwu & Irechukwu, 2015). The Nigerian population could be up to 182.2 million half of which is made up of youths, between 15 and 35 years of age (Ajuwon et al., 2017). Regrettably, as youth population grows, so does the unemployment rate. The national data for first quarter of 2016 revealed that out of a youth labor force of about 38.2 million, the total of 15.2 million were either unemployed or underemployed (Ajuwon et al., 2017). This study

result may contribute to business practice by providing information, knowledge, and skills for identifying constraints in accessing startup financial support for small business initiatives in order to resolve funds constraints and improve youth's participation. Although literatures on diverse types of bootstrapping techniques which businesses owners use exists, however, effectiveness of different types of financial bootstrapping techniques is relatively undocumented (Perry, Chandler, Yao & Wolff, 2011). Therefore, research identifying and validating bootstrapping techniques that facilitate new business launch has significant implications for young entrepreneurs

Chwolka and Raith (2012) suggested that small-business prowess may (1) facilitate improved entrepreneurs' understanding of their business and its environment and (2) facilitate planning and predictions of critical factors which influence small business success. Findings of this study may be useful for future researches on small-business management and practices which entrepreneurs may use for improved business practices. According to Berkovich (2014), social change could result in modifications to behaviors, laws, and institutional policies to reproduce better standards of fairness, opportunity, and diversity. Results of this study could contribute to a better understanding and appreciation of challenges confronted by unemployed youth who are willing to invest time and resources in development of SMEs as far as funding of such firms is concerned. Leadership of youth organizations like the NYSC could use results of current study as a basis to advocate support and training in organizational effectiveness for new generation

small business leadership. The government may also use as basis for policy adjustments that may influence changes.

## 1.10 Review of Literature

### 1.10.1 The Nigerian Economy

Despite her natural resources, Nigeria remains a monolithic economy that is dependent on petroleum resources as its main source of foreign earnings (Ambe-Uva & Adegbola, 2009; Ololube, Onyekwere, Kpolovie & Agabi, 2012). As one of the largest oil exporters in the world, Nigeria's oil has been and continues to be a great source of revenue for oil companies and for the Nigerian government. Unfortunately, revenue of oil industry has not contributed to solving societal issues of poverty, environmental degradation, lack of state capacity to provide sustained security, political inequity and unemployment. Regardless of thriving oil economy due to high oil prices and significant new investment from International oil companies, the welfare and security needs of the citizens remains unmet (Ajayi, 2012). While in a few cases social infrastructures such as pipe borne water, electricity, proper roads, school, scholarship programs and job opportunities are provided to oil producing communities, such facilities are not enough in many of those communities (Ololube et al., 2012). Oil production has become a central focus in the agitation over resource control, which is a subject of intense national discourse.

According to Ajayi (2012), oil has brought more disaster than blessing and has not proved to be a means out of poverty or for rapid development. Also, the oil industry has shaped power relations in Nigeria both internally and with foreign partners. Consequently, there is a legitimate concern in the Niger

Delta region both politically and economically. It is, a living fact that long after the brief oil boom of the 1980s, all has not been well with Nigeria as a petro-monolithic economy (Prince Umor, 2004). The economy got worse instead of better as years went by and continued over-reliance on crude oil is comparable to standing on one leg, which dislocates stability, agility, and longevity. Expectedly, successive past governments put out some laudable programs with a view to redirect and reposition the economy in including highly celebrated schemes such as operation feed the nation (Prince Umor, 2004). Nevertheless, along with the endemic distress of Nigeria's non-oil sectors, the economy continues to witness massive growth of informal sector economic activities, estimated at about 75% of the total economy (Ajayi, 2012).

### 1.10.2 Unemployment in Nigeria

A macroeconomic goal for any government is the achievement of full employment. Unemployment is generally a serious macroeconomic problem representing colossal waste of a nation's manpower resources. One of the main causes of unemployment is fluctuations in the business cycle. The business cycle or economic cycle is the change in economic activity of a country during a particular period (Skare & Stjepanovic, 2016). Between 1979 and 1983, employment was never a problem as many job-seekers had the options of picking and choosing the jobs they wanted in Nigeria (Ugwu, 2012). However leaders rather than developing the country embarked on official corruption where the privileged few become fabulously rich at the expense of Nigeria (Ugwu, 2012). Various financial mismanagement by leaders including political and private sector managers resulted in the country becoming unstable for

business which resulted in lack of investment in the country by foreign companies.

Ugwu (2012) argued that prevalence of economic and financial crimes in Nigeria led to significant decrease in foreign inflow of investments, relocation of companies, and consequently resulting to high rate of unemployment. Low production indicates a decrease in employment of factor inputs such as labor, therefore many Nigerians remain poor, and economic development remains stagnant in Nigeria (Abu, 2017). Rapid changes in labor markets may also result in unemployment, for examples, unskilled workers may not gain employment in a high tech economy. In addition, a fall in demand for goods during a recession causes people to be laid off. For developed and developing countries, attainment of high growth rates and full employment are priorities. Nevertheless, unemployment is a serious issue in Nigeria as the nation continues to report high unemployment rates and unimpressive growth (Obadan & Odusola, 2000).

Rising unemployment may be linked to social deprivation. There is a relationship with crime and social dislocation including increased divorce rates, worsening health and lower life expectancy. These high unemployment rates have resulted in an increase in social vices including prostitution, human trafficking, child labor, kidnapping, robbery and the recent recruitment of teenagers by the dreaded Boko Haram insurgents to bomb various locations throughout West Africa (Abu, 2017). The increase in unemployment significantly affects economic growth resulting from decline in aggregate demand or consumption and declining domestic investment that

augment unemployment problems.

The effect of unemployment on the economy includes reduced overall spending. When people are unemployed in large numbers, they are unable to spend thereby hurting the rest of the economy. In line with Okun's Law, unemployment affects the growth of an economy. Okun's Law states that a percentage increase in unemployment causes a 2% fall in GDP (Abu, 2017). Impact of unemployment on the family includes poverty and hardship, strained relationships, poorer health, and housing stress (Artazcoz, Benach, Borrell & Cortes, 2004). In addition, unemployment may harm children's development and future ability for employment. Unemployment could also result in young people without full-time work experience, drug abuse, crime Mental illness and increased suicide rate (Fryer & Fagan, 2003). Some of the social costs of unemployment to families include: increased family breakup, homelessness, crime and domestic violence. For the community, unemployment results in higher and rising crime rates, brutalization of lifestyle and lost income. To mitigate the unemployment situation in Nigeria, government created several agencies including the National Directorate of Employment (NDE) in 1986 to encourage entrepreneurship and create more employment. The NDE approach, however, did not take cognizance of the fact that there may not be any reasonable entrepreneurship and employment generation without adequate finance (Ugoani & Ibeonwo, 2015).

The incidence of unemployment in Nigeria has become alarming. The rate of unemployment is rising with no clear and appreciable efforts by policy makers to cushion the effects.

Unemployment rate is on the increase in Nigeria and year in year out, tertiary institutions turn out graduates who seek employment rather than start up their own businesses (Akpomi & Nnadi, 2010). The National Youth corps scheme represents a veritable program for addressing the serious issues of youth unemployment. In the past member of the NYSC have been trained and equipped with varieties of skills in diverse fields. Some Youth members were trained in working with youth and adults in their community using the AIDS Competent Community model (Arnold et al, 2012; Dlamini et al., 2012).

#### 1.10.4 Small Business in the Nigerian Economy

Small businesses are generally regarded as the driving force of economic growth, job creation, and poverty reduction in developing countries (Akaeze & Akaeze, 2017). Small businesses have been the means through which accelerated economic growth and rapid industrialization have been achieved (Ado & Mallo, 2015). Small businesses are essential for sustained growth of any economy (Cant, Wiid & Kallier, 2013). In the Nigerian economy, small businesses are significant source of employment generation (Birch, 1979). Specifically, in Nigeria SMEs serves as the major employer of labor and represent about 95% of its enterprises (Abdullahi et al., 2015). Abdullahi et al. (2015) suggested that SMEs account for 50% employment on average and also fifty percent of Nigeria's industrial output. However, it is very difficult for a business to survive in harsh business environment and a huge failure rate can have a devastating outcome on the economy (Cant, Wiid & Kallier, 2013).

The rate of small business failure in developing countries is higher than in developed world (Arinaitwe, 2006). Economic

contribution of small businesses in Nigeria falls below expectation due largely to the harsh economic environment (Ado & Mallo, 2015). In particular, for developing economies with limited capital, high failure rate of small business is a huge negative for the economy (Okpara & Wynn, 2007). Small businesses entrepreneurs face diverse challenges which inhibit their long-term development and survival. Therefore, owners who sustained businesses beyond five year are considered successful because the chances of small-business ventures making it past the five-year mark are very slim (Okpara & Wynn, 2007).

Successive past governments in Nigeria adopted several policies to address small business failures but these had yielded minimal results. Agundu and Dagogo (2009) posited that in the glare of an ailing economy failures of different policies of successive governments to achieve targeted economic growth and development resulted in restructuring of the financial system in Nigeria. Structural adjustment program (SAP) was one of the products of past government policies formulated in 1986 (Agundu & Dagogo, 2009). The SAP was formulated in response to failed institutional measures promoting and galvanizing SMEs in Nigeria over a long period of time. In the first few years of SAP (1986-1988), the prevailing economic condition in Nigeria was favorable. This period witnessed emergence of great companies like the Nnewi Auto-Technology and others, in the Eastern geopolitical zone. Unfortunately, SAP became history even before the gains could be consolidated, and financing windows that was created to provide relief for SMEs lacked continuity and sustainability (Agundu & Dagogo, 2009).

The (2015) ILO analysis revealed that small businesses net share of job creation is approximately 54% while that of larger firms at 46% in low-middle-income countries like Nigeria (Ajuwon, Ikhide & Akotey, 2017). However, SME enterprise financing difficulty has long been a bottleneck restricting the development in the sector (Cheng & Tang, 2015). There are diverse reasons for this situation including the fact that small and medium-sized enterprise financing tool is poorly understood, and improper usage which is a critical factor. Small businesses in developing world are beset with a lot of challenges that impede their capacity to grow and develop (Bamfo, 2012). Small businesses are therefore not able to contribute meaningfully to the economies of developing world. However, based on facts that emerged from appraisal of various past financing schemes and initiatives for SMEs, finance is by no means the only or most important constraint to SME development. Other constraints include inadequate entrepreneurial or managerial skills, financial indiscipline, lack of enabling environment for investment, and weak monitoring mechanisms.

Some factors responsible for small business failure in Nigeria includes lack of management experience, corruption, lack of infrastructure, lack of training, and inadequate bookkeeping, recordkeeping and lack of financial support. Other reported major obstacles were insufficient profits, poor location, low demand for products or services, excessive withdrawal business cash for personal use, and lack of market research (Okpara & Wynn, 2007).

Furthermore, political considerations also contribute significantly to small business failure in Nigeria. According to

Okpara and Wynn (2007), government works are awarded not to the best-qualified and competent companies but to party loyalists and contributors who may not necessarily deliver to expected standards. Agundu and Dagogo (2009) posited that this situation resulted in the formation of the Small and Medium Industries Equity Investment Scheme (SMIEIS).

The SMIEIS, which was later changed to SMEIS involved the use of venture capital (VC) financing where entrepreneurs could receive financing at different stages of the business including seed, start-up, expansion, and development or bridge finance stages. In Nigeria, the sources of finance for non-VC-backed SMEs are conventional financial market institutions, while for the VC-backed SMEs, the sources are relatively few. Agundu and Dagogo (2009) suggested that Nigerian SMEs with the help of venture capitalists may eventually develop within a reasonable period given the critical elements of VC financing. Entrepreneur's receipt of VC financing at different stages imply that VC financing could facilitate the sustenance of an enterprise.

Capital is important for operation and survival of any business, and capital constraints refer to lack of access to debt or equity financing. . . The SME sector needs support to address financial challenges in the sector to enable firms play their crucial roles in the economies of developing countries (Aborampah, 2012). The performance of SMEs largely depend on the firm's ability to generate and secure finance. Inadequate access to financial capital is harmful to the future and potential growth of business (Rahaman, 2011). Xavier, Kelley, Kew, Herrington and Vorderwülbecke (2013)

suggested that lack of financial capital is a significant contributing factor to SMEs weak performance. Business firm with inadequate or no access to financial resources are constrained in the pursuit of their objectives and are unlikely achieve set performance targets (Giannetti & Ongena, 2009). Similarly, access to finance is one of the main problems responsible for the gross low performance of SMEs in Nigeria (SMEDAN, 2012). Therefore, once SME owner's access to financial capital is limited, their contribution to economic growth will be minimal. Nevertheless, SMEs access to finance is determined and influenced by government policies and the financial structures of a nation (Berger & Udell, 2006). For this reason, academics and policy makers all over the world are concerned about SMEs' access to finance (Aminu & Shariff, 2014).

#### 1.10.6 Sources of Early-Stage Capital

A significant challenge which business owners face is the funding to start-up their business (Prisciotta & Weber, 2005). Understanding how business owners raise capital beyond the founder's own money, family, and friends is critical to business success. The most predictable sources of business funding are banks. However, there are challenges which business owners need to know about involving the bank's process to approve loans based on established loan policies, credit scoring, approval systems, and loan committees. According to Prisciotta and Weber (2005), diverse bank loan durations are available that may match need with the useful life of the underlying collateral of owners. Other common loans include lines of credit, which establish a maximum amount that can be borrowed, real estate loans,

equipment loans, construction loans, and inventory loans. Prisciotta and Weber (2005) suggested that banks usually grant loan approvals or disapprovals based on:

1. The borrowers' reputation, business background, and credit history.
2. Availability of sufficient cash flow (typically three to five years of historical or projected cash flow) to repay loans
3. Availability of sufficient capital encompassing all of the assets owned by a business; generally, banks look for 20%-30% owner equity for any business loan.
4. Availability of sufficient collateral.

Business owner's lack of sufficient collateral results in loan being turned down. All collaterals are not considered equal and may be discounted by loan committees based on risk. For example, cash and cash equivalents may be considered as collateral on a dollar-for-dollar basis, while other assets such as accounts receivable, inventory, equipment, marketable securities, and real estate will be discounted by 20%-40% (Prisciotta & Weber, 2005). Nevertheless, adequate collateral does not replace a lack of cash flow (Prisciotta & Weber, 2005). Certainly, banks always require personal guarantees from the business owners and this put their personal assets at risk. When traditional banks decline to grant loans, other available additional options for borrowed capital includes: 1) governments sources and 2) asset-based lenders who provide equipment loans, leases, and accounts-receivable factoring. Even though these other alternatives are risks than traditional banks, nevertheless their lending rates are

commensurately higher. Some issues that complement access to business capital include contract law, liability protection, estate planning, succession planning and general tax planning and obtaining assistance in raising business capital is a great advantage to entrepreneurs. Early-stage capital is often the most difficult to access in business initiative. Equity partners (Angel partners) are high-net-worth individuals seeking high returns and typically invest \$100,000-\$350,000 in early-stage businesses (Prisciotta & Weber, 2005). Equity partners usually have in-depth knowledge of the business or industry they are investing in through prior experience in management of similar type of business. They often want to mentor or participate in management or serve as board members.

Venture capital (VC) firms are typically the largest cash investors in early-stage entities when banks and other lenders are unwilling to make sufficient capital available (Prisciotta & Weber, 2005). The Venture capitalists raise capital from institutions such as pension funds and insurance companies, who earmark funds for such high-risk/high-return investments. The VCs generally have specific industries they favor, such as technology, health care, or consumer goods. The VCs often place certain demands on the business, such as gaining a substantial equity position in the business and seats on the board of directors. Private equity groups are another source of capital for businesses. Private equity groups are pools of capital usually funded by money management firms, pensions, other institutions and select high-net-worth investors. Private equity groups sometimes fund early-stage investments. For startup businesses, financial bootstrapping refers to a variety of techniques that business

owners use to raise funds from nontraditional business funding sources such as spouses, friends and family, including for example utilizing used machinery, delaying salaries (Payne, 2007). Specifically, for owners of new businesses, bootstrapping is a critical source of financing since they lack access to traditional sources of business funding such as bank loans, venture capital financing, and public equity (Stouder, 2002). Entrepreneurs often use bootstrapping techniques because they lack access to traditional sources of capital or because they wish to maintain full control and ownership of their ventures, or both (Stouder, 2002). Specific bootstrapping techniques include practices such as continued regular employment with investment of personal savings, borrowing from family members, using personal credit cards, bartering for needed goods and services, state and local government grants, and having pre-agreements with suppliers and customers (Perry, Chandler, Yao & Wolff, 2011).

## 2. Method

### 2.1 Research Method

Qualitative research method was used in this study because data collection comprised documenting the opinions, and experiences of the respondents as opposed to numbers and other quantitative measurements. With qualitative research, practitioners can simultaneously gather and modify all collected data (Bloor, Sampson, Baker & Dahlgren, 2013). Qualitative researchers use interviews, field notes, conversations, memos, and recordings to create a sequence of representations of situations and units under study.. However, study sample was small and the selection of the sample was not random,

## 2.2 Research Design

The study used qualitative case-study method to facilitate in-depth exploration. Hashim, Hashim, and Esa (2011) suggested that qualitative case studies allow researchers to evaluate specific cases in ideal settings. For this study, we selected the multiple-case-study design to facilitate comprehension of real-life contemporary phenomenon in context. The strength in using an exploratory case study lies in narrative description within the methodology (Akaeze & Akaeze, 2017). Researchers may use case designs to investigate dynamic, experiential, complex processes and areas (Vissak, 2010). Researchers generalize in single-case and multiple-case studies that apply to fundamental principles rather than to populations. Qualitative case study approach enabled us to describe how participants understood the problem of youth unemployment and Nigerian economy.

## 2.3 Data Collection Technique

We used semistructured interviews based on open-ended questions to facilitate exploration of the issues dealt with by the research. To mitigate interview limitations, we listened carefully and skillfully asked participants for further clarifications without pressuring or making participants uncomfortable. We collected data in form of verbatim responses by participants to interview questions. Although we set each session to last for about one hour, where necessary this time limit was exceeded as long as participants were willing to divulge more information. We continued the data collection process up to evidence of data saturation. According to O'Reilly and Parker (2012) data saturation happens after a researcher observes repetitions in information from participant

responses.

In line the suggestion by Houghton, Casey, Shaw and Murphy (2013) we used member checking to verify accuracy and reliability of this study. Seidman (2012) posited that researchers could allow participants to assist with explanations of data during interviews, as well as clarification of transcribed information through member checking. Harper and Cole (2012) suggested that after interviews, researchers can use member checking to encourage participant's validation of responses and data interpretation accuracy. Member checking and multiple data sources are useful for improving credibility in case study designs (Houghton et al., 2013). For this study, member checking took place throughout each interview. We exchanged transcripts of interview responses with participants, to reaffirm accuracy.

## 2.4 Data Analysis Technique

.Thematic analysis is a qualitative analytic method for identifying, analyzing and reporting patterns (themes) within a collection data (Braun & Clarke, 2006). Nvivo trademarks software, a qualitative program for data analysis, facilitated thematic coding and categorization of data in the analysis phase (Bergin, 2011). Nvivo trademarks software program enabled the search and recognition of themes in a data collection. For this study, we used methodological triangulation and supported analysis of interview data with field notes.

The focus of this analysis was identification of various themes relative to how unemployed youths with post-secondary certificates accessed initial capital for startup small businesses. We used Interview protocol consisting of open-ended questions to collect data

from participants. Following the interviews, we critically reviewed data collection to validate findings and reasonable conclusion of study.

## 2.5 Reliability and Validity

Dobrow, Miller, Frank and Brown (2017) posited that internal validity is the quality or rigor of research methodology while external validity is the applicability, generalizability or transferability of research to other settings or contexts. We explained the scope and boundaries, and utilized convenient sampling to enhance transferability. Also, we used Triangulation techniques and context of study as methods to validate confirmability. We addressed all study challenges using research method, design, interview protocol with open ended semi structured questions and standardized practices of decoding and interpretation of data to remove the risks. To maintain reliability in the study, we avoided using any leading questions as much as possible, and allowed participants enough room to respond freely. The consistency of interview questions supports creditability and dependability of study results (Zohrabi, 2013).

## 3.0 Results and Discussion

### 3.1 Findings and Discussion of Study

In line with TOC concept the rate of goal attainment is limited by at least one constraint; in turn, only improvements to constraint will further the goal. The use of TOC attempts to identify constraints to system success and to effect changes necessary to remove the constraint. The theory of constraints is a system improvement approach that focuses on ways constraints limit system performance. Basically, the TOC is a management philosophy designed to facilitate achievement of goals.

The research question was further broken into 14 open ended interview questions about experiences of unemployed youths regarding access to initial capital and its influence on success of startup small business initiatives in Nigeria. Concept of TOC can be used for management and cost accounting (Ronen, 2005). Analysis indicated 13 themes classed within six categories emerging from the analysis of data pertaining to experiences of participants in acquiring funds for their startup businesses. The six emergent core themes were: (a) reliance on insufficient private funds and short-term overdraft, (b) inability to provide collaterals, (c) bureaucracy, (d) bribery and corruption, (e) leadership style, and (f) difficulty in expanding business. These six main themes morphed into three constraints with significant influences on ability to access initial capital for startup small business success by unemployed youths. These were inability to provide collaterals, reliance on insufficient private funds and short-term overdraft, and bureaucracy.

### 3.3 Summary of Themes

The major themes in a data collection are those that occurred or recurred repeatedly (Guba, 1978). In-depth analysis of interview data for this study revealed three main themes: (a) inability to provide collaterals, (b) reliance on insufficient private funds and short-term overdraft, and (c) bureaucracy. A concept is likely to be a theme when it occur or reoccur multiple times in the same context. Repetition was the key to identification of three major themes from the collection with 13 emergent themes. The main themes were most occurring or recurrent repetitions within data collection. Elements of inability to provide collaterals occurred 28% of the time while components of reliance on insufficient private funds and short-term overdraft

occurred 27% of the times. Components of bureaucracy occurred 25% of time while bribery and corruption themes occurred 20% of the times.

This result aligned with suggestion by Ellé (2012) that most micro entrepreneurs are excluded from traditional sources of financing because they cannot provide required collaterals needed for financing. Responses from the interviews showed that SMEs are handicapped in securing adequate funding because most of the time, they find it difficult to meet demand for collateral on credit applications. As expressed by majority of respondents, the demand for collateral is an obstacle regarding access to adequate funding. The result also supports position of Veselovsky, Nikonorova, Stepanov, Krasnyukova, and Bitkina (2017) that a common source of startups initial capital funding for innovative startups are own funds. Participants in this study suggested that although they rely on other sources the use of funds from their own resources to operate their firms is normal.

The result also supports suggestion by Ling and Chok (2013) and Sorensen 2007), that organizational bureaucracy constraints are a critical factor with significant impact on entrepreneurship. Organizational bureaucracy is characterized by rigidly defined roles, elaborated hierarchies, and inflexible routines (Ling & Chok, 2013). According to participants in this study, their experiences with creditors were that credit application processes were full of bureaucratic dispositions. In addition, this finding aligns with Nwogwugwu and Irechukwu (2015) who concluded that a principal cause of youth unemployment has been public sector corruption. Usually, bribery situations entail inducements or bid-rigging schemes.

For this study, participants cited corruption by bank officials as some of the experiences in credit application process. Startup capital is a significant predictor of entrepreneurial success (Baluku, Kikooma & Kibanja, 2016). However, access to finance is one of the most constraining features of business environment for SMEs. Financial capital matters in decision to start a firm. According to majority of participants, the demand for collateral is an obstacle regarding access to adequate funding. With respect to credit from formal sources, participants suggested that components of cost of borrowing included interest charges, cost of bribery, cost associated with bureaucracy processing and commitment fees. Majority of the respondents also indicated that although they might rely on other sources of funding, the use of funds from their own resources to operate their firms is the standard practice in Nigeria.

## 4. Conclusion and Recommendations

### 4.1 Recommendations for Action

The current research explored experiences of unemployed youths regarding their ability to access initial capital from formal and informal sources, and its effect on startup small business success in Nigeria. Participants believed that requirement for collateral were an obstacle to SMEs' access to finance. In addition to policy, government must ensure that small businesses are encouraged to thrive and able to provide jobs for the large army of unemployed youths. The federal government may initiate policy measures to adequately resource small business initiatives with funds by encouraging commercial banks to advance both short term and long-term loans to potential SME owners. Some possible measures to encourage long-term lending to SMEs by banks may include

offering partial guarantees on behalf of firms and tax incentives. Partial guarantees may replace collaterals required, and could be offered to potential owners who are serving youth corps members with valid small business ideas. Government should allow banks that incur bad debts resulting from loans extended to potential SME owners additional tax reliefs for the year losses were incurred. Introduction favorable interest rate regime whereby interest rate on lending to small and medium scale enterprises is approximately 5% per annum may facilitate economic growth (Nwogwugwu & Irechukwu, 2015). Entrepreneurial education should be made a core part of curriculum in higher institutions and the NYSC scheme. This will ensure that graduates have requisite skills to create jobs.

The Nigerian government may also adopt start-up subsidies for unemployed youths with post-secondary education using the NYSC scheme. This approach was useful in addressing youth unemployment through small business initiatives in Germany. To qualify for the start-up subsidy program known as SUS (Gründungszuschuss) individuals had to provide a business and financing plan which had to be evaluated by a competent body. If all requirements were fulfilled, SUS subsidy was paid in two parts for a maximum duration of 15 months (Caliendo, Hogenacker, Künn & Wießner, 2015). Government may adopt this scheme using the NYSC program for youths with good business ideas. Such youths should be allowed to stay back after the

completion of their NYSC to receive training and financial supports for startups.

With respect to credit from formal sources, government intervention to free potential SME owners from high costs of borrowing may encourage small business initiatives. Rather than the current system where both small and large firms go through same processes to the disadvantage of smaller firms, government may encourage banks to set-up special units wholly for SMEs. To discourage corruption by officials, authorities may enact measures including disciplinary actions to sanitize the process. Majority of participants suggested government intervention by providing credit schemes for SMEs to access funds without guarantees by owners. Government may also set money aside through the Central Bank at lower interest charges on SME initiatives. Government financial assistance should be backed by technical assistance through training, seminars and workshops for qualified individuals to understand how to source available initial funding at their disposal.

#### 4.2 Recommendations for Further Study

There is a need for quantitative research in order to understand fully the experiences of unemployed youths towards accessing initial capital for startup small businesses. The advantages derivable from a quantitative approach includes that results are easy to summarize and analyze from grouping comparisons. In addition the location for this study was mainly

heterogeneous business districts therefore future researchers may explore same issue using samples of youths within homogeneous populations. This can potentially give a reliable indication of the views from diverse populations. Another recommendation for further research includes qualitative researches that explore influence of education on youth's experiences in accessing initial capital for success of small business initiatives.

#### 4.3 Study Conclusions

Small businesses are vehicles for employment creation and family income in Nigeria. Nevertheless, youths who want to engage in small business initiatives lack access to initial startup capital. Findings from this study revealed that potential small business owners lack ability to access medium to long term loans from formal banks because they cannot provide required collateral to support such loans. In addition, high interest charged on loans, bureaucracy, bribery and corruption makes cost of borrowing very high, leading to inability to initiate startup small businesses.

If these obstacles and challenges are not addressed, SMEs may not play their critical roles in employment generation, poverty reduction, revenue generation, and distribution of income in the Nigerian economy. The study recommend policy maker's support and assistance to the SME subsector to facilitate access of funding at lower cost and technical assistance for ownership development.

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## RENEWABLE ENERGY CONSUMPTION AND ECONOMIC GROWTH IN NIGERIA: A CO-INTEGRATION AND GRANGER CAUSALITY APPROACH



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### 1.0 Introduction

The current world's population outburst, with venial desire for a better quality of life, and incremental demand for energy adds further expediency to the need for frameworks that can guarantee cost-effective, efficient, clean and renewable energy. Indisputably, the conventional way to meet energy needs in contemporary economies is to burn fossil. Presumably the share of energy production from alternative, cost effective and cleaner sources has increased slightly. Nonetheless, the usage of fossil fuels as an energy source remains predominant, supplying an estimated 85.0 percent of the world's energy production. The burning of fossil fuels, which results in greenhouse gas emissions, is

the primary human activity affecting the amount and rate of climate change (World Bank, 2017).

Fossil fuels for energy contribute directly to global warming by emitting carbon dioxide to the atmosphere, as well as increasing deforestation and climate change. Economies dependent on fossil fuels increases greenhouse gas emissions causing drastic changes to our climatic systems. Therefore, the trade-offs between energy needs and the environmental consequences of increased energy consumption must be addressed through sustainable and clean energy sources. Providing the energy needed for growth while mitigating its effects on the world's climate is a global challenge. Goal 7 of the United Nations Development Programme (Sustainable Development Goals) – Affordable and clean energy – reaffirms the centrality of energy to development and wellbeing, and points to the policy deliverables that are required to ensure universal access to affordable electricity by 2030.

The International Energy Agency (2017) reports affirmed that one in five people across the globe lack access to electricity and, about 2.8 billion people still lack access to clean cooking. The expected switch to liquefied petroleum gas (LPG), natural gas and electricity remains unimpressive. One-third of the world's population – 2.5 billion people – still rely on the traditional use of solid biomass while another 120 million people cook with kerosene and 170 million with coal. Household air pollution from these sources is currently linked to 2.8 million premature deaths per year, and several billion hours are spent

collecting firewood for cooking, mostly by women, that could be put to more productive uses (World Energy Outlook, 2017).

The inadequacy of electricity supply in Nigeria is one of the country's gigantic malaises. Installed generation capacity is 12,500 megawatts (MW), but only 3,500–5,000 MW current output is available and demand widely expected to dramatically outstrip available electricity generation capacity. The electricity supply is untrustworthy and not widespread (per capita electricity consumption in 2005 was 127 kWh, less than half that in Ghana (World Bank, 2008)). The national electrical grid system is increasingly constrained due to its ageing infrastructure, vandalism, theft, bad maintenance culture, and a lack of proper monitoring. Unreliable electricity forces economic agents to install their own generators in their houses and businesses, at substantial cost. This is also a major contributor to carbon footprint.

Encouragingly, Nigeria can reverse this ugly trend with her endowed huge renewable resources which remain underutilised and largely untapped including solar, hydroelectric, wind in coastal areas and geothermal in the northern region. Nigeria occupies a position on the world solar map that allows the country access to 7.0 kWh/m<sup>2</sup> (25.2 MJ/m<sup>2</sup> per-day) in the far north and about 3.5 kWh/m<sup>2</sup> per day (12.6 MJ/m<sup>2</sup> per-day) in the coastal latitudes at 2500 sunshine hours per year.

Oxymoronically, Nigeria remains beneath the comity of nations known for solar power utilization. This is in stark contrast to Germany, a country that is at the

forefront of solar power and a world leader in photovoltaic (PV) installation, yet receives an average of only 3.3 sunshine hours per day. Nigeria's advantageous position means that renewable energy must be considered as a viable solution to the energy challenges that face the country, and in particular for communities in rural areas and informal settlements. In this regard, renewable energy technologies are capable of providing sustainable solution to Nigeria's energy access problems and support its economic development. Renewable energy technologies have the capability to be affordable, decentralised sources of electricity to those who are not connected to the national electrical grid. One of the things renewable energy technologies can help developing countries with, besides a diversified energy portfolio and increased energy security, is poverty reduction by providing affordable and accessible electricity to poverty stricken communities. Improving renewable and hybrid energy systems is key for rural communities, many of whom are still without a reliable connection to the national grid. However, cynics and critics of renewable energy affirm that electricity is required constantly in modern life today, so ideally there should be no breaks in energy transmission. This is one of the most common and a pervasive critique of renewable energy since it is often viewed as an intermittent energy source with disruptive cycles due to seasonal variations. The questions that remains resonate are what happen if some days the sun doesn't shine? There may be no wind, or there may be a drought, each of which inhibits the production of solar, wind and hydro-electricity, respectively. Nevertheless, this ubiquitous concern about renewable energy is slowly being answered. In 2014, there were notable improvements in the usage and creation of energy storage units

which can store excess electricity to be used in times when renewable energy technologies cannot generate electricity (Renewable Energy Policy Network, 2015).

Importantly, past research has been inconclusive as to what type of relationship exists between renewable energy consumption and economic growth and there is few independent analysis of the Nigerian case. Hence, this work will empirically examine the relationship between renewable energy consumption and economic growth. It is increasingly becoming germane to understand the relationship between energy consumption, the environment, and the unrelenting pursuit of economic growth in the context of the Nigerian power sector with existing disequilibria between finite resources and infinite needs. This research work will attempt to further the understanding of this relationship in Nigeria.

## 2. Conceptual Review

The conceptual review of this paper was discussed under two major subheadings namely: renewable energy and economic growth

### 2.1 Renewable Energy:

Renewable energy can be broadly defined as any energy generated from natural processes including hydropower, geothermal, solar, tides, wind, biomass, and biofuels. Natural endowments are a rich source of adaptation, innovation and inspiration for numerous technologies for power generation. Renewable energy often displaces conventional fuels in four areas: electricity generation, hot water/space heating, transportation, and rural (off-grid) energy services (Renewable Energy Policy Network for the 21st Century, 2010).

Based on IEA (2017) report, by 2030, renewable energy sources power over 60 percent of new access, and off-grid and mini-grid systems provide the means for almost half of new access, underpinned by new business models using digital and mobile technologies. Since 2000, most new access has come from fossil fuels (45 percent coal, 19 percent natural gas and 7 percent oil). The technologies used to provide access however have started to shift, with renewable providing 34% of new connections since 2012, and off-grid and mini-grid systems accounting for 6 percent. Worldwide investments in renewable technologies amounted to more than US\$286 billion in 2015, with countries like China and the United States heavily investing in wind, hydro, solar and biofuels (Renewable Energy Policy Network for the 21st Century, 2016). According to the UNEP (2015) renewable energy, excluding large hydroelectric projects, made up 53.6 percent of the total gigawatt capacity of all energy technologies installed in 2015. Some places and at least two countries, Iceland and Norway generate all their electricity using renewable energy already, and many other countries have the set a goal to reach 100 percent renewable energy in the future. For example, in Denmark the government decided to switch the total energy supply (electricity, mobility and heating/cooling) to 100% renewable energy by 2050, (VadMathiesen, et. al., 2015).

Renewable Energy Policy Network for the 21st Century (2015) found that majority of developing countries have a natural advantage when it comes to renewable energy because of their abundant renewable energy resources. This makes a renewable solution to developing economies' energy problems even more competitive relative to the rising prices of more traditional energy sources (Renewable Energy Policy

Network for the 21st Century, 2015). There are invaluable sources of energy within developing countries that have thus far been largely unexploited. For example, according to Adusei (2011), Ethiopia and the Democratic Republic of Congo possess about 61 percent of Africa's untapped hydroelectric power potentials. Moreover, in 2014, Kenya added 1.1 gigawatts of geothermal energy which was the largest share of newly added geothermal energy in the world (Renewable Energy Policy Network for the 21st Century, 2015).

Renewable energy resources exist over wide geographical areas, in contrast to other energy sources, which are concentrated in a limited number of countries. Rapid deployment of renewable energy and energy efficiency is resulting in significant energy security, climate change mitigation, and economic benefits. Globally, there are an estimated 7.7 million jobs associated with the renewable energy industries, with solar photovoltaics being the largest renewable employer. As of 2015 worldwide, more than half of all new electricity capacity installed was renewable (Renewable Energy Policy Network for the 21st Century, 2016). It is widely recognised that sustainable energy at low cost would contribute to poverty alleviation and arrest climate change. Renewable energy technologies have more benefits to developing countries than merely being environmentally friendly. They also can provide protection against future price increases in conventional fuels by diversifying the energy portfolio, aid in the balancing of both budget and trade deficits, and create new local economic opportunities which help support poverty reduction and promote economic growth (World watch, 2005 and Renewable Energy Policy Network for the 21st Century, 2015).

However, there are limitations that bedevil the use of renewable energy. Despite the fact that as renewable energy technology improves, its downsides will continue to decrease and it will become even more competitive with fossil fuels. There are still aspects of renewable energy technologies which have put countries off from implementing it earlier or in larger quantities. For instance, the initial investment cost is high, much larger than conventional energy sources, which does not favor developing countries (International Renewable Energy Agency, 2015). But while conventional energy sources have lower capital costs, they tend to have significant operating costs whereas the operating costs of renewable energy systems offset their high initial capital costs over time (World watch Institute, 2005).

## 2.2 Economic Growth:

Economic growth is the increase in the inflation-adjusted market value of the goods and services produced by an economy over time. It is conventionally measured as the percent rate of increase in real gross domestic product (real GDP). Economic growth is an increase in the capacity of an economy to produce goods and services, compared from one period of time to another. It can be measured in nominal or real terms, the latter of which is adjusted for inflation. Traditionally, aggregate economic growth is measured in terms of gross national product (GNP) or gross domestic product (GDP).

Economic growth is an important macro-economic objective because it enables increased living standards, improved tax revenues and helps to create new jobs. Economic growth is accepted and desirable. It is the major cause of changes in living standard, with growth, each generation can expect, on the average, to be substantially

better off than all proceeding generations.

However, growth is not without its costs, industrialisation, unless very carefully managed, causes deterioration of the environment. Nevertheless, most people would probably agree that the gains from growth were worth the economic costs incurred by those who lose it. Since growth doubles average living standards over 20 to 30 years. It is clearly possible by suitable redistributive policies to make everyone better off as a result of growth. The theory of economic growth is a long-run theory. It ignores short-run fluctuations of actual national income around potential income and concentrates on the effects of investment on raising potential income.

## 2.3. Theoretical and Empirical Review

There are four causality scenarios which have led to the creation of the following hypotheses regarding the relationship between renewable energy consumption and GDP. First, if an increase in renewable energy consumption causes an increase in GDP then this is evidence of the growth hypothesis. The growth hypothesis connotes unidirectional causality running from energy consumption to GDP whereby energy acts as a complement to labour and capital in the production process (Payne, 2010). The growth hypothesis interprets energy as a driver of economic growth such that energy conservation policies, perhaps to reduce emissions for example, may result in a decrease in GDP. The second scenario is the antithesis of the growth hypothesis. As such, the conservation hypothesis posits that there is unidirectional causality from GDP to energy consumption.

The conservation hypothesis implies that energy conservation policies such as emission

reductions or energy efficiency improvements will not adversely affect economic growth (Payne, 2010). The third scenario suggests the existence of an interdependent relationship whereby energy consumption and GDP affect each other simultaneously (Payne, 2010). This scenario is described as the feedback hypothesis and is supported by evidence of bidirectional causality between energy consumption and GDP. Finally, the neutrality hypothesis sees energy consumption as a relatively small component of GDP and thus should not have a significant impact on economic growth (Payne, 2010). Consequently, the neutrality hypothesis is supported by the non-existence of a causal relationship between energy consumption and GDP.

Sustainable energy sources are germane to socio-economic development in the global space. The empirical literature studying the relationship between renewable energy consumption and economic growth has expanded considerably in the last decade. The current research spans a wide variety of countries and regions and encompasses both developed to developing economies. Similar to the energy consumption economic growth literature, the research findings also vary between countries and within regions. Many studies have been conducted on the causal relationship between economic growth and renewable energy consumption but have found mixed results (Apergis, Chang, Gupta and Ziramba, 2016). Amri (2017) examines the relationship between economic growth and energy consumption under two categories- renewable and non-renewable energy consumption. The findings from the ARDL model supported a long-run relationship between economic growth and non-renewable energy consumption but no co-integration was found between

renewable energy consumption and economic growth. The results posited bi-directional causality between non-renewable energy consumption and economic growth both in the short-run and long-run. Furthermore, the results revealed a unidirectional causality flowing from renewable energy consumption to economic growth in the long-run.

Apergis et.al, (2016) investigates the long-run relationship between hydroelectricity consumption and economic growth for the 10 largest hydroelectricity consuming countries (Brazil, Canada, China, France, India, Japan, Norway, Sweden, Turkey and the USA). The study used annual data for the period 1965 to 2012. The results from the Bai and Perron (2003) tests of co-integration suggested an existence of a long-run relationship between economic growth and hydroelectricity consumption. The results from a non-linear panel smooth transition vector error correction model were divided based on the three structural breaks, 1988, 2000 and 2009. A one-way causality from economic growth to hydroelectricity consumption was established in the long-run and short-run for the period before 1988. For the period after 1988, a feedback hypothesis was realised between economic growth and hydroelectricity consumption in the long-run and short-run.

Khobai (2017) investigates the causal relationship between renewable energy consumption and economic growth in South Africa. It incorporates carbon dioxide emissions, capital formation and trade openness as additional variables to form a multivariate framework. Quarterly data is used for the period 1990 – 2014 and is tested for stationarity using the Augmented Dickey Fuller (ADF), Dickey Fuller Generalised Least Squares (DF-GLS) and Phillips and Perron (PP) unit root tests. The study employs the Autoregressive Distributed Lag

(ARDL) model to examine the long run relationship among the variables. The results validated an existence of a long-run relationship between the variables. Moreover, a unidirectional causality flowing from renewable energy consumption to economic growth was established in the long-run. The short-run results suggested a unidirectional causality flowing from economic growth to renewable energy consumption. The findings of the study suggest that an appropriate and effective public policy is required in the long-run, while considering sustainable economic growth and development.

Omri, Mabrouk and Sassi-Tmar (2015) examines the causal link between energy consumption (nuclear energy and renewable energy) and economic growth for 17 developed and developing countries covering the period between 1991 and 2011. Mixed results were found for nuclear energy and renewable energy. Commencing with nuclear energy, their findings validated a one-way causality flowing from nuclear energy consumption to economic growth in Spain and Belgium, a unidirectional causality flowing from economic growth to nuclear energy consumption was established in Sweden, Netherlands, Canada and Bulgaria and bidirectional causality between nuclear energy and economic growth was found for Argentina, Brazil, France, Pakistan, and the USA. No causality was established for Finland, Hungary, India, Japan, Switzerland and the UK. The results for renewable energy and economic growth suggested a unidirectional causality from renewable energy consumption to economic growth in Hungary, India, Japan, Netherlands, and Sweden. A unidirectional causality from economic growth to renewable energy consumption was evident in

Argentina, Spain and Switzerland whereas bidirectional causality was found for Belgium, Bulgaria, Canada, France, Pakistan and the USA. No causality was found for Brazil and Finland. A feedback hypothesis between nuclear energy consumption and economic growth was realised for the panel while a conservation hypothesis was established between renewable energy consumption and economic growth.

The study by Halkos and Tzemes (2014) investigates the link between electricity consumption from renewable sources and economic growth for 36 countries covering the period between 1990 and 2011. The study used a non-parametric methodological technique. The study analysed the entire sample of countries and then grouped the countries into sub-samples. The results for the entire sample of countries established that the relationship increases only up to a certain level of economic growth. A highly non-linear relationship was realised for emerging and developing countries while for developed countries, an increasing non-linear relationship was observed.

Sebri and Ben-Salha (2014) studies the relationship between economic growth, renewable energy consumption, carbon dioxide emissions and trade openness for the Brics countries. The study was taken over a period 1970 to 2010, using the ARDL bounds testing approach and the vector error correction model (VECM) technique. The results suggested an existence of a long-run relationship between economic growth, renewable energy consumption, carbon dioxide emission and trade openness. The VECM model results supported bi-directional causality flowing between renewable energy consumption and economic growth. Apergis and Payne (2014) investigates the relationship between renewable energy consumption, output,

carbon dioxide emissions and fossil fuel prices for seven Central America countries for the period between 1980 and 2010. The results affirmed a long run relationship between renewable energy consumption, output, carbon dioxide emissions, coal prices and oil prices. The results further showed that these variables are positively and significantly related.

Ohlers and Fetters (2014) examines the causal linkage between electricity generated from different forms of renewables for the 20 OECD countries covering the period between 1990 and 2008. Their findings from the Pedroni panel co-integration test confirmed that electricity generated from the renewables and economic growth has a long-run relationship. Furthermore, they established a feedback hypothesis between economic growth and hydroelectricity in the short-run. Zirimba (2013) examines the relationship between economic growth and hydroelectricity consumption for Algeria, Egypt and South Africa for the period 1980 – 2009. The findings from the Toda and Yamamoto technique suggested a feedback link between hydroelectricity consumption and economic growth in Algeria. Moreover, it was established that economic growth Granger-causes hydroelectricity in South Africa while no causality was observed for Egypt.

Apergis and Payne (2012) investigates the linkage between renewable energy consumption, non-renewable energy consumption and economic growth for 80 countries for the period 1990 – 2007. The study employed the Pedroni heterogeneous panel co-integration test and panel error correction model. Their findings confirmed an existence of a long run relationship between economic growth, renewable energy consumption and non-renewable energy consumption,

capital formation and labor. The results further supported a feedback link between renewable energy consumption and non-renewable energy consumption and economic growth in the long run and short run.

Apergis and Payne (2011) studies the link between renewable energy consumption and economic growth in six Central American countries covering the period from 1980 to 2016. The study employed the heterogeneous panel co-integration model and panel error correction model. Their findings confirmed an existence of co-integration between economic growth, renewable energy consumption, labor force and gross fixed capital formation. Furthermore, it was observed that there is a feedback relationship between renewable energy consumption and economic growth both in the long-run and short-run. Aminu and Aminu (2015) set out to re-examine the causal relationship between energy consumption and economic growth using Nigeria's data from 1980 to 2011 in a multivariate framework by including labour and capital in the causality analysis. Applying Granger causality test, impulse response and variance decomposition analysis; the results of the causality test reported absence of causality and that of variance decomposition found that capital and labour are more important in affecting output growth compared to energy consumption.

Odularu and Okonkwo (2009) investigates the relationship between energy consumption and the Nigerian economy from the period of 1970 to 2005. The energy sources used to test for this relationship were crude oil, electricity and coal. By applying the cointegration technique, the results derived infer that there exists a positive relationship

between current period energy consumption and economic growth. With the exception of coal which was positive, a negative relationship was noted for lagged values of energy consumption and economic growth. The implication of the study is that increased energy consumption is a strong determinant of economic growth having an implicit effect in lagged periods and both an implicit and explicit effect on the present period in Nigeria.

Ogundipe and Apata (2013) examines the relationship between electricity consumption and economic growth in Nigeria using the Johansen and Juselius

Co-integration technique based on the Cobb-Douglas growth model covering the period 1980-2008. The study also conducted the Vector Error Correction Modelling and the Pairwise Granger Causality test in order to empirically ascertain the error correction adjustment and direction of causality between electricity consumption and economic growth. The study found the existence of a unique co-integrating relationship among the variables in the model with the indicator of electricity consumption impacting significantly on growth. Also, the study shows an evidence of bi-directional causal relationship

between electricity consumption and economic growth.

### 3.1. Model Specification

This study is aimed at establishing the causal relationship between renewable energy consumption (RENC) and economic growth proxied by real gross domestic product (RGDP) in Nigeria over the years (1990-2017). The Mao Lin Cheng and Yun Han (2013) modified Cobb-Douglas production model which conjure that changes in the factor of production are responsible for economic growth and development is the foundation of the model.

The modified Cobb–Douglas production function is given thus:

$$Y = AX_1^{\beta_1} X_2^{\beta_2} \dots X_m^{\beta_m} e^{p_1D_1+p_2D_2+\dots+p_rD_r} \dots \dots \dots [1]$$

Through differential computation, we get

$$dY = \frac{Y}{A} dA + \beta_1 \frac{Y}{X_1} dX_1 + \beta_2 \frac{Y}{X_2} dX_2 + \dots + \beta_m \frac{Y}{X_m} dX_m. \dots \dots \dots [2]$$

Assume that the economic vector  $(A, X_1, X_2, \dots, X_m, Y)$  changes from the  $t$ th year  $(A^{(t)}, X_1^{(t)}, X_2^{(t)}, \dots, X_m^{(t)}, Y^{(t)})$  to the  $(t + 1)$ st year  $(A^{(t+1)}, X_1^{(t+1)}, X_2^{(t+1)}, \dots, X_m^{(t+1)}, Y^{(t+1)})$  in accordance with a certain continuous curve; then

$$\Delta Y = \int_{L^{(t)}} dY = \int_{L^{(t)}} \frac{Y}{A} dA + \int_{L^{(t)}} \beta_1 \frac{Y}{X_1} dX_1 + \int_{L^{(t)}} \beta_2 \frac{Y}{X_2} dX_2 + \dots + \int_{L^{(t)}} \beta_m \frac{Y}{X_m} dX_m. \dots \dots \dots [3]$$

Let

$$\Delta Y = \int_{L^{(t)}} \frac{Y}{A} dA, \quad \Delta Y_{X_i} = \int_{L^{(t)}} \beta_i \frac{Y}{X_i} dX_i (i = 1, 2, \dots, m) \dots \dots \dots [4]$$

Then

$$\Delta Y = \Delta Y_A + \Delta Y_1 + \Delta Y_2 + \dots + \Delta Y_{X_m} \dots \dots \dots [5]$$

Since

$$\frac{\partial Y}{\partial A} = \frac{Y}{A}, \quad \frac{\partial Y}{\partial X_i} = \beta_i \frac{Y}{X_i} (i = 1, 2, \dots, m), \dots \dots \dots [6]$$

It follows that

$$\Delta Y = \int_{L^{(t)}} \frac{\partial Y}{\partial A} dA, \quad \Delta Y_{X_i} = \int_{L^{(t)}} \frac{\partial Y}{\partial X_i} dX_i (i = 1, 2, \dots, m) \dots \dots \dots [7]$$



Hence, the labour contribution rate is expressed as

$$\frac{\Delta Y_L}{\Delta Y} = \beta_1 \left( \frac{1}{y} - \frac{1}{l} \right) 1n(1+l) + \beta_1 \dots \dots \dots [15]$$

Similarly, the obtained capital contribution rate is

$$\frac{\Delta Y_K}{\Delta Y} = \beta_2 \left( \frac{1}{y} - \frac{1}{k} \right) 1n(1+k) + \beta_2; \dots \dots \dots [16]$$

the energy contribution rate is

$$\frac{\Delta Y_E}{\Delta Y} = \beta_3 \left( \frac{1}{y} - \frac{1}{e} \right) 1n(1+e) + \beta_3; \dots \dots \dots [17]$$

Further, the contribution rate of technical progress is

$$\begin{aligned} \frac{\Delta Y_A}{\Delta Y} = & 1 - (\beta_1 + \beta_2 + \beta_3) - \beta_1 \left( \frac{1}{y} - \frac{1}{l} \right) 1n(1+l) \\ & - \beta_2 \left( \frac{1}{y} - \frac{1}{k} \right) 1n(1+k) \dots \dots \dots [18] \\ & - \beta_3 \left( \frac{1}{y} - \frac{1}{e} \right) 1n(1+e) \end{aligned}$$

In the above formula, k, l, e denote the growth rates of capital, labour and energy, respectively; and y denotes the economic growth rate. Obviously, when k, l, e are small, then

$$1n(1+l) \approx l, \quad 1n(1+k) \approx k, \quad 1n(1+e) \approx e. \quad \dots \dots \dots [19]$$

From equation [15], [16] and [17], the contribution rate of each factor (labour, capital and energy contribution) is derived as shown in equation [19], [20] and [21] respectively.

$\frac{\Delta Y_L}{\Delta Y} = \beta_1 \frac{l}{y}, \quad \dots \dots \dots [20]$
$\frac{\Delta Y_k}{\Delta Y} = \beta_2 \frac{k}{y}, \quad \dots \dots \dots [21]$

$\frac{\Delta Y_E}{\Delta Y} = \beta_3 \frac{e}{y}, \quad \dots \dots \dots [22]$
---

$\frac{\Delta Y_A}{\Delta Y} = 1 - \beta_1 \frac{l}{y} - \beta_2 \frac{k}{y} - \beta_3 \frac{e}{y} \dots \dots \dots [23]$
--

Equation [23], is also consistent with the calculation result which is achieved by Solow's growth rate equation (Wu, 2006 and Yuan et .al, 2009).

Since the focal emphasis of this study is on the impact of renewable energy consumption on economic growth. We dropped the independent variable (energy) and replaced it with a more suitable vector of variable which is renewable

energy consumption. Also our study is time series in nature, this makes us to remove i from the model which represents cross-sectional component. The theoretical propositions embodied in these relationships are verified and the estimation of

the variables involved which are measured with econometric model is undertaken.

The equation of this study is specified in a production function form as:

$$RGDP = f (RENC, LFE, GFCF, COE, EXCR) \dots\dots\dots [24]$$

$$RGDP = \alpha_0 + \alpha_1RENC + \alpha_2LFE + \alpha_3GFCF + \alpha_4COE + \alpha_5EXCR + \epsilon_i \dots\dots\dots [25]$$

By adopting a log-linear specification and taking the natural logarithm of both sides of the equation and assuming linearity among the variables, equations [24] and [25] gives:

$$\log RGDP = \alpha_0 + \alpha_1 \log RENC + \alpha_2 \log LFE + \alpha_3 \log GFCF + \alpha_4 \log COE + \alpha_5 \log EXCR + \epsilon_i \dots\dots\dots [26]$$

$$\alpha_0 > 0, \alpha_1 > 0, \alpha_2 > 0, \alpha_3 > 0, \alpha_4 > 0, \alpha_5 > 0$$

Where:

RGDP = Real gross domestic product

RENC = Renewable energy consumption

LFE = Labour force employed

GFCF=Gross Fixed capital formation

COE = CO2 emission per capita

EXCR = Official exchange rate

$\alpha_0$  = Constant

$\alpha_1, \alpha_2, \alpha_3, \alpha_4$  and  $\alpha_5$  are parameters to be estimated

$\epsilon_i$  = error

Causality Model Specification

The pair-wise bivariate causality model is as present below:

$$RGDP_t = \sum_{i=1}^n \alpha_0 RGDP_{t-i} + \alpha_1 RENC_{t-i} + \epsilon \dots\dots\dots [27]$$

$$RENC_t = \sum_{i=1}^n \alpha_0 RENC_{t-i} + \sum_{i=1}^n \alpha_1 RGDP_{t-i} + \epsilon \dots\dots\dots [28]$$

In Equation [27], current RGDP is related to its past values as well as past values of RENC. On the other hand, equation [28] postulates that RENC is related to its past values as well as past values of RGDP. If  $\alpha_1 = \alpha_2 = \dots, k = 0$  in equation [27] it implies RENC does not Granger Cause RGDP. Similarly, if  $\alpha_1 = \alpha_2 = \dots, k = 0$  in equation [28] it implies RGDP does not Granger Cause RENC.

**3.2 Source of Data/Technique of Analysis**

The study employed annual time series data spanning from 1990 – 2017. Data were collected from the World Development Indicator (WDI) and U.S Energy Information Administration various issues. The econometric methods used in this study are Ordinary Least Squares (OLS) method, Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit-root test, a version of analyzing multivariate cointegrated systems developed by Johansen and Juselius (1994) and Pairwise Granger Causality Test. The econometric view package (E-view version 7) was used to analyse data.

**4. Results and Discussion**

This section deals with the econometrics analysis of data obtained from the study. The chapter is dichotomized into Unit

Root Test, Ordinary Least Squares (OLS) result, Co-integration Test and Causality Test.

Unit Root Test: To investigate the existence of stochastic non-stationary in the series, the unit root test using Augmented Dickey Fuller (ADF) and Phillips-Perron statistic was conducted. The result is presented in Table 1. Table 1 showed the test for unit root in the series with Augmented Dickey Fuller (ADF) and Phillips-Perron test statistics. The Augmented Dickey Fuller (ADF) developed by Dickey and Fuller (1979) showed that LnRGDP, LnRENC, LnLFE, LnCOE and LnEXCR were stationary at first differencing while LnGFCF was stationary at second differencing. On the other hand, the unit root result on Phillips-Perron showed that the entire series (including GFCF) was stationary at first differencing or integrated at order one i.e. I(1).

This implies that the hypothesis of non-stationarity was rejected for all variables at their difference form. The result therefore justified the need to test for co integration. The reason for the discrepancy between ADF and PP coefficient on GFCF was explained by Phillip and Perron (1988) and Elliot, Rothenberg and Stock(1996) who opined that due to the poor size and power properties of ADF statistics, ADF coefficients are usually fairly larger than other conventional unit root tests. Hence, they are sometimes not reliable for small sample dataset as they tend to over reject the null hypotheses when it is true and accept the null hypothesis when it is false. This justifies the need to confirm the stationarity property of the series with the Phillips-Perron (PP) test.

Ordinary Least Squares (OLS) result

Table 1: Unit Root test result on the Variables

Series	ADF statistic	Critical values		Order of Integration	Philips-Perron statistic	Critical values		Order of Integration
		1%	5%			1%	5%	
LnRGDP	-3.787	-3.711	-2.981	I(1)	-3.787	-3.711	-2.981	I(1)
LnRENC	-6.786	-3.711	-2.981	I(1)	-6.860	-3.711	-2.981	I(1)
LnLFE	-5.321	-3.711	-2.981	I(1)	-5.446	-3.711	-2.981	I(1)
LnGFCF	-10.481	-3.737	-2.992	I(2)	-6.078	-3.711	-2.981	I(1)
LnCOE	-4.606	-3.711	-2.981	I(1)	-4.607	-3.711	-2.981	I(1)
LnEXCR	-4.918	-3.711	-2.981	I(1)	-4.917	-3.711	-2.981	I(1)

Source: Regression result (E-view version 7)

Result of the OLS regression is shown in Table 1.

Variable	Coefficient	Standard Error	t-statistics	prob.
Constant	13.8597	3.2985	4.2018	0.0004
LnRENC	0.9569	0.2202	4.3460	0.0003
LnLFE	1.4684	1.6243	0.9040	0.3758
LnGFCF	0.1588	0.0516	3.0793	0.0012
LnCOE	0.0684	0.1205	0.5677	0.5760
LnEXCR	0.0011	0.0003	3.9695	0.0006

R-squared =0.7769

Adjusted R-squared =0.7707

F-statistic = 179.72

Durbin Watson statistic = 1.773

Ln represents natural logarithm  
Dependent Variable: LnRGDP

From Table 2, the estimate of 0.957 for LnRENC, 0.159 for LnGFCF and 0.001 for LnEXCR are statistically significant ( $p < 0.05$ ). The estimates showed that renewable energy consumption per capita (LnRENC), gross fixed capital formation (LnGFCF) and exchange rate (LnEXCR) has direct relationships with real gross domestic product (LnRGDP). This corroborates apriori expectations. This further implies that a unit increase in LnREC, LnGFCF and LnEXCR will bring about an approximate increase of 0.957, 0.159 and 0.001 percent increase in LnRGDP respectively. The estimate of 1.468 for LnLFE and 0.068 for LnCOE showed direct but statistically insignificant relationship with the dependent variable (LnRGDP).

The overall goodness of fits of the model was satisfactory with an r-squared (R<sup>2</sup>) and adjusted r-squared of 0.768 and 0.763 respectively. The values indicated that the model explained about 77.7 percent to 77.1 percent variations in the dependent variable (LnRGDP)

while the residue of 22.3 percent to 22.9 percent variation is attributed to error or other relevant factors with prominent impact which were not captured in the model. The overall performance of the estimates in the model is measured by the F-statistic. The estimate of F-statistic 179.72 showed that independent variables jointly had statistically significant impact on the dependent variable at 5 percent level of significance. Therefore, the overall parameter estimates for the model are considered to be statistically significant. The Durbin Watson (D.W) statistic of the model is 1.773. Following the rule of thumb of  $1.8 = D.W = 2.2$ , the statistic explains that there is no presence of serial auto-correlation between or among the independent variables.

Although, CO<sub>2</sub> emissions is one of the environmental sustainability issues that have been acclaimed by international protocols such as the United Nations (UN) and World Health Organization (WHO) to have adverse effect on health of the productive workforce. However, result showed that emissions from the

consumption of carbon monoxide (CO<sub>2</sub>) per capita had direct impact on economic growth. This may be due to the fact that increase in carbon emissions (CO<sub>2</sub>) per capita emanates from increased land use, urbanisation, forest resource exploration and increase in productive activities from economic units – consumers, producers, and the government.

Co-integration Test

Economically speaking, two variables are cointegrated if they have a long-run or an equilibrium relationship between them (Gujarati, 2004:822). The Johansen (1991) likelihood ratio test statistics, the trace and maximal eigenvalue test statistics, were utilised to determine the number of cointegrating vectors. The decision rule is to reject the null hypothesis if the probability (p-value) is less than 5percent (0.05). Otherwise, we do not reject.

The result of the cointegration is summarized in the Tables 3 and 4.

Table 3: Cointegration Rank Test (Trace) on the Series

Series: LnRGDPLnRENCLnLFElnGPFLnCOELnEXCR  
Lags interval (in first differences): 1 to 1

Hypothesized No. of CE(s)	Eigenvalue	Hypothesized No. of CE(s)	Eigenvalue	Hypothesized No. of CE(s)
None *	0.913415	None *	0.913415	None *
At most 1 *	0.672118	At most 1 *	0.672118	At most 1 *
At most 2 *	0.609088	At most 2 *	0.609088	At most 2 *
At most 3 *	0.484173	At most 3 *	0.484173	At most 3 *
At most 4	0.404883	At most 4	0.404883	At most 4
At most 5	0.042372	At most 5	0.042372	At most 5

Trace test indicates 4 cointegratingeqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

From the trace statistics (Table 3) and maximum eigenvalue statistics (Table 4), the first and second null hypotheses at 5% level of significance is rejection based on our decision rule that the probability value(s) is or are less than 5% (0.05). The trace statistics revealed that there is at least four cointegrating equation or vector among the variables while the maximum eigen

revealed that there is at least one cointegrating equation. Therefore, there is a long-run relationship among the variables in the model. This therefore justified the need to test for causality.

**Causality Test**  
To determine the direction of causation between renewable

energy consumption and economic growth in Nigeria, the Granger causality test developed by Granger (1969) was employed. According to this test, a variable is said to Granger cause another variable if the past and present values of the former predict the latter. Result of the causality test is presented in Table 5.

Table 4:Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.913415	63.61236	40.07757	0.0000
At most 1	0.672118	28.99267	33.87687	0.1714
At most 2	0.609088	24.42111	27.58434	0.1207
At most 3	0.484173	17.21156	21.13162	0.1623
At most 4	0.404883	13.49391	14.26460	0.0659
At most 5	0.042372	1.125683	3.841466	0.2887

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

Table 5: Pair-wise Granger Causality test on the series

Null Hypothesis:	Obs	F-Statistic	Prob.
LnRENC does not Granger Cause LnRGDP	26	1.94928	0.1673
LnRGDP does not Granger Cause LnRENC		6.75754	0.0054
LnGFCF does not Granger Cause LnRGDP	26	3.86435	0.0372
LnRGDP does not Granger Cause LnGFCF		15.5305	7.E-05
LnEXCR does not Granger Cause LnRGDP	26	5.25888	0.0141
LnRGDP does not Granger Cause LnEXCR		0.02757	0.9728
LnCOE does not Granger Cause LnRENC	26	4.15755	0.0301
LnRENC does not Granger Cause LnCOE		0.86565	0.4353
LnEXCR does not Granger Cause LnCOE	26	7.68985	0.0031
LnCOE does not Granger Cause LnEXCR		0.61085	0.5523

Source: E-view result

The result (Table 5) of the pairwise granger causality tests conducted on the variables shows that there exist a unidirectional causality running from LnRGDP to LnRENC, LnEXCR to LnRGDP, LnCoe to LnRENC and from LnEXCR to LnCOE while a bidirectional relationship runs from LnGFCF to LnRGDP and vice-versa. This result therefore shows that real gross domestic product granger causes renewable energy consumption, exchange rate granger causes real gross domestic product, CO2 emissions granger cause renewable energy consumption and exchange rate granger causes CO2 emissions but a bidirectional relationship runs between gross fixed capital formation and real gross domestic product and vice versa.

The implication of causation running from real gross domestic product to renewable energy consumption is that RGDP causes renewable energy consumption without feedback. This result supports the conservation hypothesis which posits that there is unidirectional causality from GDP to energy consumption. The conservation hypothesis implies that energy conservation policies such as emission reductions or energy efficiency improvements will not adversely affect economic growth (Payne, 2010). At the micro perspective, this result is

indicative of the fact that individuals renewable energy consumption increases when output rises. Consequently, renewable energy consumption increases with improvement in the productive capacity of the economy. The bidirectional causation between gross fixed capital formation and real gross domestic product showed that past and current capital formation drives growth and vice versa. The means that expenditure to boost capital formation has a multiplier effect on national income and in return; this could increase investment demand in the private sector leading to increased capital formation.

#### 5. Recommendations/ Conclusion

The paper investigates the relationship between renewable energy consumption and economic growth in Nigeria over the period 1990-2017. The casual link between the pairs of variables of interest were established using Granger causality test while an Ordinary Least square (OLS) estimation technique was used to estimate the regression model. The result of the analysis indicates that renewable energy consumption has positive and significant impact on economic growth. Renewable energy consumption boosts economic growth. The pairwise granger

causality tests showed a unidirectional causality running from real gross domestic product to renewable energy consumption. The implication of causation running from real gross domestic product to renewable energy consumption is that RGDP causes renewable energy consumption without feedback. This confirms the conservative growth hypothesis. This is unsurprising given the energy crisis currently bedeviling the country. To address this worrisome phenomenon, government should invest massively on renewable energy technologies and increase public awareness on deleterious energy practice and their environmental consequences. A renewable energy cost subsidy frameworks to serve as a powerful incentives for the deployment of renewable energy technologies such as the use of solar energy panels at homes and business places to power basic appliances and machineries as against relying heavily on premium motor spirit (fuel) and diesel consumption with attendant environmental hazards. Towards this end, government should encourage research and development in the renewable energy sector so that innovation can be fostered to tap into alternative energy sources such as solar, water, wind, biogas as against the use of fossil fuels.

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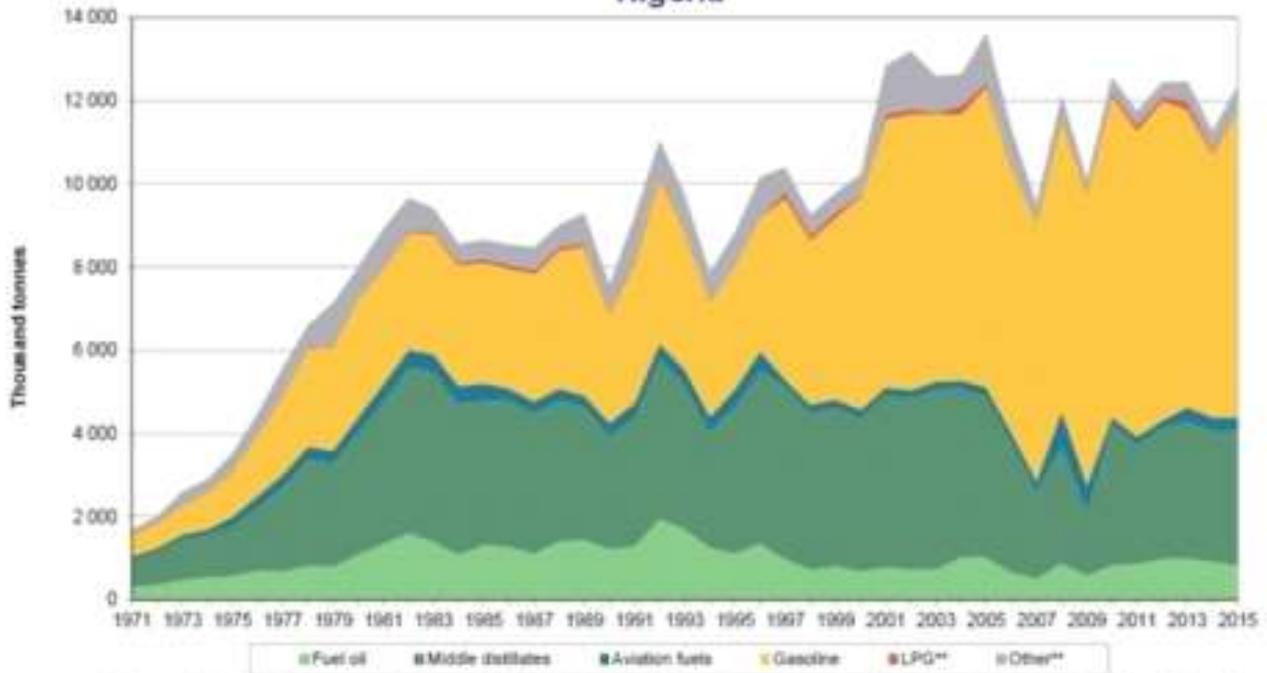
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IEA Energy Statistics

Statistics on the web: <http://www.iea.org/statistics/>

### Consumption of oil products\* Nigeria

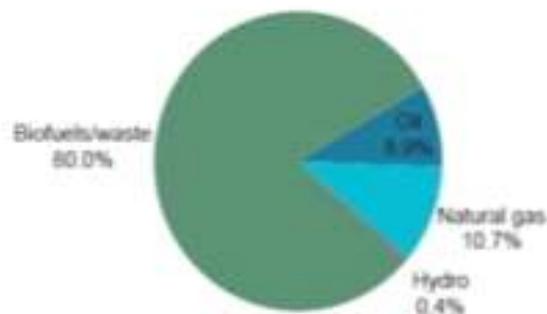


\* Consumption includes international bunkers. \*\* LPG includes LPG, NGL, ethane and naphtha. Other also includes direct use of crude oil and other hydrocarbons.

IEA Energy Statistics

Statistics on the web: <http://www.iea.org/statistics/>

### Share of total primary energy supply\*\* in 2015 Nigeria



139 Mtoe

\* Share of TPES excludes electricity trade. \*\* In this graph, peat and oil shale are aggregated with coal, when relevant.  
Note: For presentational purposes, shares of under 0.1% are not included and consequently the total may not add up to 100%.

IEA Energy Statistics

Statistics on the web: <http://www.iea.org/statistics/>

### Energy production Nigeria

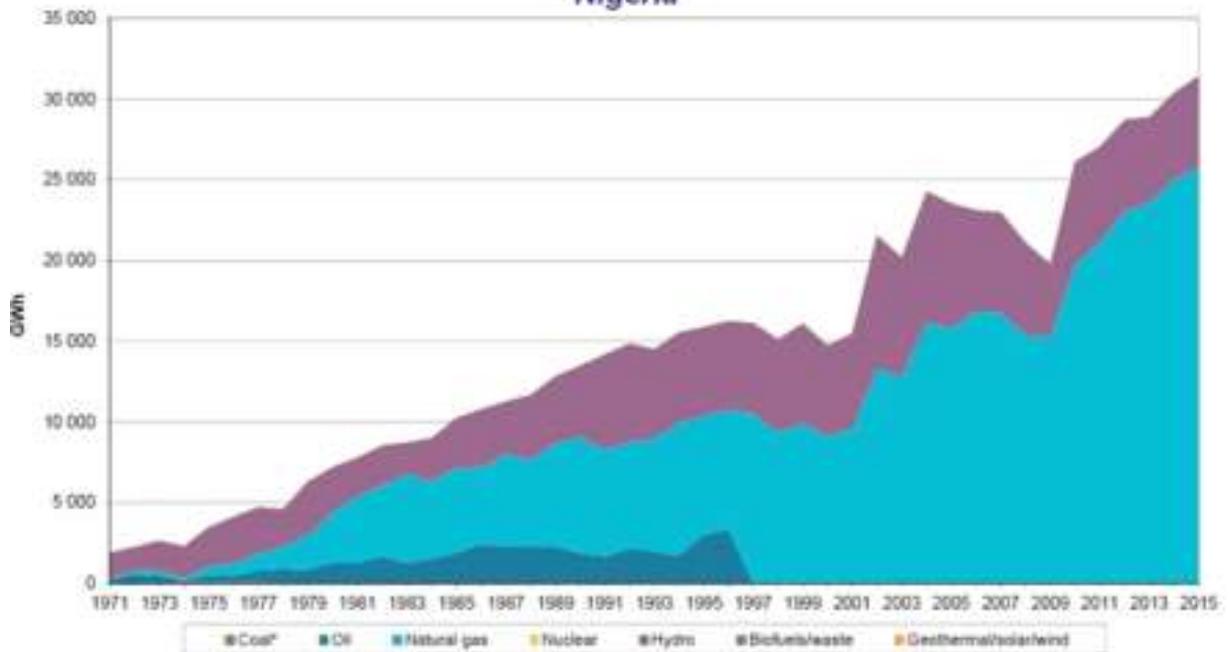


\* In this graph, peat and oil shale are aggregated with coal, when relevant.

IEA Energy Statistics

Statistics on the web: <http://www.iea.org/statistics/>

### Electricity generation by fuel Nigeria



\* In this graph, peat and oil shale are aggregated with coal, when relevant.

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## AN OVERVIEW OF THE CHEQUE PAYMENTS SYSTEM IN NIGERIA



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### 1.0 INTRODUCTION

The dynamic nature of business activities in Nigeria has necessitated the diverse innovations in the payments system. These innovations are specifically characterised by speed, efficiency, reliability and promptness, which aptly reflect the tremendous progress that the system had undergone in the past years. The present trend in the cheque payments system is no doubt designed to propel robust growth and development in the payments system. In this context, the cheque payment system is considered a substantial subset of the payments system. Thus, the various stages that it had undergone over the years, since its inception, have far reaching implications for the payments system. By implication, the usage and the volume of cheques cleared highlight the relevance of cheques as a means of payment.

The present cheque payment systems is no doubt designed to complement the upcoming payments system, which is designed to reduce the volume of cash-based transaction and thus, creates cash-less transaction that can mitigate the risks which are associated with it. Thus, the relevance of the cheque payment cannot be

ignored in the bid to reduce the volume of cash used in business transactions. It is in accordance with this objective; coupled with the use of electronic-based transaction, that a cap is placed on the cheque payment (the maximum limit for cheque payment is N10 million while that of third party cheque payment for encashment over the counter is N150,000.00).

Before the advent of electronic banking, cheque payment was considered as an improved and better alternative to cash transaction. For instance, in the past, a trader could use "a trailer load" of cash to effect the payment of goods and services with all risks involved. Thus, the only possible alternatives that would mitigate such risks were to resort to the use of cheque to consummate such transactions. This implies that cheque was the earliest means of payment or one of the few negotiable instruments that was developed to ease the challenges of cash transactions in the payments system.

Presently, the world is in a state of unprecedented transformation which is accentuated by the rate of technological change. The shift from cheque payment system is a direct pointer to these changes that had culminated in the payments system. In addition, there has been a push from a low tech cheque payments system to a high tech cheque payments system. This began with the introduction of Magnetic Ink Character Recognition (MICR) in 1993 along with the manual clearing system, which was replaced by the Nigeria Automated Clearing System (NACS) in October 21, 2002. The rate of technological changes had accelerated the entire payments system to the point where we now have what is

called cheque truncation, which entails presenting the cheque electronically without the rigours of gathering DMBs' representatives in any of the premises of CBN for the purpose of clearing cheques. It is against this background that this paper is designed to examine critically the modern trends in the cheque payments system in Nigeria. In the light of this, the paper is divided into nine parts. The second part of the paper examines the concepts of payment, clearing and settlement. The evolution of cheque clearing in Nigeria is examined in part three. The part four presents the cheque standard in Nigeria. The part five gives the synopsis of cheque payment in Nigeria while the cheque truncation system (CTS) and its benefits and challenges are examined in part six and part seven respectively. The paper concludes with recommendations and conclusion in part eight.

### 2.0 THE CONCEPTS OF PAYMENT, CLEARING AND SETTLEMENT

According to Luis and Andre' (2017), payments system plays a central role in the functioning of modern market economies, by enabling the transfer of money and financial instruments between economic agents in a safe and efficient way. As a result of this role, researchers have devoted a great deal of attention to the assessment of the spillover effects that the development of payments system could induce in an economy and on the demand for currency (Luis and Andre', 2017). A payment system is a mechanism that facilitates intermediation through the processing and transfer of value of money from the payer (buyer) to the payee (seller) in the

process of exchanging goods and services (Amedu, 2005). It is a set of instructions and procedures used for the transfer of value and settlement of obligations arising from the exchange of goods and services within a defined market (Ovia, 2005). It consists of institutions, set of instruments and procedures through which financial obligations are discharged by economic agents (Nnanna and Ajayi, 2005). The payment system is categorised into retail/small value payment and wholesale/ large value payments system. A retail payments system is a fund transfer system which is operated either by the private or the public sector that deals with large volumes of low value payments which is operated either by the private or public sector that deals a variety of forms like cheques, credit transfers, direct debits and card payment transactions while the large value payments system is also a funds transfer system, but processes large value and high priority payments and is operated by central banks (Luis and Andre', 2017). However, the emphasis of this paper is on the retail payments system which consists of paper-based instruments, including personal cheques and other instruments.

Clearing is a system whereby bankers exchange the financial instruments drawn on each other through the use of a clearing house (Oyedele, 2009). It is also the process of establishing the amount each person/each bank owes in the clearing house. Nnanna and Ajayi (2005) stated that clearing is the exchange of payment related information between system participants and any regulations under which payments are settled on bilateral or multilateral basis. In addition, clearing is the process by which banks meet on banking days at specified hours to exchange payment instruments, particularly bank drafts and cheques. Apart from the aforementioned financial instruments, other

instruments that are approved for clearing are manager's cheque, corporate cheque, dividend warrant, interest warrant, among others. These instruments are also called negotiable instruments because they are used to secure the payment of money through endorsement and delivery which guarantees complete ownership and transfer of legal title from one party to another. The operations of these instruments are examined in the subsequent sections of this paper.

It is important to draw a distinction between clearing and settlement. Clearing is the process of establishing the amount owed by a bank (or payer) in the clearing house, while the process of moving the amount owed to another bank (or payee) is called settlement. Hence, clearing does not imply the transfer of value, it is settlement that ensures the transfer of value and thus, completes the payment system in this context. Nnanna and Ajayi (2005) explained that settlement is the actual discharge of an obligation i.e. by debiting specific amount from the payer's account and crediting same to the payee's account. Alade (2005) considered settlement as a component of a country's payment system and it is an act that discharges obligations in respect of funds or securities transfer between two or more parties. Oyedele (2009) defined settlement as the calculation of the multilaterally netted payments obligations due and from each participant in the clearing house. This therefore, implies that settlement follows the activities (i.e. the process of establishing the indebtedness) in the clearing house within the premises of the CBN.

According to Casu, Girardone and Philip (2006), clearing relates to the transfer and confirmation of information between the payers (sending financial institution) and the payee

(receiving financial institution), while settlement is the transfer of funds between the payer's financial institution and the payee's financial institution. Casu, Girardone and Philip (2006) further emphasised that settlement discharges the obligation of the payer's financial institution to the payee's financial institution with respect to the payment order. It can be deduced from the foregoing definitions and analyses that the clearing and settlement of the values of cheques form the bedrock of the retail payment system in Nigeria.

### 3.0 THE EVOLUTION OF CLEARING SYSTEM IN NIGERIA

The clearing system commenced in 1961 with the establishment of the Lagos clearing zone and First Bank was the clearing house during this period. The establishment of the Central Bank of Nigeria by the CBN act of 1958 provided fresh impetus to the payments system in Nigeria. Thus, section 29 sub-section (1) and section 42 of CBN Act (1958) empowered the CBN to promote the establishment of bank clearing system; provide facilities for the conduct of clearing, as well as, facilitates the clearing of cheques and other credit instruments for banks carrying out business in Nigeria. In furtherance of this Act, section 47 subsections (2) and (3) of the 2007 Act stated that the Bank shall continue to promote and facilitate the development of efficient and effective system for the settlement of transactions (including the development of electronic payments system); and the Bank shall have power to prescribe rules and regulations for the efficient operations of clearing and settlement system.

Apart from the Lagos clearing house, other clearing houses were established in the 36 states of the Federation, including the Federal Capital Territory. These

clearing houses were located in the premises of the CBN in the 36 state capitals of the Federation. But the recent introduction of the cheque truncation system (CTS) has led to the consolidation of the clearing houses into a single clearing zone which is located in Lagos.

In the past, the process of clearing cheques in Nigeria was purely a manual process and thus, was highly cumbersome. Alade (2005) observed that it could take as much as eight hours after the commencement of clearing house before banks could know their net positions and as long as twenty one (21) days before customers of banks could take value for their clearing cheques. In the same vein, Ovia (2005) outlined some of the challenges that confronted the clearing of cheques in the past thus:

- ◆ Lack of quantity control of instruments: The system recorded as high as 30-35 per cent of rejection of cheques due to non-conformity with MICR cheque standards for the above tolerable rate of 1-3 per cent;
- ◆ Long clearing days: The clearing days for cheques took as long as 21 days;
- ◆ Incidence of fraud and forgeries: Insider complicity was a key factor in the cases of frauds and forgeries;
- ◆ Incidence of returned cheques: Huge amount of cheques were returned due to insufficient fund in the customers' accounts;
- ◆ Poor banking culture: The culture that trapped huge amount of cash outside the banking system posed dire consequences to the cheque payments system.
- ◆ The introduction of clearing

period came into effect in July 1985 when the 21-day uncleared effect was introduced; it was changed to 15-day uncleared effect in December 1994 and later to 12-day uncleared effect in August 1996 (Durunguma, 2009). In June 2001, the clearing period was reduced to 9 days.

In 2002 clearing session was reduced to T+3 and this meant that from the day a customer lodged a cheque into his or her account to the date he or she will be credited with the value of the cheque would be four days. This was later reduced to T+2 days for both upcountry and local clearing in 2007. These changes were meant to reduce the incident of fraud in the clearing and settlement system because longer clearing days could create opportunities for fraud.

Another major development in the clearing and settlement system in Nigeria was the introduction of a new settlement framework on April 1, 2004. This framework involved the categorisation of the then seventy-five clearing banks, which were operating in Nigeria, into settlement and non-settlement banks. The settlement banks participated directly in the clearing house activities and receive the net clearing position in its settlement account with the CBN, while the non-settlement banks participated in the clearing house activities through a settlement bank and received their net clearing position through the settlement account of their respective settlement banks. The banks that wished to participate as settlement banks must meet the following criteria:

- ◆ The banks must possess the capacity to provide clearing collateral of N15 billion treasury bill which was subject to review;
- ◆ The banks should be able to

offer agency facilities to other banks and also settle on their behalf nationwide; and

- ◆ The banks should be able to provide adequate network in all the states and FCT.

The automation of the Nigeria clearing and settlement system was equally considered as another major milestone following the launching of the Automated Clearing System (NACS) in 2000, which later went live in Lagos in October 2002. This innovation set the pace for the new clearing rule that culminated in the issuance of the Cheque Truncation Guidelines by the Central Bank of Nigeria in 2012. The Guideline was designed to reduce the clearing cycle from T+2 to T+1 for both local and upcountry cheques. Thus, it was the advent of the cheque truncation system that scrapped the physical movement of cheques and encouraged the processing of dematerialised physical cheques through the use of electronic image. The legal framework for the use of the electronic image for business transaction in Nigeria was established when the Electronic Transaction Bill was passed into law in 2015 by the National Assembly.

Overall, the evolutionary stages of the clearing and settlement system were aided by the undermentioned innovations:

- ◆ Magnetic Ink Character Recognition (MICR): The introduction of MICR marked the beginning of automation of clearing. The establishment of MICR was mooted in 1982 when the CBN commissioned Messrs. KOMPLEX limited to carry out full feasibility study on how to improve the domestic payments system. The Report of the firm advocated the introduction of MICR which was

eventually adopted in 1988 by the CBN. The second phase took off in 1991, but was formally introduced in 1993; and was fully implemented in the Lagos clearing zone in July 1 1994. MICR was introduced to achieve the following objectives to:

- Facilitate document process;
- Shorten the clearing duration; and
- Boost the confidence of the banking public nationally and internationally.

The introduction of MICR technology was, however, confronted with some challenges that were peculiarly posed by lack of cheque standards and the long operation of clearing system which took 9 to 15 days for customers to obtain value for their cheques. Then the reject rate of cheques processed on MICR machines was 40 per cent. These challenges had in recent times been addressed by the evolving innovations in the e-payment channels.

- ◆ Nigeria Inter-bank Settlement System (NIBSS): NIBSS was established by the Central Bank of Nigeria and the Nigerian Bankers' Committee in 1993 and began operation in June 1994. NIBSS is a payment and settlement company set up to provide electronic payments, transactions switching, payment aggregation and settlement services for the banking industry.
- ◆ Nigeria Automated Clearing System (NACS): NACS was launched in 2000 to automate financial instruments like cheques used in the clearing system. It enhances the automation

of the financial instruments that are used in the clearing system. Presently, the introduction of the cheque truncation system had resulted in the establishment of one clearing zone in Lagos. This system implies that the scanned copies of cheques are sent electronically to the Lagos clearing unit of the CBN Lagos and finally to NIBSS for clearing and eventual settlement.

- ◆ Cheque Printers Accreditation Scheme (CPAS): CPAS was introduced in September 2005 to ensure efficiency in the clearing system. It was also established to regulate

cheque printing and standardisation which implies that only accredited printers, foreign or local shall be given approval or licence to print cheque in Nigeria (CBN, 2015).

- ◆ Nigeria Uniform Bank Account Number (NUBAN): NUBAN simply implies 10 digit account number which was implemented in 2010 to enhance efficiency in the activities of the Automated Clearing House (ACH) by reducing wrong account postings by receiving banks and also reduce the number of transactions that were wrongly processed due to incorrect account numbers.

MAJOR TIMELINE IN THE EVOLUTION OF CLEARING CHEQUES IN NIGERIA

1961	The establishment of the Lagos Clearing zone; First Bank was the clearing house.
1988	The introduction of the Magnetic Ink Character Recognition (MICR).
1985	21- day uncleared effect was introduced.
1993	The establishment of Nigeria Interbank Settlement System(NIBSS) to provide clearing and settlement services to the DMBs.
1994	15-day uncleared effect was introduced.
1996	12-day uncleared effect was introduced.
2001	The clearing period was reduced to 9 days.
2002	The full implementation and live operation of Nigeria Automated Clearing System (NACS); the reduction of clearing cycle to T+3 (local) and T+5 (upcountry).
2005	The introduction of cheque standard and Cheque Printers Accreditation Scheme.
2006	The commencement of the old RTGS.
2007	The harmonization of clearing cycles (upcountry and local) at T+2; Payment System Vision 2020 (PSV2020) was equally inaugurated.
2010	The directives enforcing a cheque cap of N10 million was implemented coupled with the implementation of the Nigeria Uniform Bank Account Number (NUBAN).
2012	The implementation of cheque truncation system in Lagos; the clearing cycle was reduced from T+2 to T+1 in Lagos.
2013	The cheque truncation system was introduced nationwide; the clearing cycle was equally reduced from T+2 to T+1 nationwide. The new RTGS and the Payment System Vision2020 (PSV2020) Document Release 2 was launched.
2014	BVN was introduced to address the absence of unique identifier.
2015	Electronic Transaction Bill was passed into law by the National Assembly.

Source: Compiled by the author

**4.0 THE CHEQUE STANDARD IN NIGERIA**

A cheque is an instrument payable on demand and drawn on or payable through or at an office of a bank, whether or not negotiable, that is handled for forward collection or return (CBN, 2016). Two types of cheques exist in terms of sizes: the small cheque which comprises personal cheque and the large cheque which comprises managers' cheque, bank draft, corporate cheque, interest warrants, dividend warrants, debit notes and direct debit. The following are the permitted transaction codes for the aforementioned sizes of cheques:

CODE	ITEMS
01	PERSONAL CHEQUE
02	CORPORATE CHEQUE
03	BANK DRAFT
04	MANAGER'S/BANK CHEQUE
05	BANKERS' PAYMENT
06	DEBIT NOTE
11	DIVIDEND WARRANT
12	INTEREST WARRANT
13	DIRECT DEBIT
19	TEST CHEQUE

Among the items listed in the above table, the personal cheque, corporate cheque, bank draft and the manager's cheque are commonly used by the customers of banks. The personal and corporate cheques have similar connotations and usage, but differ in the category of customers that issue them. Personal cheque, as the name implies, is issued by individual

customers, while the corporate cheque is issued by corporate bodies that are considered legal entity and are equally the customers of banks in this context.

The bank draft and the manager's cheque also share similarities except the location. For instance, the bank draft is issued for the purpose of

transferring money from one location to another or from one clearing zone to another clearing zone, while the manager's cheque is issued within a clearing zone.

Similarly, the cheques that are drawn on the banks contain the following digits on their code lines in the following order:

CHEQUE SERIAL NUMBER	8 DIGITS
SORT CODE	9 DIGITS: <i>The sort code on the cheque enables the MICR device to identify the bank on which the cheque was drawn the branch and the state in Nigeria where the bank is located.</i>
ACCOUNT NUMBER	10 DIGITS
TRANSACTION CODE	2 DIGITS

It is equally important to note that the first three digits on the sort code is called the Bank code. Hence, with the bank code one can identify a particular cheque

and the bank on which it is drawn. The table below highlights the list of the Deposit Money Banks (DMBs) in Nigeria and their respective bank codes.

S/N	BANK	3DIGIT CODE	S/N	BANK	3DIGIT CODE	S/N	BANK	3DIGIT CODE
1	ACCESS BANK	044	8	GT BANK	058	15	STERLING BANK	232
2	CITIBANK	023	9	HERITAGE BANK	030	16	SUNTRUST BANK	100
3	DIAMOND BANK	063	10	KEYSTONE BANK	082	17	UNION BANK	032
4	ECOBANK	050	11	PROVIDUS BANK	101	18	UNITED BANK	033
5	FCMB	214	12	SKYE BANK	076	19	UNITY BANK	215
6	FIDELITY BANK	070	13	STANBIC IBTC	221	20	WEMA BANK	035
7	FIRST BANK	011	14	STANDARD CH.	068	21	ZENITH	057

SOURCE: Compiled by the author as provided in the NUBAN guidelines.

As earlier stated, the introduction of the 10 digit account number was designed to enhance the efficiency of the automated clearing house. Similarly, the Nigeria Cheque Accreditation Scheme (NICPAS) was inaugurated to address the fundamental problems of poor quality of cheque and inadequate security on the paper. These innovations have

encouraged the adoption of appropriate technology that complies strictly with every bit of technical requirements so as to avert the abuses that were associated with clearing activities in the past.

Furthermore, innovations in the clearing activities, as emphasised in the preceding section, had somewhat

addressed the inherent anomalies through the following ways:

- raising the standard for printing cheques in Nigeria which includes printing cheques with uniform physical properties, minimum cheque quality to reduce reject rates, minimum security features for all the banks and the ability of banks to confirm the genuineness of other banks' cheque;
- promoting greater efficiency in the clearing system through the introduction of the CTS, which will be examined in the subsequent section, to reduce reject rate and other irregularities and thus, enhance the use of image technology and the process of archiving by CIWA; and
- mitigating the risks of cheque fraud through the introduction of security features which are designed to protect the cheques against fraudulent alterations and cloning.

### 5.0 A SYNOPSIS OF CHEQUE PAYMENT IN NIGERIA

As it has been established in this paper, the foremost mode of payment had been the cash payment; and the Nigerian payments landscape was largely dominated by cash-based transactions. A review of the payment transactions that were carried out by the CBN in 2010 revealed that 99 per cent of customers' activities were mainly cash-based.

The cheque, as a means of payment, had been considered in the past as the best alternative to cash. In fact, cheques help customers to

manage their money and following the clearing rules, they provide safe security and documentary evidence of payments than other channels of payment and above all the cheques that clear through the banking system are, like other electronic payment instruments, considered as potential indicators of current GDP growth (Galbraith and Tkacz, 2015). Cheques played this role for a considerable number of years before the advent of the e-payment channels and other recent innovations like the ATM, NIP, NEFT and the PoS. The introduction of these payment landscapes reduced the usage of cheques. In 2009, the value of cheque transactions reduced from N29, 436.03 billion to N4, 309.43 billion in 2014 and this decline was attributed to the increased use of the e-payment channels. The e-payment channels have become popular among consumers of financial services, particularly with the introduction of the cash-less policy in 2012. However, the e-

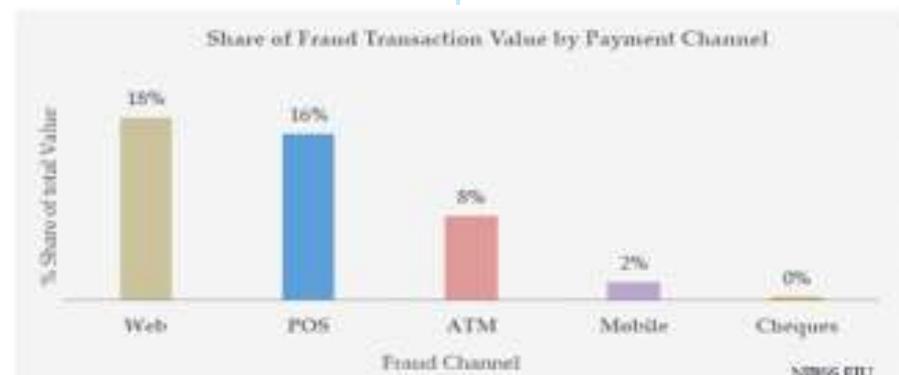
payments were equally designed to complement the cheque payment. For instance, the maximum limit on cheque payment is N10 million per transaction and the payment in excess of such transaction shall be consummated only through the e-payment mode.

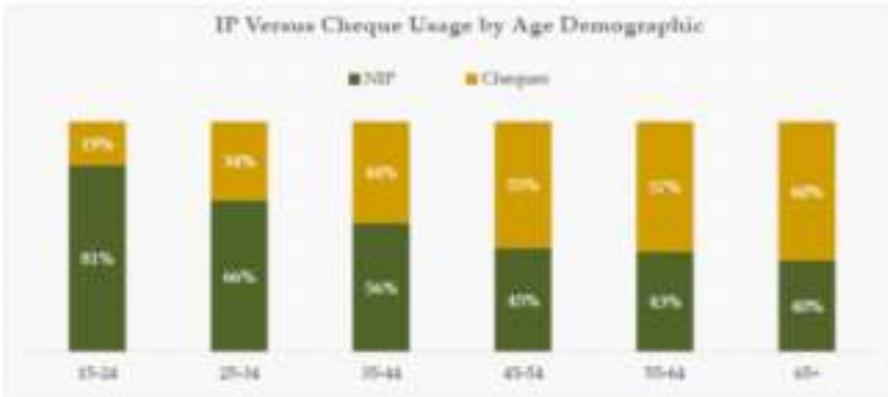
However, the cheque payment still remains the preferred option for high value transaction because it is believed to be more secured than other modes of payment. Similarly, it gives control to its users over their funds through the features that give it the ability to stop cheque and equally postdate a cheque payment (NIBSS 2016). The following table provides a comparative analysis of average transaction value for cheques and other e-payment channels: Further studies show that cheque payment has the least chances of fraud transaction, compared with other modes of payment as shown in the following figure:

Payment Channel	Average Transaction Value(₦)	*Average Transaction Value(US \$)
Cheque	496,988	1,630
POS	12,097	40
Instant Payment	283,698	930
ATM	8,393	27.50

\*Exchange Rate (N/US\$:305)  
Source: NIBSS

Further studies show that cheque payment has the least chances of fraud transaction, compared with other modes of payment as shown in the following figure:





Source: NIBSS

Despite the aforementioned benefits that accrue to cheque payment, the usage of cheque payment among a considerable number of consumers of financial services has been in decline since the advent of e-payment channels. As shown in the subsequent figure, there is a generational division in the usage of cheques in Nigeria. The cheque usage is high among individual between the ages of 35-64 years while the age bracket that is below 45 and 35 years prefer the e-payment option (NIBSS, 2016).

### 6.0 CHEQUE TRUNCATION SYSTEM (CTS)

On August 10, 2012, the Cheque and Automated Clearing Working Group of the Payments System Vision 2020 reviewed the Nigeria Bankers' Clearing House Rule and this was followed by the launching of the Cheque truncation guideline on March 14, 2012. The objectives of the Cheque truncation guidelines are to:

- ◆ Provide for regulation and management of cheque truncation in Nigeria with a view to reducing cost and days of clearing instruments;
- ◆ Articulate the rights and the responsibilities of the presenting and paying banks in the cheque truncation system;

- ◆ Provide for minimum technical and operational standards for cheque truncation; and
- ◆ Facilitate the implementation of an effective and efficient payments system in the Nigeria banking industry.

#### 6.1 WHAT IS CHEQUE TRUNCATION?

To truncate simply means to stop the flow of physical cheques issued by a drawer to the drawee's branch. Cheque truncation is a process that involves stopping the physical movement of the cheque and replacing the physical instrument with the image of the instrument and the corresponding data contained in the MICR line. It is a system of cheque clearing and settlement between banks which is based on images and associated electronic payment data without the physical exchange of cheques. That is, a physical cheque is dematerialised and converted into an electronic image.

The process of CTS ensures that the cheque details, which are basically the MICR line that includes the bank routing number, account number, cheque number, cheque amount and other details that are printed near the bottom of a cheque in magnetic ink in accordance with the Nigeria

Cheque Standards, are captured by the bank that presents the cheque or its agent. The data captured is then presented electronically to the clearing house which is eventually delivered to the paying bank for payment. This process is obviously in contrast to the old process of presenting a cheque physically to the paying bank or a situation whereby cheques were transported from all the branches countrywide to the clearing house using courier services.

From the above analysis, it could be deduced that three parties are directly involved in the cheque truncation system:

- i. The presenting bank (or sending bank): The bank that receives the cheque from the customer either directly or via third party. It also presents the cheque to the clearing system for clearing and eventual settlement. In the context of cheque truncation, it is the presenting bank that dematerialises the physical cheque by converting it into an electronic image which is transmitted to the paying bank via the automated clearing house. This implies that cheques are truncated at the presenting bank, and the minimum retention period of physical cheques by the presenting bank is five (5) years (CBN, 2016).
- ii. The paying bank: It is the bank at or through which a cheque is payable and to which the cheque is sent for payment or collection (CBN, 2012).
- iii. The automated clearing house (or Electronic Clearing House): The automated clearing house acts as the intermediary for data and image flow between the presenting

bank and the paying bank. NIBSS is the automated clearing house and the Central Image Warehousing Agency (CIWA) that is charged with the responsibility of storage and certification of cheques. The paying bank may request any image from CIWA for the purpose of proof of payment up to a period of ten (10) years. This equally implies that the electronic image shall be retained by CIWA for a minimum period of ten (10) years (CBN, 2016).

**7.0 BENEFITS AND CHALLENGES**

Delivering services on the platform of automated process provide enormous benefits to both the customers and to the banks that provide such services. The advent of the CTS, as this paper had alluded to, had eliminated the cumbersome process of exchanging physical cheques among clearing banks. Be that as it may, the introduction of the CTS poses dire challenges that basically border on cybersecurity risks. The following sections will examine those challenges and benefits.

**7.1 BENEFITS TO THE CUSTOMERS**

- **FASTER SETTLEMENT OF CHEQUES:** When a cheque is lodged by a customer, its value is quickly obtained within two days after the

cheque was lodged. This trend stands in total contrast to the distant past when the values of cheques were obtained within fifteen or twenty-one days. In the same vein, the migration from T+2 to T+1 enhances faster intercity clearing and this specifically implies that when a customer deposits his or cheque on Monday, the value of such cheque will be obtained on Wednesday.

- **EFFICIENT SERVICES:** The CTS has ended the days of piling up mountains of customers' cheques. As stated in the preceding paragraph, customer's cheque cannot be held for twenty one or fifteen days in the paying banks' vault; and this obviously underlines the fact that consumers of banking services can have access to efficient and faster service delivery through customer-focused and technology-driven stance of the financial services industry through the CTS.

**7.2 BENEFITS TO THE BANKS**

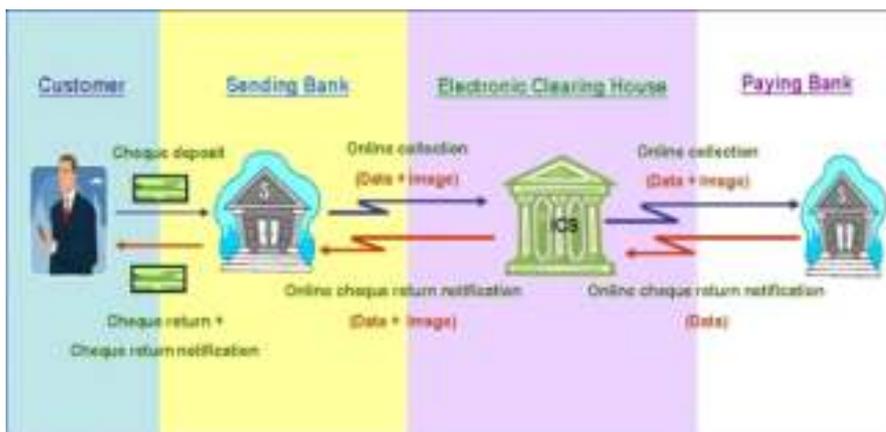
- **REDUCTION IN OPERATIONAL COST:** The operational cost of moving "portfolios" of cheques coupled with the associated logistics using courier services has reduced. In

addition, the cumbersome process of moving a cheque from the bank in which it was deposited to the bank on which it was drawn and the movement of money in the opposite direction had stopped with the advent of CTS, thereby ending the incident of loss of cheques in transit, which hitherto posed dire risks to the banks.

- **OPERATIONAL EFFICIENCY:** The removal of the cumbersome process of exchanging cheques and the subsequent consolidation of all the clearing zones into a national clearing centres, which culminated in the introduction of the Automated Clearing House have ensured efficiency in the clearing and settlement system. This has equally reduced the risks that are associated with paper sharing as a result of abolishing the use of physical cheque during the clearing session. It has also eased reconciliation and verification challenges that were associated with the manual process of clearing cheques.

**7.3 ISSUES AND CHALLENGES**

Every innovation is bound to be confronted with issues and challenges. The CTS, which is also an innovation in the payments system, is not an exception. As a result of its technological implications, the CTS has become increasingly susceptible to intermittent power supply and poor telecommunication connectivity, especially in the absence of alternative power supply or backup device. For instance, the prevalence of system glitch results in the delay in processing cheque payment and equally poses dire



SOURCE: NIBSS

consequences in the entire payments system. Similarly, compromised electronic devices that can be inadvertently used for processing transaction can be infested by virus that may be attributed to the oversight of the participants and operators in the CTS or perpetrators of cyberfraud.

The use of computers and other electronic devices have made the CTS, like the entire payments system, to be prone to cybercrime. If adequate cybersecurity is not established, the entire system may be hacked by cybercriminals whose top motives are to steal money by holding the entire system to ransom (i.e. ransomware).

**8.0 RECOMMENDATIONS AND CONCLUSION**

The implementation of the CTS

has no doubt improved the operations and the management of cheque transaction thereby reducing the processing time and the operational costs that were hitherto incurred by the banks in the past as noted by this paper. This paper further deduced from the foregoing that the CTS represent an exceptional innovation in the payments system which had eased the challenges of the cheque payment.

As clearly noted in this paper, the cheque payment still remains the preferred option for high valued transaction. Therefore, it is important to sustain this attribute and thus, make the cheque payment system to appeal to a broad spectrum of stakeholders in the financial system. This can be achieved by ensuring that adequate cybersecurity is

established to guard the CTS against e-fraud. In addition, efficient and effective capacity building must be put in place so as to allay the potentials of operational risks; the custodians of CTS devices-servers, scanners, workstations, software, among others - must handle such devices with utmost care because of their sensitivity and fragility.

In conclusion, this paper envisaged an era of drastic improvement of the CTS whereby customers will sit in the comfort of their homes to truncate their cheques by simply sending the details of the cheque to the paying bank using their mobile devices. This will entail capturing the MICR details of the cheque on the mobile device and then transmit such details to the paying bank and then get the value of the cheque truncated on real-time basis (i.e.T+0) from their respective banks.

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## DEMYSTIFYING THE MICROECONOMIC FOUNDATION OF ECONOMIC DEVELOPMENT IN NIGERIA: EVIDENCE FROM EASE OF DOING BUSINESS INDEX



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### INTRODUCTION

The primacy of macro-economic stability approach in economic development discussion and policy simulation across the globe calls to question the relevance of microeconomic approach to development in the contemporary world. Copious emphasis are usually on macro-economic framework of the economy which is made up of aggregate economic variables such as employment levels, gross domestic product (GDP), gross capital formation, inflationary rates, exchange rate, balance of payment equilibrium, capacity utilization, public finance management, among others. Such questioning is understandable, but regrettable since any doubt about the relevance of the microeconomic foundation of economic development represents an age-long myth. The import of this vigorous questioning is the perennial categorisation of microeconomic analysis alongside most institutional theoretical fads in economics, reducing its relevance to a pedagogical undertaking with little or no relevance in reality.

This argumentum is premised on the impracticability of the

plausible but rather unrealistic assumptions of homo economicus individual economic agents and market perfection mantra which permeates the fulcrum of microeconomic analysis. More so, in less developed countries (Nigeria inclusive) characterised by a structural dysfunctional economy and precarious productive infrastructures. Fortunately, these limitations can be resolved through the establishment of regulations, procedural rules, establishment of arbitration bodies, legislative and political measures which serves as a mechanism for revitalising the microeconomic instrument of integration through which the resources at the disposal of the microeconomic units are allocated to the most socially beneficial uses.

A central theme that underpins a robust economy is a coherent set of political institutions, an enabling legal environment, a good social element and sound macroeconomic policies. However, these macroeconomic conditions are necessary, but not sufficient. They provide the enabler to create wealth, but do not create wealth unilaterally. Wealth is actually created in the microeconomic milieu of the economy, implanted in the

sophistication of enterprise strategic actions, quality of raw materials, infrastructural facilities, institutions, and varieties of regulatory and other policies/institutions that constitutes the business environment. Microeconomic elements are interdependent and mutually reinforcing pillars of economic development. A malfunctioning microeconomic unit is capable of thwarting a country economic progress and renders the more tangible macroeconomic policy instruments/toolkits less effective.

The ubiquitous nature of microeconomics in the well-being of the generality of citizens in both developed and less developed countries is not difficult to prove. The welfare of the citizenry in a modern economy depends critically on the state of the consumer behaviour of the household and the production decisions of business firms. Accordingly, individual economic agents, with associated economic activities, are the rudimentary units for aggregating social welfare, whether of individuals, groups, a community, or a society, and there is no realistic social welfare without taking cognisance of individual economic units who constitutes the end and means of every developmental effort.

Fig 1.

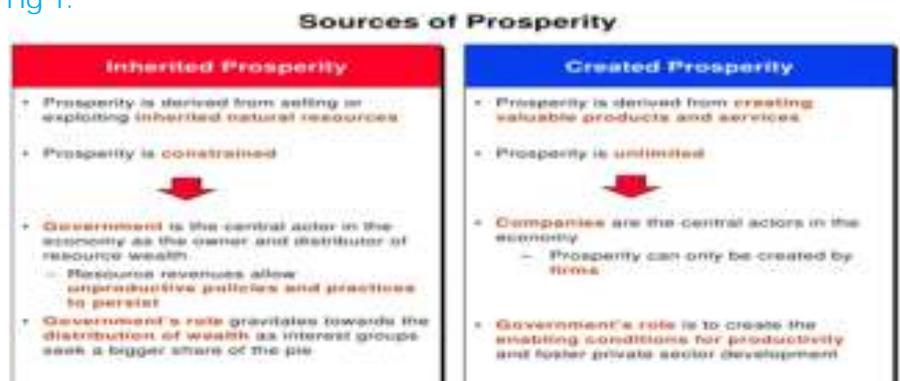
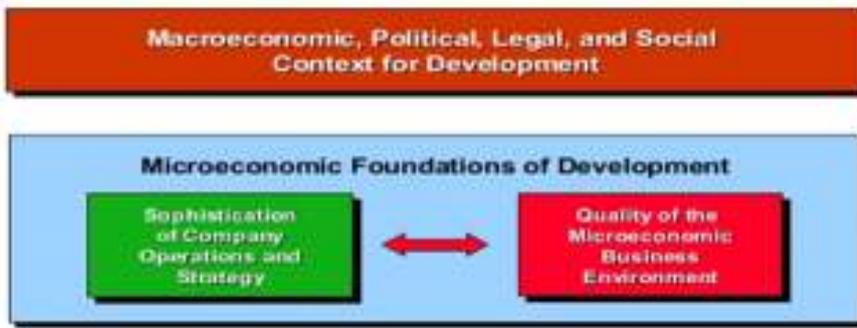


Fig. 2

**Determinants of Productivity and Productivity Growth**



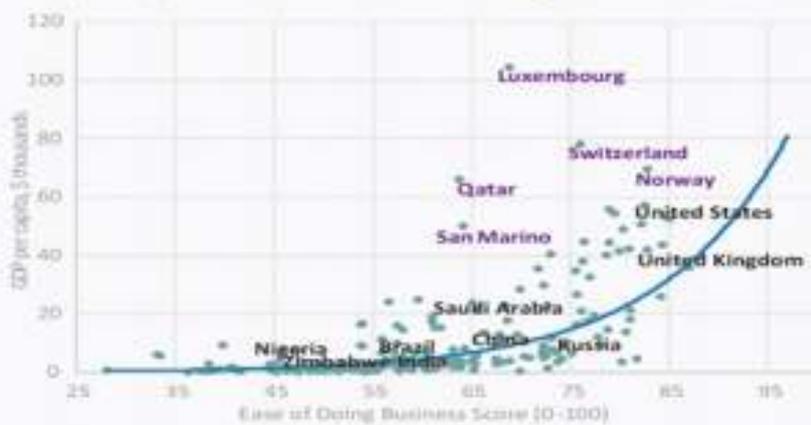
- A sound macroeconomic, political, legal, and social context creates the potential for competitiveness, **but is not sufficient**
- Competitiveness ultimately depends on improving the **microeconomic capability** of the economy and the **sophistication of local companies and local competition**

Sources: Porters (2009)

Fig. 3

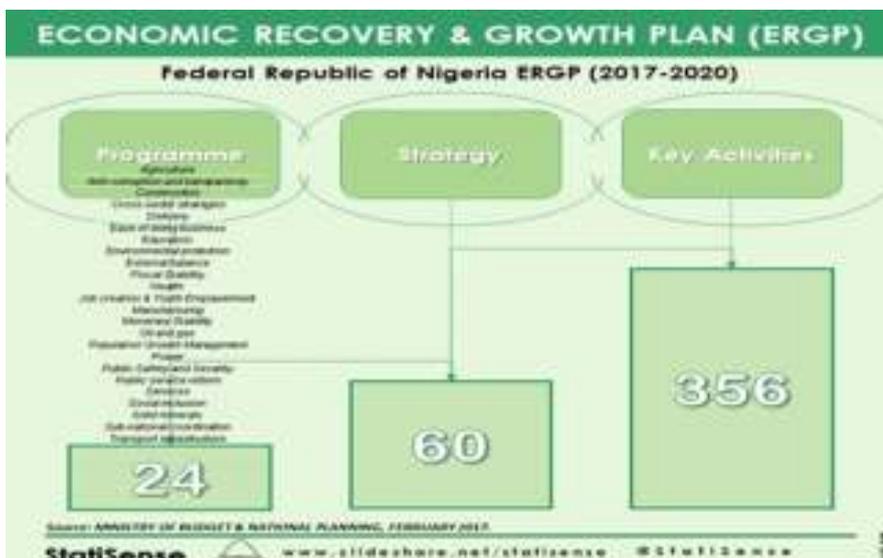
**Regulatory freedom brings prosperity**

GDP per capita, \$ thousands v. Ease of Doing Business score, 0-100



Source: World Bank Ease of Doing Business 2017; International Monetary Fund, Steve Hanke, The Johns Hopkins University

Fig. 4



The Federal Government of Nigeria, in consonance with best practices the world over initiated the Ease of Doing Business Executive Order E01, directing the Central Bank of Nigeria, Ministries, Departments and Agencies (MDAs) to eliminate all impediments, which make doing business in Nigeria cumbersome and problematic. It is also articulated with the understanding that the role of government in the 21st century must evolve from that of being an omnibus provider of citizens' needs into a force for eliminating the bottlenecks that impede innovation and market-based solutions (Ministry of budget and National planning, 2017). The Ease of Doing Business was also incorporated into the Economic Recovery and Growth Plan (ERGP), a medium term plan for 2017 – 2020 in Nigeria. The Economic Recovery and Growth plan has been developed for the purpose of restoring economic growth while leveraging the ingenuity and resilience of the Nigerian people – the nation's most priceless assets. Economic recovery and transformative growth cannot be achieved by the government alone. It is essential to harness the dynamism of business and the entrepreneurial nature of Nigerians, from the MSMEs to the large domestic and multinational corporations to achieve the objectives of this Plan. The Plan prioritizes the provision of a more business friendly economic environment.

Nigeria's national target is to rank in the top twenty economies on the ease of doing business by the year 2020. According to the World Bank's Annual Ease of Doing Business Report 2018, Nigeria ranked 145, an improvement over the previous ranking of 169 in 2017, which "flatters the medieval realities those running businesses in Nigeria confront daily. It takes longer to register a business in

Nigeria than in most other countries in the world. Access to credit is a mirage, with dissuasive interest rates and collateral demands. A litany of arduous government regulations, high cost of energy, lack of adequate security for personnel and properties, multiple taxations, and the activities of corrupt and hostile government officials all combine to dissipate the

energies of business owners"(Ogunyemi, 2017). Nigeria's dismal rankings in World Bank's Ease of Doing Business report, compared with smaller economies is also quite worrisome as it lags behind a number of other African countries such as Mauritius (25), Rwanda(41), Seychelles (95), Swaziland (112), Lesotho (104), Cabo Verde (127), Ghana (120)

and South Africa (82

This underscores the expediency of creating an efficient and inclusive ethos for enterprise and business in Nigeria to strive. An economy with a well regulated institutional support base for business is capable of facilitating entrepreneurship, creativity and ingenuity among individual and provide a framework for the actualisation of people full potential, emancipate the populace from the clout of poverty, enhance living standards and promote growth and shared prosperity. Undoubtedly, the Central Bank of Nigeria considers the actualization of sustainable economic development a germane issue with enormous resources and effort devoted to supporting private business, especially SMEs and the real sector which are considered pivotal to answering the recurring developmental questions confronting the country. Surprisingly, despite the efforts of the monetary authorities in supporting the micro-components of the economy and invariably improving the Ease of Doing Business in the country, very little has been done to evaluate their appropriateness in stimulating economic development. Against this backdrop, this paper critically examines the impact of supporting the microeconomic units on economic development in Nigeria.)

Fig 5

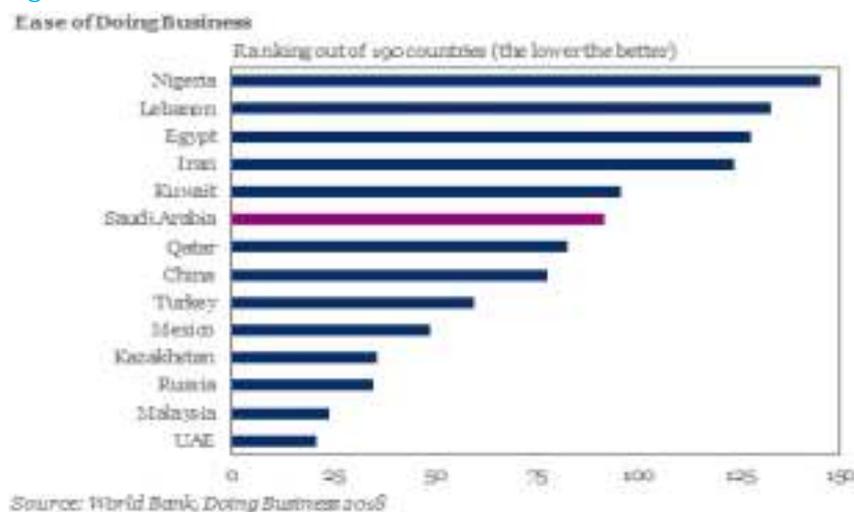


Fig 6: Ease of doing business 2008-2018

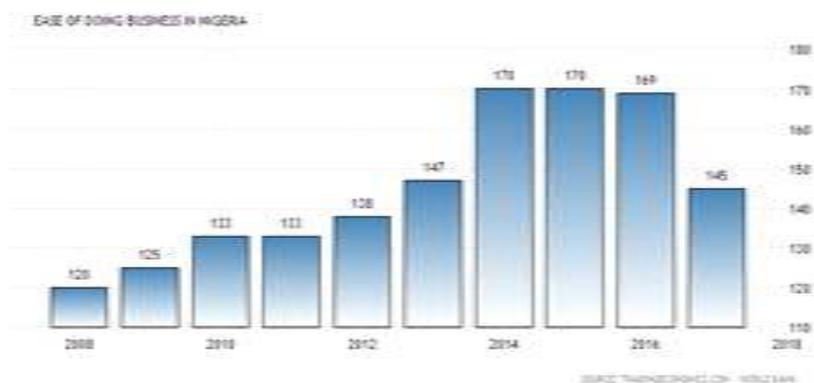
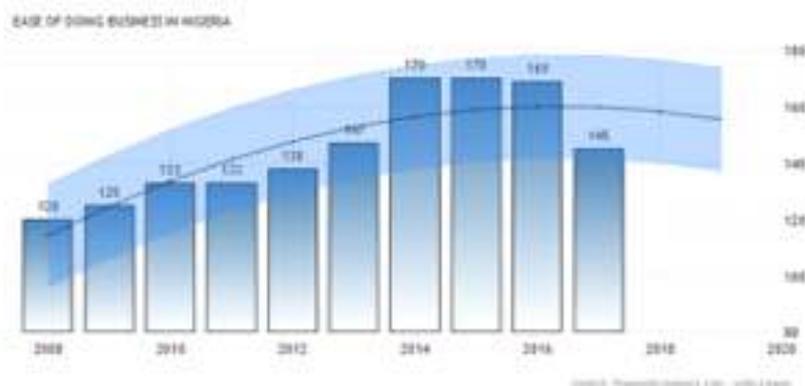


Fig 7:Ease of doing business projections 2008-2018



2.1 Conceptual issues/ Literature Review

Ease of Doing Business is an index published by the World Bank. It is an aggregate figure that includes different parameters which define the ease of doing business in a country (The Economic Times, 2018). The Ease of Doing Business measures the rules and regulations that can help the private sector thrive because without a dynamic

private sector, no economy can provide a good and sustainable standard of living for people (World Bank, 2015). The study has become one of the flagship knowledge of product of the World Bank group in the field of private sector development, and is claimed to have motivated the design of several regulatory reforms in developing countries. The DB indicators, are anchored on extensive research that exposes the inter connectedness of the features of a country's business environment to enterprise performance and macroeconomic projection outcomes. The indicators have been highly effective in drawing attention to the burdens of regulation. Reform as measured by the DB indicators typically means reducing regulations and their burden, irrespective of their potential benefits. The Ease of Doing Business index ranks countries against each other based on how the regulatory environment is conducive to business operations. Economies with a high rank (1 to 20) have simpler and friendlier regulations for businesses (Trading Economics, 2018). As an exercise in cross-country comparison, DB is not intended to, and cannot, capture country nuances. The Ease of Doing Business report has its origin in a paper first published in the quarterly journal of economics by Simeon Djankov, Rafael la porta, florenciolopez-de-silanes and Andrei shleifer called 'The regulation of entry' in 2002 (Wikipedia, 2018). Since its first publication, the Index has expanded to measure eleven areas in its 2018 report. These are: starting a business; dealing with construction permits; getting electricity; registering property; getting credit; protecting minority investors; paying taxes; trading across borders; enforcing contracts; resolving insolvency and Labour market regulation. A high Ease of Doing Business ranking means the regulatory environment is more conducive

to starting and operating a local firm. Constructing the Ease of Doing Business index is in tripod. Firstly, cardinal values for each sub-indicator is constructed: time, costs, number of procedures, and so on. On the basis of these values, countries are ranked on each sub-indicator. Secondly, the sub-indicator rankings are averaged to establish an indicator-level ranking. Thirdly, Countries receive a ranking for each of the eleven topics, which are then averaged to give an overall ranking on the Ease of Doing Business. Economies are ranked on their Ease of Doing Business from 1-190. Empirical research funded by the World Bank to justify their work show that the economic growth impact of improving these regulations is strong. Whelen and Gillanders in 2010 showed the ease of doing business is good for economic growth and development of the country. This finding was corroborated by Djankov, McLiesh and Ramalho (2006), who posited that there is a positive relationship between economic growth and the Ease of Doing Business indicator. In addition to the positive relationship between regulatory freedom and prosperity, more deregulation yields increasing returns. Each incremental increase in the DB score yields greater gains in GDP per capita. With each improvement in regulatory freedom, there is a disproportionate improvement in prosperity (Hanke, 2017).

According to Djankov et. al (2006) and Hander(2009), cross country regression shows that burdensome business regulatory procedures are negatively correlated with GDP growth. Influential proponents of the regulatory business environment claim that such reforms are not only appropriate to unleash private sector development and growth, but that they immediately benefit the poor more than proportionally

because "heavy regulation and weak property rights exclude the poor from doing business" (World Bank/IFC 2005; see also: Klein/Hadjimichael 2003, Klein 2006, Klapper 2006). A vibrant private sector with firms making investments, creating jobs and improving productivity promotes growth and expands opportunity for poor people (OECD and World Bank, 2006). Brunetti et al (1997) found evidence that developing countries face the most institutional obstacles in doing business. Ease of Doing Business report by the World Bank ranks Nigeria as one of the top 10 economies that showed notable improvements in doing business in 2016/2017. Precisely, the Report, which presents quantitative indicators on business regulation, compared across 190 economies and ranked Nigeria 145th - up by 24 positions from the previous report ranking, to reach its highest rank since 2013. This may not be unexpected, given that it is consequent upon various reforms on business environment in 2016. Particularly, the Presidential Enabling Business Environment Council (PEBEC) set up in 2016 enacted 31 reforms to improve business (such as improving credit to small and medium-size businesses) all enacted into law in May 2017. While acknowledging recent efforts by the Federal Government to strengthen regulations that enhance ease of doing business, however, more still needs to be done in the areas of property rights (especially land), infrastructure provision, and access to finance to small and medium scale enterprises (CSEA, 2017). The cost of running a business remains high in Nigeria. Banks have to factor in the ideally unnecessary cost of generating their own electricity, almost permanently via supposedly standby generators. Inflation at above 16 percent also means they cannot

lend below that price risk threshold. It matters little how much incentives they are proffered (Rafiq, 2016). Private sector-led economic growth remains stymied by the high cost of doing business in Nigeria, including the need to duplicate essential infrastructure, the lack of effective due process, and nontransparent economic decision making, especially in government contracting (Wikipedia, 2018). Creating a regulatory environment that enables private enterprises, especially small firms, to function and be creative has a large positive impact on job creation and therefore good for the economy. Improvement of the regulatory environment in terms of quality and efficiency is particularly in the best interest of Nigeria, which sits on a demographic time-bomb or an anticipated demographic dividend. For the latter to result, the ease of doing business should improve (Business Day, 2016). Available evidence shows that many investors have left Nigeria because of burdensome regulations that stifle business, with those that have remained confining themselves short-term skimming investments, protected through institutions outside the formal system, such as corporative, internet banking, Ponzi/pyramid schemes, esusu, ajo, kin, ethnicity, and localised relations. This has significant consequences beyond constraining the business environment as a whole, creating prophylactic against large-scale investment and long-run ventures that might provide dependable employment opportunities and benefits over time. It is germane to note, as pointed out by the World Bank, that "the economies performing best in the Ease of Doing Business rankings are not those without regulation, but those whose governments have managed to create rules that facilitate interactions in the market place

without needlessly hindering the development of the private sector." "Sound business regulations are fundamental to all of this.

The right business regulations enable good ideas to take root, leading to the creation of jobs and to better lives. But where business regulations make it difficult to start and operate a business, good ideas may never see the light of day and important opportunities may be missed. Budding entrepreneurs, daunted by burdensome regulations, may opt out of doing business altogether or, if they have the resources, take their ideas elsewhere.

## 2.2 The Microeconomic Foundation of Economic Development

Development microeconomics deals with the amalgam of the strength of conventional developmental thought and insights gained from contemporary mainstream economics in proffering answers to complex developmental questions. Demystifying the micro foundation of economic development is a conscious effort to explain aggregate economic phenomena in terms of the behaviour of individual economic agents and their interactions. Microeconomics encompasses specific reforms, individual and institutional-level intervention, regulatory changes and competitive pressures that influence the behaviour of individual economic agents.

It focuses on the dialectical interpretation and empirical estimation of microeconomic models of individual, household, firms, market and non-market institutions that relate to the workings of an economy. Economic theory is becoming farther from holism methodology which provides complex/sophisticated theorems of the

entire economy, rather renewed focus is on the realities of business and individuals and comprehending the complexity of the real world phenomena premised on methodological individualism leaning. The microeconomic components of the economy are the brass tacks that underlie the workings of an economy. Empirical findings from available strands of literature emphasises the role of microeconomic policies in economic development (among others, Porter, 1998, 2003; Bloom et al., 2001; Delgado, Porter, and Stern, 2010). Economic development can be triggered through a successive refurbishment of the microeconomic components to gain sophisticated competitive advantage. Microeconomic proponents have aptly posited that a theory of the aggregate economy which is inconsistent with the character of its constituent parts is misleading and can cause economic cataclysms. Developing countries, again and again, are tripped up by microeconomic failures.

Countries can engineer spurts of growth through macroeconomic and financial reforms that bring floods of capital and cause the illusion of progress as construction cranes dot the skyline... Unless firms are fundamentally improving their operations and strategies and competition is moving to a higher level, growth will be snuffed out as jobs fail to materialise, wages stagnate, and returns to investment prove disappointing (Porters, 2001).

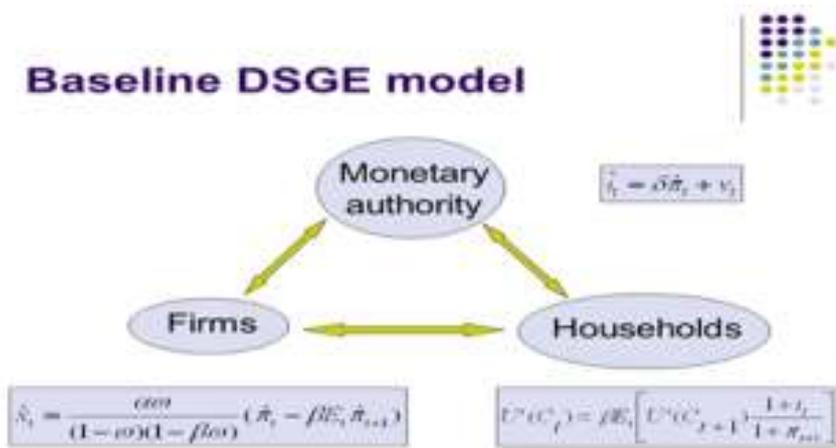
The relationship between microeconomics and macroeconomics in economic development is synergetic. Microeconomic structures determine the ability of firms to be creative and productive. They are the germane determinants of national

competitiveness and prosperity. The macroeconomic leg of the economy and other institutions also plays fundamental roles in the economy. A stable political and legal institutions and sound macroeconomic policies create the potential for improving national prosperity. They set the overall context and framework for generating wealth and prosperity. Nonetheless, the generation of wealth and prosperity is dependent on

strategic actions, and strategic actions are clearly within the domain of the set of capabilities of businesses in the economy. Firms exploit the potential for improving national prosperity by their action, orientation and discipline of getting things done. The importance of business and their competitiveness is indisputable in the context of economic reforms and national competitiveness because firms remain the economic dynamo.

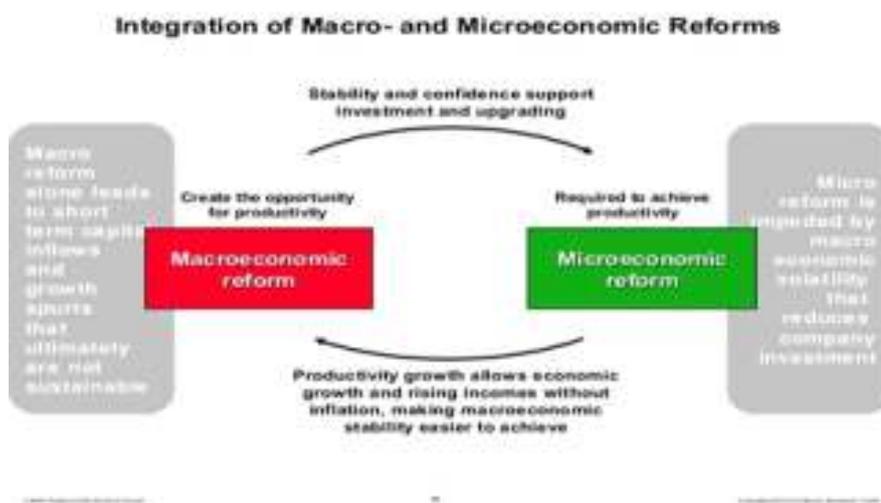
Microeconomic reforms facilitates the sustainability of progress in Gross Domestic Service for every capita initiated by macroeconomic policies, as a result it will be very imperative to amalgamate micro-economics in direction of macroeconomic policy reforms. Developing economies must beginning to explore the possibility of integrating macroeconomic stability approach in economic development and renewed competition in the provision of the most productive environment for business as developmental discuss in the global context witness a paradigm shift from focal emphasis on comparative advantages (Factor endowment) to competitive advantage (Favorable business environment).

Fig 8



Source: Google Images

Fig 9



Sources: Porters(2003)

3.1 Central Bank of Nigeria Interventions in the microeconomic units and macroeconomic performance in Nigeria.

The performance of Central Bank of Nigeria interventions in the microeconomic components of the economy can be assessed in relation to growth in the real sector of the economy, enterprise development, macroeconomic stability, extent to which these interventions promotes economic development and eliminate the scourge of poverty that ravaged the society. The regulatory authorities took various actions to stimulate economic development, so as to complement the achievement of macroeconomic stability. The CBN interventions in the microeconomic components of the economy and macroeconomic performance evaluation are enunciated in the table overleaf:

INTERVENTION	OBJECTIVES	MODALITIES	FUNDING SOURCE	EXIT DATE	IMPACT/ACHIEVEMENT as at July, 2016	CHALLENGES
<b>N200 Billion Commercial Agriculture Credit Scheme (CACS)</b>	To fast-track the development of the agricultural sector of the Nigerian economy by providing credit facilities to commercial agricultural enterprises at a single digit interest rate, enhance national food security, increase output, generate employment as well as diversify the revenue base.	DMBs are granted facilities to be disbursed to clients (both private and State governments) at a maximum interest rate (all inclusive) of 9.0 per cent. CBN earns 2.0 percent as interest from the 9.0 per cent	N200 billion FGN Bond for 7 years tenor, floated by the Debt Management Office (DMO)	The scheme which was initially meant to terminate in September, 2016 was extended to September 2025	N373.73 billion disbursed in favour of 460 projects. Contributed to the creation of 1,132,260 jobs created along the various agricultural value chains. Increased capacity utilisation of agro-allied companies.	Underutilisation of installed capacity due to inadequate raw materials as a result of low agricultural productivity. Infrastructural constraints (transport and electricity) are increasing the cost of production of beneficiaries
<b>N200 Billion Small and Medium Enterprises Restructuring and Refinancing Facility (SMERRF)</b>	To re-finance and Restructure banks' existing loan portfolio to manufacturers to improve access to finance as well as improve the financial position of DMBs	Administered at 7.0 per cent per annum payable on quarterly basis. The Managing agent (BOI) is entitled to a 1.0 per cent management fee and the Banks, a spread of 6.0 percent. Loans shall have a maximum tenor of 15 years and or working capital facility of one year with provision for roll over	N200 billion debenture issued by Bank of Industry (BOI) to fund SMEs and manufacturing sector	Scheme has been discontinued while repayment is still ongoing.	N381.99 billion disbursed to 604 projects. Contributed to the creation of 89,860 direct jobs. Increased productivity and turnover of firms. Restoration of 905 MW of electricity to the National grid. N6.9 billion estimated as interest savings to beneficiaries.	Quest for cheap imported goods. Cost of power supply is significantly increasing beneficiaries cost of production.
<b>Small and Medium Enterprises Credit Guarantee Scheme (SMECGS)</b>	To fast-track the development of the manufacturing SME subsector of the Nigerian Economy	Provide guarantee cover of 80.0 per cent of principal and interest on term loans for SMEs	Contingent liability		87 projects valued at N4.21 billion in favour of 9 financial institutions	Apathy of banks to fund SME projects from their balance sheet. 80.0 per cent guarantee not considered as adequate incentive by financial institutions to lend to SMEs
<b>Power and Airline Intervention Fund (PAIF)</b>	To stimulate and sustain private sector investment in the power and airline sectors as well as fast track development in both sectors of the economy	Administered at a rate of not more than 7.0 per cent per annum. The Managing agent (BOI) is entitled to a 1.0 per cent management fee and the banks, a spread of 6.0 percent. Effective May 2016, new projects charged at 9.0 per cent (BOI at 1.0 per cent, CBN at 3.0 per cent, DMB at	N300 billion debenture issued by Bank of Industry (BOI)	2025	40 power projects valued at N140.442 billion; and 16 airline projects valued at N120.762 billion were financed. 840 MW of power generated and 120 km of gas pipeline constructed. Resuscitation of a number of aircrafts, captive and embedded power projects to complement the national grid	Pricing of electricity. Wanton destruction of pipelines and increasing cost of aviation fuel has hindered repayment by beneficiaries.

<b>Nigerian Incentive Based Risk Sharing System for Agricultural Lending (NIRSAL)</b>	Creates access to finance by integrating end-to-end agriculture value chains with financing value chains. It seeks to de-risk agricultural finance value chain, build long-term capacity and institutionalise incentives for agricultural lending	Guarantee banks' exposure to agricultural sector and provide cascaded interest rebates to farmers.	NIRSAL created as a Special Purpose Vehicle (SPV) and fully funded by CBN		NIRSAL has taken off fully as a SPV and reports to its Governing board.	
<b>N220 Micro Small and Medium Enterprises Development Fund (MSMEDF)</b>	The Fund seeks to enhance access by MSMEs to financial services, increase productivity and output of microenterprises; increase employment and create wealth, and to engender inclusive growth	Administered at 2.0 per cent per annum to PFIs for on-lending to beneficiaries at 9.0 per cent. Maximum loan tenor of 1 and 5 years for micro and SMEs, respectively.	Funded by CBN		478 projects funded by PFIs valued at N74.797 Billion	Low uptake by PFIs due to low lending margins that is considered not commensurate with the risk of lending to MSMEs and startups. Poor capacity of PFIs to monitor micro entrepreneurs.
<b>Nigeria Electricity Market Stabilisation Fund (NEMSF):</b>	The NEMSF is aimed at putting the Nigerian Electricity Supply Industry (NESI) on a route to economic viability and sustainability by facilitating the settlement of Legacy Gas Debts and payment of outstanding obligations due to market participants, service providers and gas suppliers that accrued during the Interim Rules	Funds to be disbursed at 10.0 per cent per annum with a ten year tenor. 6.0 per cent CBN; 2.0 per cent NESI SS Ltd; 2.0 per cent Participating Mandate Banks	Funded by CBN		N106.64 billion disbursed to 23 market participants. N8.67 billion earned by beneficiaries as interest savings on funds received.	Court judgment against the takeoff of Transitional Electricity Market (TEM). Wanton destruction of gas pipelines.
<b>N300 Billion Real Sector Support Fund (RSSF)</b>	Established to stimulate output growth, enhance value addition and engender productivity in the economy. The Facility will concentrate on increasing credit to priority sectors of the economy with sufficient employment capabilities, high growth potentials, increase accretion to foreign reserves, expand the industrial base and consequently, enhance the diversification of the economy	Interest at 9.0 per cent (all-inclusive) and CBN to earn 1 per cent.	Special Intervention Reserve (SIR) of DMBs		4 projects valued at N4.6 billion approved. Contributed to the creation of 17,000 direct and indirect jobs.	Apathy of DMBs to fund real sector projects from their SIR
<b>Anchor Borrowers' Programme (ABP)</b>	Designed to create an ecosystem that links small holder farmers to local processors; improve productivity in identified commodities with high domestic production potential; and also build capacity of small holder farmers	Administered at 2.0 per cent per annum to PFIs for on-lending to beneficiaries at 9.0 per cent	CBN MSMEDF		N15.77 billion disbursed to 76,251 small holder farmers through 5 private anchors in 3 states. 26 states have expressed interest in participation under the wet season farming	Fragmentation of farm holdings by small holder farmers have limited the use of mechanisation and hence hindered the optimisation of potentials
<b>Secured Transaction and National Collateral Registry (ST and NCR)</b>	A collaborative effort between the Central Bank of Nigeria (CBN) and the International Finance Corporation (IFC) as a financial infrastructure to deepen credit delivery to the micro, small and medium enterprises (MSMEs). The Secured Transaction and National Collateral Registry (ST and NCR)	The NCR is a public data base of ownership of assets, allowing borrowers to prove their creditworthiness and potential lenders to assess their ranking priority in potential claims against particular Collateral.	Counterpart funding for the provision Registry on-line platform		27 Financial Institutions have registered their administrators on the NCR platform	Delayed passage of the ST and CR Bill. Poor capacity of financial institutions on asset based lending

	seeks to specifically, address the constraints posed by lack of collaterals as a hindrance to credit by MSMEs					
<b>N50 Billion Textile Intervention Facility:</b>	A one-off special intervention with a seed fund of N50 billion to resuscitate the textiles industry in Nigeria. The Facility will be used to restructure existing loans and provision of additional credit to cotton, textile and garment (CTG) companies in Nigeria as part of its efforts to promote the development of the textile and garment	Long-term loans for acquisition of plant and machinery. All-Inclusive rate of 4.5 per cent; 3.5 per cent to CBN and 1.0 per cent to BOI Fund Management by BOI	CBN. To be funded by repayments from other interventions	31st December, 2025		
<b>N500 Billion Export Stimulation Facility (ESF)</b>	Established to Broaden the scope of export financing instruments. It seeks to improve access of exporters to concessionary finance to expand and diversify the non-oil export baskets; attract new investments and encourage reinvestments in value added non-oil exports production and nontraditional exports; shore up productivity and create more jobs within the non-oil exports value chain of Nigeria etc. among other deliverables	All-inclusive interest of 7.5 per cent for facilities = 3 years and 9.0 per cent for facilities > 3 years: (PFI – 4.5 per cent - 6.0 per cent; NEXIM – 1.0 per cent; CBN – 2.0 per cent). Managed by NEXIM	To be funded by CBN	28th February, 2026	Stakeholders' engagement ongoing.	
<b>N50 Billion Export Rediscounting and Refinancing Facility (RRF)</b>	To encourage and support DMBs to provide short-term pre-and post shipment finance in support of exports by providing a discount window to exports financing banks and, therefore, improving their liquidity and exporters' access to export credit. To also provide moderation and indirect influence on the cost of export credits to the nonoil sector in order to enhance competitiveness of Nigeria's exports and thereby assist in export production and marketing	All-inclusive rate of a maximum of 6.0 per cent per annum with the pricing structure as follows; CBN/NEXIM would provide the RRF at a rate of 3.0 per cent per annum Participating banks shall have a maximum spread of 3.0 per cent per annum NEXIM as the Managing Agent				
<b>Youth Empowerment Development Programme (YEDP)</b>	Established to improve access to finance by youths to develop their entrepreneurial skills using a well-structured business model; stimulate job creation through the development of small and medium enterprises among Nigerian youths; harness the entrepreneurial capacity of Nigerian youths; and increase the contribution of the non-oil sector to the nation's GDP	NYSC Certificate, Tertiary Institution Certificate, 3rd Party Guarantors as collaterals. Registration of Collaterals (movables) and financed equipment with the National Collateral Registry. Loan at max 9.0 per cent interest rate (all-inclusive)	Funded from CBN MSMEDF		11,000 applications received and about 3,000 processed by lending bank. 1,211 prospective entrepreneurs trained nationwide in the 1 <sup>st</sup> training.	Unwillingness of DMBs to fund startups and their lack of readiness to accept movable assets as collaterals for loans.

Sources: Olaitan(2015)

**Table 2 – Selected Macroeconomic Projections, 2016 -2020(in percent of GDP, unless otherwise specified)**

	2016	2017	2018	2019	2020
<b>REAL</b>					
<i>Real GDP Growth%</i>	-1.54	2.19	4.80	4.50	7.00
<i>Of which...Agriculture %</i>	4.69	5.03	7.04	7.23	8.37
<i>Of which...Industry %</i>	-10.13	7.74	6.11	6.07	8.02
<i>Of which...Services%</i>	-0.51	-1.26	3.16	2.45	5.82
<i>NonOil GDP%</i>	-0.07	0.20	4.83	4.52	7.28
<i>Oil GDP%</i>	-15.41	24.30	4.55	4.35	4.45
<i>Gross National Disposable Income (GNDI)</i>	101.73	101.86	101.83	101.78	101.70
<i>Gross National Income (GNI)</i>	97.48	97.67	97.77	97.88	97.91
<i>Gross National Savings</i>	11.29	13.71	15.53	18.19	21.31
<i>Total Consumption (C)</i>	90.44	88.14	86.30	83.59	80.39
<i>Private Consumption (Cp)</i>	86.33	83.28	81.08	77.92	73.84
<i>Government Consumption (Cg)</i>	4.11	4.86	5.22	5.67	6.55
<i>Gross Domestic Investment (I)</i>	13.95	13.90	14.34	15.57	17.34
<i>Government Investment (Ig)</i>	3.53	3.71	3.15	2.89	2.76
<i>Private Investment (Ip)</i>	10.42	10.20	11.19	12.68	14.58
<i>Inflation Rate%</i>	18.55	15.74	12.42	13.39	9.90
<i>Oil Price Benchmark US\$</i>	38.00	42.50	45.00	50.00	52.00
<i>Oil Production (mbpd)</i>	1.7	2.2	2.3	2.4	2.5
<i>Labor Force growth rate%</i>	3.66	3.92	4.37	3.98	4.09
<i>Unemployment %</i>	14.20	16.32	14.51	12.90	11.23
<i>Unemployment inc underemployment rate%</i>	32.77	33.51	31.88	29.65	26.92
<b>EXTERNAL</b>					
<i>Current Account, n.i.e.</i>	-1.84	0.65	1.96	2.59	2.89
<i>Trade Balance</i>	-0.31	1.80	2.85	3.26	3.42
<i>Capital and Financial Accounts</i>	1.02	1.32	1.35	1.28	1.34
<i>Of which : FDI</i>	0.21	0.22	0.33	0.33	0.43
<i>PI</i>	0.85	1.14	1.06	0.98	0.95
<i>Overall Balance</i>	1.38	-2.11	-3.43	-3.99	-4.34
<i>Net Factor Income Payments (Yf)</i>	-2.52	-2.33	-2.23	-2.12	-2.09
<i>Exports of goods and services(X)</i>	9.01	10.82	11.52	11.39	11.66
<i>.....of which exports of goods</i>	8.38	10.23	10.95	10.85	11.13
<i>Imports of goods and services (M)</i>	-12.58	-12.03	-11.40	-10.58	-10.47
<i>.....of which imports of goods</i>	-8.69	-8.43	-8.11	-7.59	-7.71

<i>Exports of goods and services(X)</i>	9.01	10.82	11.52	11.39	11.66
<i>.....of which exports of goods</i>	8.38	10.23	10.95	10.85	11.13
<i>Imports of goods and services(M)</i>	-12.58	-12.03	-11.40	-10.58	10.47
<b>FISCAL</b>					
<i>Revenue</i>	3.95	4.68	4.30	4.61	4.46
<i>.....of which oil</i>	0.74	1.88	1.68	2.11	2.01
<i>...of which nonoil (including accrued government revenue &amp; Other government independent revenue)</i>	3.22	2.80	2.62	2.50	2.45
<i>Non-debt recurrent expenditure</i>	2.40	2.49	2.22	2.02	2.03
<i>Interest payments</i>	1.40	1.58	1.64	1.59	1.54
<i>Expenditure</i>	6.21	6.92	6.27	5.85	5.57
<i>Capital Expenditure</i>	1.63	1.95	1.54	1.42	1.41
<i>Primary Balance</i>	-0.86	-0.66	-0.33	0.35	0.42
<i>Deficit (-) or Surplus(%GDP)</i>	-2.26	-2.23	-1.96	-1.24	-1.12
<i>Financing</i>					
<i>Domestic (% of financing)</i>	53.68	53.21	34.38	20.57	26.06
<i>Foreign(% of financing)</i>	28.80	45.30	65.62	79.43	71.66
<i>Other Financing(% of financing)</i>	17.52	0.00	0.00	0.00	0.00
<i>Use of Cash Balances(% of financing)</i>	0.00	1.49	0.00	0.00	2.28
<i>Primary balance(% of GDP)</i>	-0.84	-2.80	-6.19	-4.33	-6.08
<b>MONETARY (yoy%)</b>					
<i>Net Domestic Credit (NDC) YOY growth rate</i>	33.32	10.26	14.72	18.20	19.88
<i>Government (NDCg) YOY growth rate</i>	12.30	14.23	9.16	8.66	10.71
<i>Private (DCp) YOY growth rate</i>	30.74	10.68	14.12	17.21	19.00
<i>M2 Growth YOY growth rate</i>	22.18	22.89	20.06	21.84	19.52
<i>Income Velocity</i>	4.32	3.80	3.46	3.12	2.83

Sources: MBNP, NBS, FMF and CBN

Table 1, shows succinctly that the Central Bank of Nigeria is calibrating monetary tools in supporting the private sector, especially SMEs. This underscores the imperative of a viable private segment of the economy in triggering developmental gigantism in the country.

CBN intervention in the economy is articulated with the understanding that the role of monetary authorities in the 21st century is evolving from macroeconomic stability mandate into a force for jumpstarting developmental strides in any country. The focal emphasis of the Central Bank of Nigeria intervention in the microeconomic components of the economy is to crystallize macroeconomic stability in creating a competitive advantage to firms operating in the private sector.

The Central Bank of Nigeria as the arbiter in the economy continually provides the required stimulus that guarantee appropriate impetus for supporting the expected sophistication of the private sector CBN intervention in the economy is improving the Ease of Doing Business, especially improved access to credit which is capable of assisting firms to

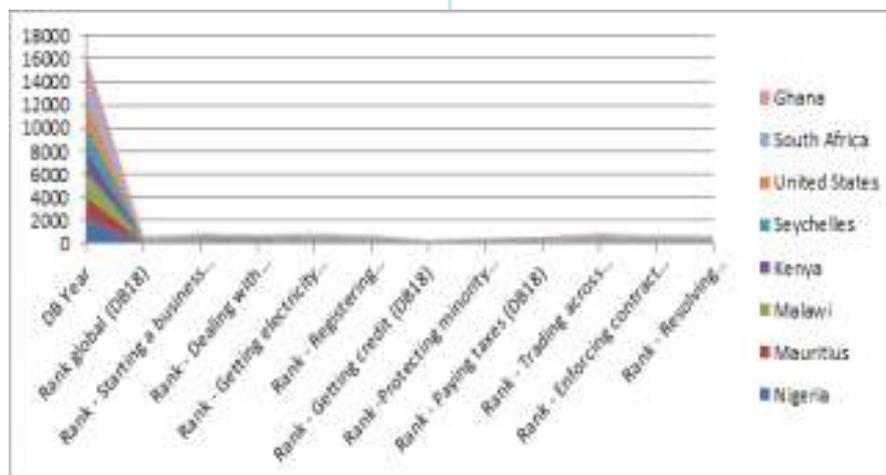
cope with increased competition in the global space, as well as provide stable supportive governance which could ensure business continuity and inspire investors' confidence in the business climate.

The world bank 2018 ranking on the ease of doing business indicates that out of 190 countries Nigeria ranks 130th in starting a business, 147th in dealing with construction permits, 172nd in getting electricity, 179 in registering properties, 6th in getting credit, 33th in protecting minority investors, 171st in paying taxes, 183rd in trading across borders, 96th in enforcing contracts, 145th in resolving in insolvency, there is 8.5 procedures for men required to start a business which takes an average of 18.9 days to complete.

The official cost is 28.8% of gross national income per capita. There is no minimum capital requirement. It is therefore not suprising that the country performed excellently better in the access to credit among comparative sub-indicators in the Ease of Doing Business given CBN continued emphasis on supporting the microeconomic components of the economy which is the bedrock of

economic renaissance. Consequently, the macroeconomic outlook remains positive. Table 2 shows that Nigerian real GDP annual growth rate is expected to grow from 2.19 percent in 2017 to 4.8 percent in 2018. labour force growth rate is expected to witness an astronomical increase from 3.6 percent in 2016 to 4.37 percent in 2018, as institutions of higher learning continue to produce graduates into the already saturated labour market coupled with the youthful bulge which puts Nigeria in the balanced knife edge situation of either reaping demographic dividends or disaster. Nonetheless, the Nigerian economy looks set to take advantage of her teeming population as unemployment rate is expected to decrease from 16.32 percent in 2017 to 14.51 percent in 2018 .Inflation is expected to fall from 15.74 percent in 2017 to 12.42 percent in 2018. The chunk of private investment is expected to increase from 10.42 percent in 2016 to 11.19 percent in 2018. The macroeconomic projection shows succinctly that with increased support of the microeconomic components of the economy the social/ economic condition of the populace which is the hallmark of economic development would improve considerable. Nevertheless, the projected macroeconomic performance of the Nigerian economy as indicated in Table 1 provides only a rough idea of the achievement of support for microeconomic foundation of economic development, as it is a product of an amalgam of factors. Nonetheless, the microeconomic foundation of economic development is pre-eminent in promoting productivity without which the economy will not be able to realize its full potential.

Fig 10



Sources: Autors compilation

### 3.2 The Drawbacks of the Ease of Doing Business Index

The Ease of Doing Business index is primal since it provides metrics for ranking countries in terms of eliminating encumbrances that impedes businesses. A dysfunctional business/ investment climate is capable of c o n s t r a i n i n g t h e macroeconomic system. That notwithstanding, the importance of the Ease of Doing Business index should not be overtly exaggerated. As is the case with any strategic reflection on development, its possibilities for implementation and practical success is subject to a number of constrains, of which this paper attempted to streamline the most consequential. The main weakness of the ease of doing business is that the index does not encompass all aspect of business environment that is primal to investors. For example issues such as political stability, security, macroeconomic stability, corruption, capacity utilization, underlying quality of institutions and infrastructure or the strength of the financial system is not taken into cognizance. The Eleven (11) topics included in the ranking in the Ease of Doing Business index are grossly inadequate as a barometer for measuring economic activity in a country, the misinterpretation, narrowness of the indicators and information base, the data collection methodology, and lack of peer-review process is a potential threat to policy execution. Furthermore, the ease of doing business advocates equal/fair treatment of foreign and local firms, as such protective measures to encourage local investors/local content are discouraged. As currently deliberated, there is the real danger that the indicators will encourage developing countries (Nigeria inclusive) to open their borders to exploitation, dumping and foreign domination of the

economy with antecedent annihilation of local investors with the premise of attracting foreign direct investment. In addition, though the Ease of doing Business indicator makes passive reference to environmental and social protection but the indicators fails to enunciate the colossal havoc increased exploitation of the natural resource resulting from expansion in business would cause on the larger society. Economic development is not an end in itself but a means to an end. According to development experts humans are the initiator and ultimate beneficiary of every developmental effort. Therefore, a suitable indicator of economic development must reflect human progress accruable from such measurement. If scholars are correct in stating that the Ease of Doing Business ranking too often pursues other goals that are different and even incompatible with human welfare and well-being, then there is full justification for urgently striving to evolve both new theory and new measures to reorient economics toward its true purpose. The Ease of Doing Business also fails to take cognizance of the entire fabrics and peculiarity of the Nigerian economy. Streeten (1972) put it mildly when he observed that the simple transfer of fairly sophisticated concepts from one setting to another without close scrutiny of the institutional differences, could be misleading. He argued that: Almost all concepts formed by aggregation suitable for analyzing western economies must be carefully reconsidered before they can be applied to underdeveloped economies. The application of concepts and theories which have originated in the economic and institutional setting of the western, industrialized economies to LDCs introduces errors into analysis (Seer, 1963). This view emphasis the need for caution in

accepting the Index as an indicator of economic development in Nigeria.

### 4.0 CONCLUSION/ RECOMMENDATIONS

This paper has presented a persuasive and trenchant analysis of microeconomic development in Nigeria. This was done to expose the intricacies, interconnectedness and dynamics of supporting key microeconomic determinants. A new development dogma premised on improving the Ease of Doing Business has taken shape in the economic landscape in Nigeria. It looks promising and should not be discarded as a mere whim in the debate on development. This new dogma is the result of a critical theoretical assesment of the potency of development microeconomics in the accomplishment of shared prosperity. The subject microeconomic foundation of economics development constitutes a major issue in national and strategic enterprise development plans. Experience in advanced countries affirms to the position that individual components of the economy are the most germane sources of sustained growth and development. There is a strong relationship between the support of microeconomic components of the economy and the achievement of macroeconomic objectives. Higher productivity in business results in lowering rates of inflation and exchange rate appreciation. This will naturally enhance the share of national income available for distribution to the vulnerable in the population, namely, those who are old, the young, handicapped and unemployed. The macro economic objectives have their lag limitations. But the ingenuity of the human mind has no such bounds and people are the ultimate means and ends of

every developmental efforts. Nigeria is a fast growing economy with great economic potentials and untapped opportunities/natural endowment almost unequalled anywhere in the world. Enormous opportunities abound in the realms of business opportunities. The Central Bank of Nigeria is a financial power house with the

technical leverage and know-how to translate this dream to realities. Available reports analyzed in this paper shows that the outcome of monetary intervention in the microeconomic components of the economy is quite encouraging. The Central Bank of Nigeria must sustain its relentless efforts of supporting the

microeconomic components of the economy, which is a panacea of economic development. The removal of access to credit barriers and other problematic bedeviling businesses especially the real sector must become a part of the cultural philosophy of the Central Bank of Nigeria and MDAs.

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"Our members are really pleased that you as Governor of the CBN have led the effort in economic recovery in Nigeria. We see that things are turning around now and we just want to let you know that those efforts are noted by the business community.

"We also are happy to see the work that is being done on the Ease of Doing Business in Nigeria and we believe they are going to pay off.

"Many of our members welcome it as an opportunity to see how they can trade more with Nigeria and invest more in Nigeria. So, we thank you for your efforts." - **President/CEO, Florizelle Liser, U.S Corporate Council On Africa (CCA).**

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**TABLE 1.1 Ease of doing business ranking**

DB 2018 Rank	Economy	DTF score	DTF change	DB 2018 Rank	Economy	DTF score	DTF change	DB 2018 Rank	Economy	DTF score	DTF change
1	New Zealand	86.55	-0.18	65	Albania	68.70	+0.96	129	St. Vincent and the Grenadines	55.72	+0.01
2	Singapore	84.57	+0.04	66	Bahrain	68.13	+0.01	130	Palau	55.58	+0.46
3	Denmark	84.06	-0.01	67	Greece	68.02	+0.01	131	Nicaragua	55.39	+0.09
4	Korea, Rep.	83.92	0.00	68	Vietnam	67.93	+2.85	132	Barbados	55.20	-0.09
5	Hong Kong SAR, China	83.44	+0.29	69	Morocco	67.91	-0.03	133	Lebanon	54.67	-0.10
6	United States	82.54	-0.01	70	Jamaica	67.27	+0.57	134	St. Kitts and Nevis	54.52	+0.18
7	United Kingdom	82.22	-0.12	71	Oman	67.20	+0.08	135	Cambodia	54.47	+0.72
8	Norway	82.16	-0.25	72	Indonesia	66.47	+2.25	136	Maldives	54.42	+0.64
9	Georgia	82.04	+2.12	73	El Salvador	66.42	+3.54	137	Tanzania	54.04	+0.11
10	Sweden	81.27	+0.02	74	Uzbekistan	66.33	+4.46	138	Mozambique	54.00	+0.97
11	Macedonia, FYR	81.18	-0.21	75	Bhutan	66.27	+1.06	139	Côte d'Ivoire	53.71	+2.04
12	Estonia	80.80	+0.05	76	Ukraine	65.75	+1.90	140	Senegal	53.06	+3.25
13	Finland	80.37	-0.11	77	Kyrgyz Republic	65.70	+0.54	141	Laos PDR	53.01	+0.42
14	Australia	80.14	0.00	78	China	65.29	+0.40	142	Grenada	52.94	-0.11
15	Taiwan, China	80.07	+0.41	79	Panama	65.27	+1.25	143	Mali	52.92	+0.30
16	Lithuania	79.87	+1.05	80	Kenya	65.15	+2.59	144	Niger	52.34	+2.26
17	Ireland	79.51	-0.19	81	Botswana	64.94	+0.07	145	Nigeria	52.03	+3.85
18	Canada	79.29	-0.09	82	South Africa	64.89	-0.08	146	Gambia, The	51.92	-0.01
19	Latvia	79.28	-0.79	83	Qatar	64.86	+0.61	147	Pakistan	51.83	+0.71
20	Germany	79.00	-0.19	84	Malta	64.72	+0.43	148	Burkina Faso	51.54	+0.20
21	United Arab Emirates	78.73	+1.87	85	Zambia	64.50	+3.92	149	Marshall Islands	51.45	+0.03
22	Austria	78.54	-0.15	86	Bosnia and Herzegovina	64.20	+0.42	150	Mauritania	50.88	+1.56
23	Iceland	78.50	+0.01	87	Samoa	63.89	+2.06	151	Benin	50.47	+1.83
24	Malaysia	78.43	+0.96	88	Tunisia	63.58	-0.20	152	Bolivia	50.18	+0.32
25	Mauritius	77.54	+2.09	89	Tonga	63.43	+0.50	153	Guinea	49.80	+0.32
26	Thailand	77.44	+5.68	90	Vanuatu	63.08	+0.02	154	Djibouti	49.58	+3.99
27	Poland	77.30	+0.18	91	St. Lucia	62.88	+0.01	155	Micronesia, Fed. Sts.	49.39	+0.01
28	Spain	77.02	0.00	92	Saudi Arabia	62.50	+2.92	156	Togo	48.88	+0.64
29	Portugal	76.84	-0.14	93	San Marino	62.47	-0.03	157	Kiribati	48.74	-0.31
30	Czech Republic	76.27	+0.03	94	Uruguay	61.99	+0.35	158	Comoros	48.52	+0.47
31	France	76.13	-0.06	95	Seychelles	61.41	+1.01	159	Zimbabwe	48.47	+0.80
32	Netherlands	76.03	+0.51	96	Kuwait	61.23	+1.52	160	Sierra Leone	48.18	-0.26
33	Switzerland	75.92	+0.19	97	Guatemala	61.18	-0.43	161	Ethiopia	47.77	+2.08
34	Japan	75.68	+0.07	98	Dominica	60.96	+0.34	162	Madagascar	47.67	+3.05
35	Russian Federation	75.50	+0.81	99	Dominican Republic	60.93	+2.52	163	Cameroon	47.23	+2.18
36	Kazakhstan	75.44	+1.06	100	India	60.76	+4.71	164	Burundi	46.92	+0.06
37	Slovenia	75.42	+0.99	101	Fiji	60.74	+0.04	165	Suriname	46.87	+0.11
38	Belarus	75.06	+0.55	102	Trinidad and Tobago	60.68	-0.19	166	Algeria	46.71	-0.01
39	Slovak Republic	74.90	-0.25	103	Jordan	60.58	+2.38	167	Gabon	46.19	+1.33
40	Kosovo	73.49	+4.98	104	Lesotho	60.42	+0.54	168	Iraq	44.87	+0.48
41	Rwanda	73.40	+3.21	105	Nepal	59.95	+2.25	169	São Tomé and Príncipe	44.84	+0.39
42	Montenegro	73.18	+1.64	106	Namibia	59.94	+0.54	170	Sudan	44.46	+0.17
43	Serbia	73.13	+0.26	107	Antigua and Barbuda	59.67	+0.98	171	Myanmar	44.21	+0.30
44	Moldova	73.00	+0.30	108	Paraguay	59.19	+0.06	172	Liberia	43.55	+3.10
45	Romania	72.87	+0.17	109	Papua New Guinea	59.04	+0.17	173	Equatorial Guinea	41.66	+1.77
46	Italy	72.70	+1.75	110	Malawi	58.94	+6.33	174	Syrian Arab Republic	41.55	+0.08
47	Armenia	72.51	+0.59	111	Sri Lanka	58.86	+0.12	175	Angola	41.49	+1.38
48	Hungary	72.39	+0.26	112	Swaziland	58.82	+0.25	176	Guinea-Bissau	41.45	+0.23
49	Mexico	72.27	+0.18	113	Philippines	58.74	+0.42	177	Bangladesh	40.99	+0.15
50	Bulgaria	71.91	+0.10	114	West Bank and Gaza	58.68	+3.80	178	Timor-Leste	40.62	-0.07
51	Croatia	71.70	+0.05	115	Honduras	58.46	-0.07	179	Congo, Rep.	39.57	-0.52
52	Belgium	71.69	-0.23	116	Solomon Islands	58.12	-0.01	180	Chad	38.30	-0.28
53	Cyprus	71.63	-0.49	117	Argentina	58.11	+0.07	181	Haiti	38.24	+0.01
54	Israel	71.42	+0.05	118	Ecuador	57.82	-0.01	182	Congo, Dem. Rep.	37.65	+0.22
55	Chile	71.22	+0.37	119	Bahamas, The	57.47	+0.82	183	Afghanistan	36.19	-1.80
56	Brunei Darussalam	70.60	+5.83	120	Ghana	57.24	+0.24	184	Central African Republic	34.86	+0.78
57	Azerbaijan	70.19	+3.12	121	Belize	57.11	+0.03	185	Libya	33.21	+0.03
58	Peru	69.45	+0.01	122	Uganda	56.94	+0.42	186	Yemen, Rep.	33.00	+0.06
59	Colombia	69.41	-0.11	123	Tajikistan	56.86	+0.92	187	South Sudan	32.86	-0.33
60	Turkey	69.14	+1.16	124	Iran, Islamic Rep.	56.48	+0.26	188	Venezuela, RB	30.87	-0.29
61	Costa Rica	69.13	+1.23	125	Israel	56.45	+0.38	189	Eritrea	22.87	+0.42
62	Mongolia	69.03	+1.27	126	Guyana	56.38	+0.39	190	Somalia	19.98	-0.31
63	Luxembourg	69.01	+0.35	127	Cabo Verde	56.24	+0.42				
64	Puerto Rico (U.S.)	68.85	+0.05	128	Egypt, Arab Rep.	56.22	+0.10				

Source: Doing Business database.

Note: The DB 2018 rankings are benchmarked to June 2017 and based on the average of each economy's distance to barrier (DTF) scores for the 10 topics included in the aggregate ranking. For the economies for which the data cover two cities, scores are a population-weighted average for the two cities. A positive change indicates an improvement in the score between 2016 and 2017 (and therefore an improvement in the overall business environment as measured by Doing Business), while a negative change indicates a deterioration and 0.00 indicates no change in the score.

## BOARD OF GOVERNORS

- |                    |   |
|--------------------|---|
| Godwin I. Emefiele | - Governor<br>(Chairman)                          |
| Adebayo A. Adelabu | - Deputy Governor<br>(Operations)                 |
| Joseph O. Nnanna   | - Deputy Governor<br>(Economic Policy)            |
| Aishah Ahmad       | - Deputy Governor<br>(Financial System Stability) |
| Edward L. Adamu    | - Deputy Governor<br>(Corporate Services)         |