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Business Cycle and Economic Growth in Nigeria (1986-2014); A Time Series Econometric Approach

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Abstract: **This paper examined business cycle and economic growth in Nigeria between 1986 and 2014. The paper used the Autoregressive Distributed Lag Model (ARDL) to examine the short run and long run and short run effect of business cycle on economic growth in Nigeria during the study period. Quarterly time series data between 1986 and 2014 was used for the study. Data on real gross domestic product, nominal gross domestic product, broad money supply, government expenditure, inflation, interest rate, exchange rate and oil price were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin. The unit root test carried out revealed that all the variables were stationary at first difference except for the business cycle component that was stationary at level, furthermore, the bound test cointegration analysis established the existence of long run relationship among the variables. The result of the ARDL showed that business cycle negatively affected economic growth in the short run and positively affected economic growth in the long run. Government expenditure had a negative relationship with economic growth in Nigeria both in the short run and long run while inflation on the other hand, had a positive effect on economic growth in Nigeria both in the short and long run. Therefore, the paper recommends that business cycle and fluctuations of macroeconomic variables should not be trivialized by policymakers if the desired level of growth is to be achieved in Nigeria.**

Keywords: **Hodrick Prescott filter, Autoregressive Distributed Lag Model, Real Gross Domestic Product, Nominal Gross Domestic Product, Business Cycle,Money Supply, Oil Price, Inflation, Interest Rate, Exchange Rate, Unit Root, Cointegration.**

1. INTRODUCTION

The issue of fluctuations in macroeconomic variables and its effect on economic output has been debated by several authors in the literature. Early traditional macroeconomists argued that business cycle fluctuations and output are two separate areas of economics which should be treated separately. However, Kydland and Prescott (1982) are one of the first economic researchers to theoretically integrate business cycle and growth within the same framework using the United States of America (USA) as a case study. This spurred several other researchers such as Smet and Wouter (2003), Curdia and Finocchiaro (2005), Sugo and Ueda (2007), Peiris and Saxegaard (2007), Bouzid (2012) and Mohammad *et al*, (2012) into examining the relationship between fluctuations in macroeconomic variables (business cycle) and output performance in developed and developing countries of the world.

Theoretically, monetary economists are of the view that shocks to an economy are temporary and does not affect aggregate demand in the long run as a result of flexibility of prices. Keynesians, on the other hand argued that shocks to the economy affect the economy both in the short run and in the long run (Mishkin, 2004). The empirical literature as

regards the short run and long run effects of business cycle in developed and developing countries posits that shocks to the economy affect the economy mostly in the short run and not in the long run. In Nigeria, studies such as Olomola and Adejumo (2006), Alimi and Atanda (2011) and Chris and Anyingang (2012) posited that shocks affect the Nigerian economy only in the short run with no emphasis made on the long run effects of those shocks. However, Akinleye and Ekpo (2013) on the other hand found out that shocks to the Nigerian economy affect the economy both in the short run and the long run.

Macroeconomic shocks such as oil price shocks, money supply shocks, currency devaluation, technological advancement and changes in government policy alters the actions and plans of economic agents thereby giving rise to equilibrium behaviors' that symbolizes a business cycle (Iwayemi, 1995). The effects of these shocks affect the performance of output in Nigeria. The gross domestic product (GDP), which is a measure of economic growth in the last decade for example, experienced a growth rate of 11.9% in 2003, fell to 8.3% in 2006, rose to 7.8% in 2010 and was 6.3% as at 2014 (Ibrahim, Adesanya and Bolarinwa, 2014). The fluctuations in the GDP in Nigeria are attributable to the existence of real and nominal shocks (Alege, 2009).

Most of the studies in the empirical literature focused more on developed economies with less attention paid to developing countries. Also, these studies posited that business cycle is only a short run phenomena that does not affect the economy in the long run effect. This paper as a departure from previous studies, will econometrically examine the short run and long run effects of business cycle on economic growth in Nigeria. Furthermore, this study unlike Alimi and Atanda (2011), Chris and Anyingang (2012) and Fredrick *et al* (2014) that used macroeconomic variables to proxy for business cycle in Nigeria intends to generate the business cycle component using the Hodrick Prescotts (HP) filter.

2. LITERATURE REVIEW

Previous studies have examined the relationship between macoeconomic fluctuations and output performance in developed and developing countries of the world, with the findings of these studies producing mixed results. Some of these studies include Kydland and Prescott (1982) that analyzed the extent to which fluctuations in aggregate macroeconomic variables affect output in the US under some imposed assumptions. The study used quarterly data to model the US economy and the result showed that the business cycle component, display a moderately high degree of resistance and that investment and consumption are strongly pro-cyclical with consumption fluctuating about a third as much as output in percentage.

Also, Hofmaisser and Roldos (1997) examined the sources of macroeconomic fluctuations in the Asian economy using a VAR model; they found that domestic shocks account for a significant fraction of the business cycle fluctuations in aggregate output in those countries. Using the aforementioned study as a platform and adopting a Vector error correction model to examine the sources of macroeconomic fluctuations in Asian economies, Ahmed and Loungani (1998) found out that external shocks particularly foreign output shocks and oil price shocks play a very important role in inducing cyclical fluctuations in output in those countries.

In Argentina, Kydland and Zarazaga (1997) examined the empirical regularities of business cycle fluctuations. The authors employ two sets of data. Using atheoretical method as against the Dynamic Stochastic General Equilibrium Modeling (DSGEM) used in modern business cycle analysis and being guided by the model adopted by Kydland and Prescott (1990) and also using Hodrick-Prescott (HP) filters, the result showed high absolute volatility of output and that the correlation of the cyclical component of real total consumption with that of Real GDP is within the range observed in other countries.

Contrary to the study by Kydland and Zarazaga (1997), Smet and Wouter (2003) developed a linearized dynamic stochastic general equilibrium model using seven macroeconomic variables. The study employs the Bayesian approach by combining the likelihood function with prior distributions for the parameters of the model to form the posterior density function. A major feature of this approach is the introduction of ten orthogonal structural shocks: productivity, labour supply, investment, preferences, cost-push and monetary policy shocks. The results show that DSGEM with "sticky prices and wages can be used for monetary policy analysis in an empirically plausible set-up.

Similarly, the study of Curdia and Finocchiaro (2005) used Bayesian methods to estimate a small open economy DSGE model for Sweden. The result shows that monetary policy is mainly concerned with stabilizing the exchange rate in the

target zone and with price stability in the inflation targeting regime and that expectations of realignment and risk premium are the main sources of volatility in the target zone period and that monetary shocks were found to be important sources of volatility in the short run but not in the long run.

In Japan, Sugo and Ueda (2007) estimated a medium scale Dynamic Stochastic General Equilibrium model by using actual capital utilization data and modifying the formulation of utilization, they succeeded in incorporating a negative correlation between capital utilization and rental costs to explain actual capital utilization rate and found hump-shaped and persistent behaviour of inflation rate in response to a monetary policy shock.

However, Peiris and Saxegaard (2007), evaluates monetary policy trade-offs in low-income countries using a DSGE model for Mozambique The study uses Bayesian method to estimate the model covering the period 1996:1 to 2005:4 on 18 key macroeconomic variables. The result of the study suggests that exchange rate peg is significantly less successful than inflation targeting at stabilizing the real economy due to higher interest rate volatility. This study is seemingly one of the few ones to date in macroeconomic modelling in Sub-Sahara Africa with exception of South Africa for which DSGE models have been developed to simulate the economy.

In an attempt to examine the effect of oil price shock on output, inflation, real exchange rate and money supply in Nigeria using quarterly data from 1970 to 2003. Olomola and Adejumo (2006) employed VAR method to analyze the data. Their findings were contrary to previous empirical findings in other countries; oil price shock does not affect output and inflation in Nigeria. However, oil price shocks did significantly influence the real exchange rates and they found the existence of the Dutch Disease in Nigeria.

In contrast to the above study, Olekah and Oyaromade (2007) estimated a DSGE model for the Nigerian economy. This model appears to be one of the earliest DSGEMs on Nigeria. The study presents a small-scale DSGE model of the Nigerian economy with the aim of aiding monetary policy decisions. The authors employ Vector Autoregressive (VAR) method of estimation. The results showed that changes in prices are influenced mainly by volatility in real output while exchange rate and inflation account for significant proportion of the variability in interest rate.

Olusegun (2008) investigated the impacts of oil price shocks on macroeconomic performance in Nigeria using Vector Autoregression (VAR) approach. Forecast error variance decomposition is estimated using 7 key Nigerian macroeconomic variables. Annual data between the periods 1970-2005 were employed. The result reveals that oil price shock does not have substantial effects on money supply, price level and government expenditure in Nigeria over the period covered by the study.

However, in line with Olekah and Oyaromade (2007), a small business cycle model in the spirit of Dynamic Stochastic General Equilibrium (DSGE) model was developed for Nigeria by Alege (2009) with a view to examine the sources of business cycles and draw implications for policy analysis using the Bayesian method between 1970-2004 and a Vector Autoregression analysis. The results obtained in this study basically showed that the Nigerian business cycle is driven by both real and nominal shocks.

Alimi and Atanda (2011) in an attempt to investigate the relationship among globalization, business cycle and economic growth in Nigeria between 1970-2010 amidst cyclical fluctuations in foreign investments used an autoregressive model on annual data between these periods. The result shows that globalization has a positive and significant effect on economic growth while the effect of business cycle on economic growth in Nigeria was positive but insignificant.

In line with the above, Chris and Anyingang (2012) investigated the effect of interest rate shocks on economic growth and also the behavior of economic growth before and after the deregulation of interest rate in Nigeria using annual data between 1970-2010. They employed the ordinary least square multiple regression analysis. They found out that an inverse relationship exist between interest rate fluctuations and economic growth in Nigeria thus retarding the real sector.

In an attempt to further analyse business cycle and economic growth in Nigeria and the direction of causality between them, Fredrick *et al* (2014) employed VAR and Granger Causality Tests to analyze annual data between 1970 and 2012. The result shows that money supply shocks affects the economy more than all other shocks, a bi-directional causality running between money supply and government expenditure and a unidirectional causality between exchange rate and government revenue.

3. SUMMARY OF REVIEW OF LITERATURE

It is observed from the review that studies have been done on business cycles, its behavior and effects on economic growth in developed and developing countries of the world. The findings of the authors varied on the effects of business cycle fluctuations and economic growth; while some posited that a positive relationship exists between business cycles and economic growth, some others found the relationship between them to be negative. Also, most of the studies focused on the short run effects of business cycle on output with little or no emphasis on its long run effects. They argued that shocks to any economy will have transitory or temporary effects on the economy thus limiting its effect to the short run.

However in Nigeria, literature on the business cycle phenomena is still scanty compared to developed and other developing countries of the world. This study intends to generate a series for business cycles using the Hodrick Prescott's filter and will proffer an empirical analysis of the short run and long run relationship between business cycles and economic growth in Nigeria.

4. METHODOLOGY

The theoretical framework of this paper has its basis in the Keynesian theory of business cycle and the neoclassical growth model by Solow (1956) and Swan (1956). The Keynesian school of thought refuted the auto corrective assumption posited by the classical school of thought that all fluctuations in the economy will be self-correcting. This is because the Keynesians argued that real GDP is unable to respond automatically to changes in money supply and interest rate on the demand side and the failure of supply to adjust as a result of rigid wages on the supply side. This is evident in developing countries particularly Nigeria which is the focus of this paper. The Keynesians postulated that business cycle is caused by suboptimal price adjustment following shocks to the economy; they built their argument around aggregate demand and aggregate supply.

Aggregate demand shocks emanate from autonomous changes in the money supply, government spending, oil price, inflation, government expenditure, exchange rates, interest rates and consumption; aggregate supply shocks emanate from changes in productivity with short run and long run effects on output, which is typical of the country of focus, Nigeria. Aggregate demand shocks are temporary or transitory shocks with short run effects on the level of output while aggregate supply shocks are permanent shocks with long run effects on the level of output. In response to business cycles, the Keynesians propose government intervention in order to stabilize aggregate demand and thereby minimize the negative effects of welfare loss inherent in business cycle fluctuations which causes disequilibria in the economy.

This paper incorporates the Keynesian postulates into the neoclassical growth theory and the neoclassical model is used as the basis for modeling. The Solow (1956) and Swan (1956) model can be presented in the implicit form as follows:

$$Y_t = f(L_{t,} K_{t,} A) \quad (1)$$

Where Y is the level of output, L is stock of labour, K is capital stock and A is technical progress.

We assume that technical progress augments labour and therefore, we re-specify equation (1) as:

$$Y_t = (AL_{t,} K_t) \quad (2)$$

The level of capital affects the level of production in an economy. The price of oil affects the level of capital that is available for production of goods and services in the economy in that if the price of oil is high, the level of capital in the economy will be high and the productive capacity of the economy will improve and vice versa (Akpan, 2009).

Given the above arguments, we can express capital as a function of oil price:

$$K = f(OILP) \quad (3)$$

Substituting equation (3) into (2), we have:

$$Y = f(AL, OILP) \quad (4)$$

The labour augmented by technical progress (AL) otherwise called effective labour is expected to drive output along the long run path. The introduction of a new technology affects the productive capacity of the economy with possibilities to generate cyclical fluctuations (business cycle) in the short run. Business cycle depicts periods of booms and recessions caused by cyclical fluctuations in the economy. When there is a boom in the economy, money supply and government expenditure increases thus exerting inflationary pressure on the economy. This also generates fluctuations in interest rates and exchange rates. Thus, business cycle (BCY), money supply (M2), inflation rates (INFL), interest rates (INTR), exchange rates (EXR) and government expenditure (GEXP) affect output through the process generated by the effective labour component (AL) i.e.

$$AL = f(BCY, M2, INTR, INFL, EXR, GEXP) \quad (5)$$

Substituting equation (5) into (4), we have:

$$Y = f(BCY, M2, INTR, INFL, EXR, GEXP, OILP) \quad (6)$$

Stating equation (6) in Cobb-Douglas form gives:

$$Y = BCY^{\alpha}, M2^{\beta}, INTR^{\rho}, INFL^{\theta} EXR^{\mu}, GEXP^{\sigma}, OILP^{1-\alpha-\beta-\rho-\mu-\sigma} \quad (7)$$

By linearizing equation (7) and stating it in an econometric form, we have:

$$\ln Y = \alpha \ln BCY + \beta \ln M2 + \rho INTR + \theta INFL + \mu EXR + \sigma \ln GEXP + (1-\alpha-\beta-\rho-\theta-\mu-\sigma) \ln OILP + e_t \quad (8)$$

Substituting lnY with economic growth (EG) and π for $1-\alpha-\beta-\rho-\mu-\sigma$ we have:

$$EG = \alpha \ln BCY + \beta \ln M2 + \rho INTR + \theta INFL + \mu EXR + \sigma \ln GEXP + \pi \ln OILP + e_t \quad (9)$$

Where EG is economic growth which will be proxied by real GDP, BCY is business cycle which will be generated using the Hodrick Prescott's filter, M2 is broad money supply, GEXP is government expenditure, OILP is oil price, e_t is the stochastic error term, $\pi = 1 - \alpha - \beta - \rho - \theta - \mu - \sigma$ and α, β, ρ, μ *and* σ are coefficients.

Model Specification:

By adapting and modifying the model used by Alimi and Atanda (2011) and Fredrick *et al* (2014), this paper adopts equation (9) above to this study. Variables like money supply, government expenditure, exchange rate and interest rate were used to proxy for business cycle by Fredrick et al (2014) in line with Barro (1990) and Barro and Sala-i-Martin (1992). Also, Alimi and Atanda (2011) used the ratio of foreign direct investment to gross domestic product to proxy for business cycle because the study views business cycle as external shocks to the economy. However, this study in line with Akinlo (2009), Baba (2013) and Adriana (2014) employs the Hodrick Prescott's filter to generate series to measure business cycles from nominal GDP. The general form of the Hodrick Prescott's filter is:

$$\varphi = \sum_{t=1}^{T} (y_t - g_t)^2 + \lambda \sum_{t=3}^{T} (\Delta^2 g_t) \quad (10)$$

NB: $y_t = g_t + c_t$

Where y_t is the time series, g_t is the development trend and c_t is the cyclical component.

The Hodrick-Prescott (HP) filter assumes the presence of a trend independent of the cyclic component (Hodrick and Prescott, 1997). The HP filter extracts both the development trend (g) and the cyclic component (c) by minimising the function φ.

Since the focus of this paper is to examine the short run and long run effects of business cycle on economic growth in Nigeria. Eqn (9) is re-specified as an autoregressive distributed lag (ARDL) model:

$$\Delta \ln RGDP_t = \alpha_0 + \sum_{o}^{\rho} \delta_i \Delta \ln RGDP_{t-i} + \sum_{o}^{\rho} \phi_i \Delta \ln BCY_{t-i} + \sum_{0}^{\rho} \sigma_i \Delta \ln M2_{t-i} + \sum_{0}^{\rho} \rho_i \Delta INTR_{t-i} + \sum_{0}^{\rho} \theta_i \Delta INFL_{t-i} +$$
$$\sum_{0}^{\rho} \mu_i \Delta EXR_{t-i} + \sum_{0}^{\rho} \lambda_i \Delta \ln GEXP_{t-i} + \sum_{0}^{\rho} \omega_i \Delta \ln OILP_{t-i} + \gamma_1 \ln RGDP_{t-1} + \gamma_2 \ln BCY_{t-1} +$$
$$\gamma_3 \ln M2_{t-1} + \gamma_4 INTR_{t-1} + \gamma_5 INFL_{t-1} + \gamma_6 EXR_{t-1} + \gamma_7 \ln GEXP_{t-1} + \gamma_8 \ln OILP_{t-1} + e_t \quad (11)$$

Equation (11) above shows the unrestricted version of the ARDL specification. Where Δ is the difference operator, α is the drift component, e_t is the white noise and γ_i are the long run multipliers.

Time Series Properties and Diagnostics Test:

To investigate the time-series property of the variables in order to avoid spurious results, both the Augmented Dickey Fuller (ADF) and the Phillip-Peron (PP) test with constant and linear trend is conducted to test for the order or integration of all series. After conducting the test for stationarity and identifying the time series property of the series, the cointegration test is carried out in order to test whether the variables are co-integrated using the ARDL bounds testing proposed by Pesaran (2001).

However, to adhere strictly to the underlying assumptions for an autoregressive model, both the Breusch-Pagan test for serial correlation and the ARCH test for heteroscedascity are employed as diagnostics test.

Data Source:

Quarterly time series data on real gross domestic product, nominal gross domestic product, government expenditure, money supply, interest rates, exchange rates, inflation and oil price were sourced from the Central Bank of Nigeria Statistical Bulletin (2014).

5. DISCUSSION OF RESULTS

This section presents the empirical results of the unit root test and estimated regression. Prior to the discussion of the estimated autoregressive model, the Augmented Dickey Fuller (ADF) and Phillip Peron (PP) unit root results are presented in table 1:

Table 1: Unit Root Test

Augumented Dickey Fuller (ADF) Test				Phillip-Peron (PP) Test		
Variables	Level	1st Difference	Status	Level	1st Difference	Status
GDP	-2.3456 -1.0000	-2.5716 -1.0000	-	-2.3456 -1.0000	-10.3151 (0.0000) **	I(1)
GEXP	-3.0376 -0.1267	-3.0044 -0.1361	-	-3.0376 -0.1074	-11.7967 (0.0000) **	I(1)
EXR	-1.8719 -0.6636	-9.44 (0.0000)**	I(1)	-1.8719 -0.5624	-9.44 (0.0000)**	I(1)
INFL	-3.1023 -0.1107	-6.6344 (0.0000)**	I(1)	-3.1023 -0.0713	-10.3306 (0.0000)**	I(1)
INTR	-2.7833 -0.2065	-9.9458 (0.0000)**	I(1)	-2.7833 -0.1919	-10.18602 (0.0000)**	I(1)
M2	-0.7796 -0.9638	-13.2562 (0.0000)**	I(1)	-0.7796 -0.2436	-69.8088 (0.0000)**	I(1)
OILP	-2.6189 -0.2729	-9.3419 (0.0000)**	I(1)	-2.6189 -0.2436	-7.7971 (0.0000)**	I(1)
BCY	-4.4767 (0.0025)**	- -	I(0)	- -	- -	I(0)

Note: *, ** and *** represent 1%, 5% and 10% level of significance respectively.

Source: Authors computation using E-views

Critical values of the ADF and PP tests at 1%, 5% and 10% levels of significance are -4.041, -3.450 and -3.150 respectively.

The result of the unit root Phillip Peron test shown in Table 1 revealed that all the variables are non-stationary in their level form but became stationary at their first difference. However, business cycle which is represented by the cyclical component of nominal gross domestic product rejected the null hypothesis of "no stationarity" at level. This indicates that it is non-mean reverting, converges towards its long-run equilibrium and its variance is constant over time. This means that business cycle is found to be stationary at level.

Bounds Test Co-integration Result:

The long run relationship among the variables is tested with the null hypothesis of the non- existence of a long run relationship. The Pesaran et al. (2001) F-table is compared with the calculated F-statistics at various critical levels and it is generally assumed that co-integration exists if the calculated F test statistics exceeds upper bound limit. However, if the test statistic is below the lower bound value, the null hypothesis of no co-integration is accepted and if the test statistics lies between the lower and upper bounds limit, the test of co-integration is indecisive. From Table 2 the calculated F-statistics value is 13.14245 and it exceeds the upper bounds critical value of the Pesaran et al. (2001) bounds testing table. This implies that we reject the null hypothesis of no co-integration and accept the alternative hypothesis that says co-integration exists. Thus, long run relationship exists among the variables.

Table 2 ARDL Bounds Test

Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	13.14245	7
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.38	3.45
5%	2.69	3.83
2.50%	2.98	4.16

Source: Authors computation using E-views

Estimated ARDL (1, 2, 0, 0, 4, 0, 0, 4) Short Run Coefficients:

Table 3 shows the estimates of the short run effects of business cycle on economic growth in Nigeria. In the short run, business cycle in the current and previous quarter have a positive but insignificant relationship with RGDP at 5% significance level with a coefficient value of 0.005010 and 0.003218 in the current and previous quarter respectively. This implies that a unit increase in business cycle fluctuations in the current and previous quarter will lead to an increase of 0.50% and 0.32% increase in RGDP. Also, business cycle, in the previous two and three quarters have a negative and significant relationship with RGDP at 10% and 5% significance levels respectively with a coefficient value of -0.009012 and -0.035213. This implies that a unit increase in business cycle fluctuations in the previous two and three quarters will lead to a decrease of 0.90% and 3.52% in RGDP respectively. This means that the previous two and three quarters of business cycle have significant effect on GDP in the short run. This supports the findings of Olomola and Adejumo (2006), Alimi and Atanda (2011) and Chris and Anyingang (2012) as they concluded that business cycle affects growth in the short run.

Government expenditure (GEXP) has a negative and significant relationship with RGDP at 5% significance level with a coefficient value of -0.254403; this implies that 1% increase in government expenditure will lead to a decrease of 25.40% in RGDP. Also, inflation rate has a positive and significant relationship with RGDP at 5% significance level with a coefficient value of 0.07152; this implies that 1% increase in inflation rate in Nigeria will lead to an increase of 7% in RGDP. Exchange rates have a negative and significant relationship with RGDP at 5% significance level with a coefficient

value of -0.039930.This means that 1% increase in exchange rates leads to a decrease of about 4% in RGDP. Interest rate in the previous three quarters has a negative and significant relationship with RGDP at 10% significance level with a coefficient value of -0.031298; this implies that 1% increase in interest rates in the previous three quarters will lead to a decrease of 3% in lnRGDP. These show that business cycle, government expenditure, inflation rate and exchange rates in Nigeria have a significant relationship with economic growth at 5% significance level while interest rate in the previous three quarters was significant with RGDP at 10%.

Furthermore, money supply in the current and previous quarters, oil price and interest rates in the current and previous quarters have an insignificant relationship with RGDP at 5% and 10% significance levels. This implies that these variables have no effect on economic growth in Nigeria in the short run though the coefficients of money supply, oil price and interest rates in the current quarter were negative while that of money supply and interest rates in the current quarter were positive.

Table 3: SHORT RUN ESTIMATES

Dependent Variable: RGDP ARDL (1, 2, 0, 0, 4, 0, 0, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.Value
D(LNM2)	-0.567412	0.446794	-1.269964	0.2073
D(LNM2(-1))	0.716599	0.458728	1.562145	0.1217
D(INGEXP)	-0.254403**	0.088743	-2.866739	0.0050
D(LNOILP)	-0.169060	0.123864	-1.364884	0.1756
D(BCY)	0.005010	0.004413	1.135282	0.2564
D(BCY(-1))	0.003218	0.004901	0.656600	0.5192
D(BCY(-2))	-0.00901***	0.004924	-1.830219	0.0708
D(BCY(-3))	-0.035213**	0.005310	-6.631450	0.0000
D(EXR)	-0.03993***	0.014920	-2.676273	0.0088
D(INFL)	0.071523**	0.019710	3.628767	0.0005
D(INTR)	0.094814	0.162680	0.582825	0.9537
D(INTR(-1))	-0.061010	0.208710	-0.292319	0.7707
D(INTR(-2))	0.083681	0.204610	0.408978	0.6835
D(INTR(-3))	-0.031298**	0.015773	-1.984267	0.0500
D(@TREND())	0.152216**	0.018883	8.061051	0.0000
CointEq(-1)	-0.685315**	0.071678	-9.560993	0.0000

Note: *, ** and *** represent 10%, 5% and 1% level of significance respectively

Source: Authors computation using E-views

Estimated ARDL (1, 2, 0, 0, 4, 0, 0, 4) Long Run Coefficients:

In the long run analysis presented in Table 4, business cycle has a positive and a significant relationship with RGDP at 5% significance level with a coefficient value of 0.079767. This implies that a unit increase in business cycle will lead to an increase of about 7.98% in RGDP in the long run. This supports the finding of Akinleye and Ekpo (2013) whose findings show that business cycle affects growth in the long run, but is contrary to the findings of Antonio (2001), Olomola and Adejumo (2006), Alimi and Atanda (2011) and Chris and Anyingang (2012) who are of the view that business cycle has no effect on economic growth in the long run. This implies that business cycle has a negative relationship with economic growth in the short run and a positive relationship with economic growth in the long run. This means that business cycle fluctuations hinder growth in the short run but promotes economic growth in the long run.

Government expenditure (lnGEXP) has a negative and significant relationship with RGDP at 5% significance level with a coefficient of -0.371221.This implies that an increase of 1% in GEXP leads to a decrease of 37.12% in RGDP and this is the same with the findings in the short run. Thus, government expenditure has a negative relationship with economic

growth both in the short run and in the long run. Money supply (lnM2) has a negative and significant relationship with RGDP at 5% significance level with a coefficient of -2.622119. The implication of this is that a percentage increase in money supply will lead to a decrease of 262.21% in RGDP.

Also, inflation showed a positive and significant relationship with RGDP at 5% level of significance with a coefficient value of 0.010436; this means that a percentage increase in inflation rates will lead to an increase of 1.04% in RGDP. This supports the findings of the short run and thus implies that inflation has a positive effect on economic growth in Nigeria both in the short run and in the long run. Interest rate has a positive and significant relationship with RGDP at 5% significance level with a coefficient of 0.041621; this means that a percentage increase in interest rates will lead to an increase of 4.16% in RGDP. Exchange rate in Nigeria showed a negative and significant relationship with RGDP at 5% significance level with a coefficient of -0.058273; this implies that a percentage increase in exchange rates will lead to a decrease of 5.83% in RGDP. This supports the findings of the short run and thus implies that exchange rates affect the Nigerian economy negatively both in the short run and in the long run.

However, oil price has a negative and insignificant relationship with RGDP at 5% and 10% significance levels. This is the same with the findings of the short run as oil price was insignificant at 5% and 10% significance levels in the short run. This implies that oil price has no effect on economic growth both in the long run and in the short run.

Table 4: LONG RUN ESTIMATES

Dependent Variable: RGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNM2(-1)	-2.622119	0.378384	-6.929783	0.0000**
INGEXP(-1)	-0.371221	0.126011	-2.945945	0.0041**
LNOILP(-1)	-0.246689	0.179315	-1.375729	0.1722
BCY(-1)	0.079767	0.006712	11.884237	0.0000**
EXR(-1)	-0.058273	0.213700	-2.726612	0.0077**
INFL(-1)	0.010436	0.002789	3.741843	0.0003**
INTR(-1)	0.041621	0.017981	2.314768	0.0229**
C	11.970991	1.518568	7.883079	0.0000**
@TREND	0.222111	0.022625	9.817076	0.0000**

Source: Authors computation using E-views

Note: *, ** and *** represent 1%, 5% and 10% level of significance respectively

DIAGNOSTIC TESTS:

Testing for Serial Correlation:

According to the Breusch-Pagan test for serial correlation, the null hypothesis of no serial correlation is tested against the alternative hypothesis of serial correlation. In order to verify the existence of serial correlation in the model, the observed R-squared (Obs*R-squared) and its corresponding probability value (Pro. Chi-squared) is observed. In Table 5, the Obs*R-squared has a value 0.302632, while its corresponding p-value has a value of 0.8596. Since the probability value is greater than 5%, we accept the null hypothesis that there is no evidence of serial correlation in the model.

The Test for Heteroskedasticity:

To test for the presence of homoscedasticity in the model, this paper chooses the Arch Test. In the Arch test, the Observed R-squared value is checked with its corresponding probability value. The null hypothesis here is that the model is homoscedastic, while the alternative hypothesis here is that the model is heteroskedastic. We reject the null hypothesis if this probability value is less than 5%. From Table 6, since the probability value of 0.8596 is greater than 0.05, at the 5% significance level, we accept the null hypothesis of homoscedasticity and reject the alternative hypothesis of presence of heteroskedasticity. Hence, the model is homoscedastic and this means the model has goodness of fit and the results are desirable.

Table 5: Serial Correlation Test Using the Breusch-Pagan Method

F-statistic	0.134417	Prob. F(3,94)	0.8744
Obs*R-squared	0.302632	Prob. Chi-Square(3)	0.8596

Table 6: The Test for Heteroscedasticity Using the ARCH Method

F-statistic	0.668419	Prob. F(1,108)	0.9391
Obs*R-squared	0.676461	Prob. Chi-Square(1)	0.9384

6. CONCLUSION AND RECOMMENDATIONS

This paper analyzed the relationship between business cycle and economic growth in Nigeria between 1986 and 2014. The Autoregressive Distributed Lag Model employed revealed that business cycle negatively affects economic growth in Nigeria in the short run and positively in the long run in the last three decades. This findings of this paper establishes that business cycle affects output in Nigeria both in the short run and long run, unlike most studies in the empirical literature that concluded business cycle is only a short run phenomena with no effect in the long run.

The overall challenge to policymakers in Nigeria is to ensure that policies that will curb the fluctuations of macroeconomic variables (because they are important sources of business cycle) should be put in places. Also, policies that will mitigate the effects of business cycle in the economy should be put in place in the short run in order to place the economy on the path of growth. However, the effect of business cycle should not really be prioritized in the long run as it promotes economic growth in the long run.

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