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Abstract- This paper analyzed macroeconomic fluctuations and economic growth in Nigeria between 1986 and 2014. The paper employed the Atheoretical Statistical Method of Analysis using cross correlations to examine the co-movement between key macroeconomic variables such as broad money supply, oil price, government expenditure, inflation, interest rate, exchange rate and general household consumption and real gross domestic product in Nigeria. Quarterly time series data between 1986 and 2014 was used for the study and were sourced from Central Bank of Nigeria (CBN) Statistical Bulletin. The stationary component of the variables was extracted using the Hodrick-Prescott (HP) and Band-Pass (BP) filter and then analyzed. The paper found out that all the macroeconomic variables were countercyclical and contemporaneously related to real gross domestic product, except for oil price and inflation where the filters produced mixed results of countercyclical and procyclical relationship with economic growth in Nigeria. The paper suggests effective and better management of macroeconomic variables if the desired level of growth is to be achieved.

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I. Introduction

The issue of fluctuations in macroeconomic variables has been debated by several authors and scholars in the empirical literature. Most studies focused on developed countries of the world initially while only few focused on developing countries. This may understandably be attributed to the quality of data obtainable in developed countries and the possibility of using and adapting the findings in industrialised countries to predict the behavior of macroeconomic variables in developing countries of the world. Also, data frequency is an issue of concern in developing countries because macroeconomic fluctuations is best studied using high frequency data i.e quarterly, monthly or daily recorded data.

Previous researchers in developed and developing countries have used different econometric techniques to study macroeconomic fluctuations and business cycles in different countries or group of countries. The stylized facts they documented have been pivotal in formulating theoretical models for business cycle and macroeconomic fluctuations as an alternative to other existing classes of models (Agenor *et al*, 1999). Also, findings in industrialized economies could be useful in examining and possibly explaining macroeconomic fluctuations in developing economies and perhaps identify if there are similarities in the behavior of cyclical fluctuations between these classes of economies.

Nigeria, like other developing countries is affected by fluctuations in macroeconomic variables starting majorly with the oil boom and recessions of the early 1970's and 1980's respectively, fluctuations in government revenue and spending, unstable interest, exchange and inflation rates and the recent fall in the price of crude oil to mention a few. This paper will examine fluctuations in key macroeconomic variables and their relationship with economic growth in Nigeria using the atheoretical statistical method of analysis. This is a departure from most previous studies in developed and developing countries that have used different econometric techniques to examine macroeconomic fluctuations.

II. Literature Review

As earlier mentioned, most studies in the empirical literature used econometric techniques to examine macroeconomic fluctuations. Nevertheless, some studies used the atheoretical statistical methods, few of which includesKydland and Zarazaga (1997) in Argentina, who examined the empirical regularities of business cycle fluctuations using atheoretical statistical method of analysis(as against the DSGEM used in most business cycle analysis) and the Hodrick-Prescott (HP) filter. Their result showed high absolute volatility of output in Argentina 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.

Also, in a cross country study aimed at examining main features of macroeconomic fluctuations for 12 developing countries including Nigeria using quarterly time series data between 1978:1 to 1995:4, Agenor, Mc Dermort and Presad (2000) found out that similarities exist between macroeconomic fluctuations in less developed countries and industrialized countries, stylized facts like pro-cyclical real wages, counter-cyclical variations in government expenditure and

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counter-cyclical variation in the velocity of monetary aggregate were re-established.

Furthermore, Alege (2009) examined the sources of business cycles and draw implications for policy analysis using the Atheoretical Statistical Method of Analysis and the Bayesian-VAR method between 1970 and 2004. The results obtained in this study basically showed that the Nigerian business cycle is driven by both real and nominal shocks. The study found real gross domestic product, gross fixed investment, money supply, agricultural production, private consumption, government consumption expenditure and government revenue to be procylical while monetary aggregates such as inflation, interest and exchange rates to be countercyclical.

III. Methodology

Following previous studies such as Kydland and Zaragaza (1997), Agenor *et al* (2000) and Alege (2004), this paper adopts the atheoretical statistical method to analyse business cycle through the co-movements between key macroeconomic variables that are important sources of business cycles and real gross domestic product (RGDP) which serves as a proxy for economic growth. Variables such as RGDP, Broad Money Supply (M2), Oil Price, Inflation, Exchange rate, Consumption and Interest rates are examined.

In doing this, the stationary components or cyclical components extracted using both the Hodrick-Prescott filter (HP) and the Band-Pass filter (BP) for the purpose of robustness and comparism are examined. This means that the cyclical components of the variables are analyzedusing their cross correlations and the degree of co-movement of RGDP and any of the macroeconomic variables is measured by the correlation coefficients. Furthermore, a seriesis considered to be procyclical, acyclical or countercyclical if the contemporaneous correlation coefficient p (0) is positive, zero or negative respectively. Furthermore, if the correlation coefficient p(0) falls between 0.26 and 1, then it is strongly contemporaneously correlated, if it falls between 0.13 and 0.26, it is weakly contemporaneously correlated and it is however contemporaneously correlated if it falls between 0 and 0.13 (Agenor *et al*, 2000).

a) Data Source

The quarterly time series data on real gross domestic product, government expenditure, money supply, inflation rate, interest rate, exchange rate and household consumption expenditure were sourced from the Central Bank of Nigeria (CBN) statistical bulletin 2014.

IV. Discussion of Results

a) Co-movement between Real Gross Domestic Product and Money Supply in Nigeria

Table 1show that there is a negative relationship between money supply and economic growth in Nigeria based on the cross correlation results. Both the HP and BP filters at different lag lengths mostly indicate an inverse relationship between the observed variables. Thus, there is a clear evidence of countercyclical movements between money supply and economic growth in Nigeria. This implies that fluctuations in money supply (which generates business cycle) hinders economic growth in Nigeria. Also, the HP filter indicates that contemporaneous correlation exists between money supply and economic growth in Nigeria although the BP filter indicates a weak contemporaneous relationship between them. Therefore, the quantity of money in circulation must be checked and regulated appropriately by the monetary authorities in order to mitigate the countercyclical effect of money supply on economic growth in Nigeria.

Table 1: Co-movement of Real Gross Domestic Product and Money Supply in Nigeria

Lag/Lead		8	4	2	1	0	-1	-2	-4	-8
	HP	0.0095	0.0203	0.092	-0.0504	0.2401	-0.2652	-0.2652	-0.0995	-0.0773
	BP	-0.0021	-0.0024	-0.137	-0.2226	0.568	0.161	-0.4807	0.0233	-0.1041

b) Co-movement between Real Gross Domestic Product and Oil Price in Nigeria

Table 2 shows the co-movement of oil price and economic growth in Nigeria. It is observed from the result of the HP filter that there is a positive relationship between oil price and economic growth in Nigeria while the BP filter found a negative relationship between them. This implies that there is an evidence of procyclical movements between the observed variables using the HP filter while the movement between them is countercyclical based on the result of the BP filter. Furthermore, both the HP and BP filters indicates that there is a contemporaneous relationship between oil price and economic growth in Nigeria. This implies that oil price and economic growth can either move together or inversely although the movement is sensitive to the filter being observed. Therefore, the price of oil (which is determined in the international oil market) significantly affects the performance of economic output in Nigeria.

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Table 2: Co-movement between Real Gross Domestic Product and Oil Price in Nigeria

Lag/Lead		8	4	2	1	0	-1	-2	-4	-8
	HP	0.0585	0.0316	0.0892	-0.003	-0.073	-0.0802	-0.1298	0.0324	0.0222
	BP	-0.0006	-0.0006	0.0035	-0.0029	-0.0146	-0.0894	0.1291	0.0602	0.136

c) Co-movement between Real Gross Domestic Product and Government Expenditure

Table 3 shows that there exists a negative relationship between government expenditure and economic growth in Nigeria based on the result of the HP and BP filters. Precisely, the nature of the relationship between them is countercyclical and this implies that the observed variables cyclically move in different directions. This supports the findings of Agenor (2000) and Kouparitsas (1996). Also, the observed variables are found to be contemporaneously correlated for both filters meaning that they affect each other in Nigeria. The negative and contemporaneous relationship found between them is consistent with the predictions of the intertemporal optimizing models with imperfect capital mobility and flexible prices (Agenor, 2000). Therefore, the government should review its expenditure pattern and fiscal actions as it plays a significant role in generating cyclical fluctuations which hinders economic growth in a developing country like Nigeria.

Table 3: Co-movement of Real Gross Domestic Product and Government Expenditure in Nigeria

Lag/Lead		8	4	2	1	0	-1	-2	-4	-8
	HP	-0.0309	-0.0602	-0.0838	-0.2508	-0.5532	-0.0209	0.0205	0.1957	0.6083
	BP	0.3784	-0.2836	0.0984	0.3215	-0.347	0.3215	0.0954	-0.2836	0.3784

d) Co-movement between Real Gross Domestic Product and Inflation in Nigeria

Table 4 shows that there is an inverse relationship between inflation and economic growth in Nigeria based on the result of the HP filter in most of the observed lags. However, BP filter found a positive relationship between the observed variables. This implies that the HP filter found the movement between them to be countercyclical while BP filter found the movement to be procyclical. Also, the two filters indicate a contemporaneous correlation (in most of the lags) between inflation and economic growth in Nigeria. Therefore, inflationary pressures in the economy affect output in Nigeria as argued by some economists that some level of inflation is good for the economy while it is detrimental if the level of inflation is high. Although its effect in this case is sensitive to the observed filters.

Table 4: Co-movement between Real Gross Domestic Product and Inflation in Nigeria

Lag/Lead		8	4	2	1	0	-1	-2	-4	-8
	HP	0.0012	0.0007	-0.0001	-0.0028	-0.0069	-0.0095	-0.0138	-0.0146	0.015
	BP	0	0.0004	0.0013	0.0034	-0.0007	0.0026	0	0.0118	0.0262

e) Co-movement between Real Gross Domestic Product and Exchange Rate in Nigeria

Table 5 shows that there is a negative relationship between exchange rate and economic growth in Nigeria based on the result of both filters in most of the observed lags. This implies that both the HP filter and the BP filter found the movement between them to be countercyclical. This indicates that RGDP and exchange rates cyclically move in different directions. This may be evident to the reduction in the value of the Nigerian naira (#) to other major currencies such as the US dollars ($), British pound sterling (£). Also, the two filters indicate a contemporaneous correlation (in most of the lags) between the two macroeconomic variables. Therefore, exchange rate in the economy hinders economic performance and the government and the monetary authorities have to pay attention to exchange rate management in Nigeria.

Table 5: Co-movement between Real Gross Domestic Product and Exchange Rate in Nigeria

Lag/Lead		8	4	2	1	0	-1	-2	-4	-8
	HP	0.02	0.027	-0.0063	-0.0304	-0.0532	-0.0739	-0.0789	-0.0859	-0.0596
	BP	-0.0005	-0.0006	0.0023	0.0034	-0.0048	-0.0006	0.001	0.001	-0.0144

f) Co-movement between Real Gross Domestic Product and Interest Rate in Nigeria

Table 6 shows that there is a negative relationship between interest rate and economic growth in Nigeria based on the result of both filters in most of the observed lags. This implies that both the HP filter and the BP filter found the movement between them to be countercyclical. This indicates that RGDP and interest rate cyclically move in different directions. This explains the fact that people are discouraged to invest

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or borrow from banks when the interest rate is high thus leading to low level of investments in the economy. However, when the interest rates is low, people access loans from banks and are encouraged to invest in the domestic economy. Also, the two filters indicate a contemporaneous correlation (in most of the lags) between the two macroeconomic variables. Therefore, interest rate in the economy hinders economic performance and the monetary authorities have to pay attention to fluctuations in interest rate in Nigeria.

Table 6: Co-movement between Real Gross Domestic Product and Interest Rate in Nigeria

Lag/Lead		8	4	2	1	0	-1	-2	-4	-8
	HP	0.0009	-0.0164	-0.1023	-0.1177	-0.1109	-0.0668	-0.0369	0.0571	0.007
	BP	-0.0007	-0.0018	-0.009	-0.014	-0.0161	-0.0078	-0.042	0.1886	0.1097

g) Co-movement between Real Gross Domestic Product and Consumption in Nigeria

Table 7 shows that there is an inverse relationship between consumption and economic growth in Nigeria based on the result of both filters in most of the observed lags. This implies that both the HP filter and the BP filter found the movement between them to be countercyclical. This indicates that RGDP and consumption cyclically move in different directions. Also, the two filters indicate a contemporaneous correlation (in most of the lags) between the two macroeconomic variables. Therefore, consumption in the economy hinders economic performance because when people consume more of their income rather than invest it productively, economic growth is hampered and vice versa. The government should therefore come up with policies that will encourage people to invest their income productively in order to drive economic performance, rather than consume it.

Table 7: Co-movement between Real Gross Domestic Product and Consumption in Nigeria

Lag/Lead		8	4	2	1	0	-1	-2	-4	-8
	HP	0.01	0.1416	0.1405	-0.1238	-0.1517	-0.2034	-0.123	-0.0826	0.0324
	BP	-0.1573	-0.2855	-0.1087	0.0288	0.0747	-0.0428	-0.0128	-0.0714	0.0322

V. Conclusion

This paper analyzed macroeconomic fluctuations and economic growth in Nigeria using key macroeconomic variables such as real gross domestic product, money supply, oil price, government expenditure, inflation, interest rate, exchange rate and consumption. The atheoretical statistical method of analysis is used, the cross correlations of the stationary components (extracted using the HP and BP filters) of each of the variables and RGDP is examined in order to show the nature of movement between them. The movement between RGDP and variables such as broad money supply, government expenditure, exchange rate, interest rate and consumption was found to be countercyclical for both filters. Oil price exhibited procyclicality for the HP filter and counter cyclicality for the BP filter and the reverse was the case for inflation in Nigeria. This paper concludes that policies that will reduce fluctuations of macroeconomic variables should be put in place because these fluctuations (which are sources of business cycle) hinders economic growth in Nigeria

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