The Macrotheme Review

A multidisciplinary journal of global macro trends

## EFFECT OF THE DEREGULATION OF DOWN STREAM OIL SECTOR ON THE GROSS DOMESTIC PRODUCT (GDP) AND EMPLOYMENT IN NIGERIA

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## Abstract

The issue of deregulating the downstream oil sector through gradual subsidy withdrawal has generated heated debate in Nigeria with the government claiming that it will guarantee long term stability in product supply and price. This will translate into economic growth and development. Others, especially the organised labour, claims that deregulation will lead to higher product prices, higher cost of production, and cut of jobs and will bring about recession in the economy. Therefore, this paper employs Vector Auto regression Model using Variance Decomposition, Impulse Response Function and Granger Causality tests to assess the effect of deregulation of downstream oil sector on two macroeconomic variables which are; GDP and Unemployment. The paper finds evidence that changes in oil price due to deregulation is the major source of variation in GDP, and Unemployment in Nigeria. The result also reveals that there is positive impact of oil price changes on GDP but negative impact on Unemployment in the short run which became positive in the long run. Finally the Granger causality test indicates unidirectional causality running from Petroleum prices to GDP and also from Petroleum prices to Unemployment.

Keywords: DEREGULATION, DOWN STREAM OIL SECTOR, NIGERIA

## **1. INTRODUCTION**

This paper examines the effect of deregulation of the downstream oil sector on the Nigerian economy. Worldwide, petroleum and energy in general are indispensable for human sustenance and industrial production. Thus, crude oil is the mainstay of the Nigerian economy, accounting for a massive 83% of total federally collected revenue in 2008, 65.8% in 2009 and 73.8% in 2010 (C.B.N. Statistical Bulletin, 2010). It also accounted for 78.1% in the first half of 2012 (C.B.N. Economic Report for the first quarter of 2012). Certainly, the subjects of oil and deregulation are of immense interest to each of Nigeria's over 160 million citizens. This is due to the huge amount of money that the government spend to subsidise petroleum consumption in the country. According to Akinmutumi (2011) Nigerian government spent a whopping N115 billion for the first quarter of 2011 on subsidy. In May 2011 alone, about N74 billion was spent on subsidy, (Mirror 2011, Akinmutumi 2011). Therefore, government deregulation policy of gradual subsidy withdrawal has been a source of serious concern to Nigerians because of its far reaching

implications for industry and Nigerian masses. It leads to product price increases and has generated industrial and social upheavals in the body polity.

Nwachukwu and Chike (2011) attempted to find out whether or not government subsidy exists in the downstream oil sector in Nigeria. According to them the opponents of removal of oil subsidy argues that the existence of fuel subsidy is a fallacy. The authors further posit that the proponents opine that the existence of fuel subsidy is a fact. They rely on multiple linear regression to test their hypothesis and the result suggests that there is a significant relationship between the fuel demand and fuel subsidy and therefore concludes that there is empirical evidence that fuel subsidy in Nigeria is a fact and not a fallacy.

According to NNPC (2012) Nigerian oil industry is divided into three sub-sectors; the upstream, mid-stream and downstream sectors.

The upstream is where crude oil and gas exploration and production takes place. In Nigeria, crude oil and gas production takes place at both onshore and offshore. Onshore production is where drilling and production of crude oil and gas is done on the land, while an offshore production is the situation where drilling and production of crude oil and gas take place in the sea or ocean.

Conceptually the mid-stream oil sector deals with crude oil storage, transportation and trading. In the Nigerian context, however, midstream oil sector also consists of gas and power, renewable energy, engineering and technology, Nigerian gas master plan and Greenfield refineries initiative (ibid).

The downstream sector deals with product refining, distribution and retail services. According to Ojoku (1992) the most problematic among the sectors over the years has been the downstream sector which is the distribution arm and the link to the final consumers. The downstream sector is characterised by incessant crises in supply of products due to frequent break downs of Nigeria's four refineries as a result of neglect, skipping the routine turn around maintenances, general inefficiencies in managing the refineries and outright sabotage. This resulted in product supply shortages and scarcity of products at retail outlet; a situation which breeds black market, product hoarding, diversion and pipelines vandalism.

In response to these instead of the government to build more refineries and instil discipline in the way and manner the refineries are managed the government resorted to massive importation of refined petroleum products to bridge the wide gap that exist between domestic production and domestic demand.

Product importation makes subsidy financing very costly. According to the Budget Office of the Federation (2012), between 2006 and august 2011 total government expenditure on petroleum subsidy amounted to 3.7 Billion Naira. However Akinmutimi (2011) puts it at N115 billion for the first quarter of 2011 alone.

Consequent upon this the federal government of Nigeria decides to deregulate the sector. The deregulation is aimed at reducing the government role as owner of assets and operator in the sector while maintaining active role as a policy maker and regulator. The policy initiative is predicated upon government objective of removing the institutional, regulatory and financial difficulties inhibiting the sectors growth and development, it is also based on the government

belief that private ownership and management of the refineries will improve the delivery of the sector and enhance the sector's market orientation and efficiency.

However some Nigerians especially the working class under Nigeria Labour Congress (NLC) are of the opinion that deregulation is not a panacea and may not be an appropriate response to the poor performance of the downstream oil sector, they argued that deregulation has wide reaching implications for industry and individual house hold in the country. It leads to increase in cost of production at the industry level and may result in cut down of production which in turn could lead to loss of jobs. It leads to product price increases and erode the purchasing power of individuals especially the workers who received fixed income in the form of salaries and wages. This has generated a lot of industrial and social upheavals in the country in the form of protests and riots. As noticed by Lordic and Mignon (2006), Jones et al (2004) and Brown and Yucel (2002) prices of petroleum products may have an impact on economic activity, from the consumer view point (house hold) cost of transport and energy bills increases, whereas from the production stand point companies have to contend with a rise in the cost of production.

In view of the above therefore, the main objective of this study is to investigate the effect of deregulation of the downstream oil sector on employment and GDP growth in the Nigerian economy. The paper will be presented in five sections. Following this introduction, section two will present empirical literature and theoretical issues on the effect of changes in the price of oil on economic growth and employment. Section three will present the econometric framework; section four presents the empirical analysis and discussion of results while in section five summaries of the findings, conclusion and recommendations are presented.

## 2. EMPIRICAL LITERATURE AND THEORETICAL ISSUES

In this section an attempt has been made to review the literature on deregulation of downstream oil sector and the way and manner through which it influences some major macroeconomic variables. These variables are GDP, and Unemployment. The said variables were chosen because of their importance in explaining economic phenomenon not only on Nigeria's economy but also on the economies of many other countries in the world. These variables among others have been used by many scholars to measure the impact of oil price change on economic activities see for example (Hamilton, 1983; Mork, 1989; Mork and Olson 1994; Lee and Ratti 1995; Ferderar, 1996; Papapetrou, 2001).

## 2.1 Deregulation of Oil Market and GDP:

The effect of changes in the price of oil on GDP can be understood via its demand or supply side effect. The demand side effect is the situation where the prices of petroleum products increases as a result of increased economic activity which results in high demand of oil and this is consistent with the theory that the higher the demand other things being equal the higher will be the prices. Under this circumstance the effect on GDP will be positive. On the other hand if the increase in oil prices is due to supply side effect which means the increase in the oil prices is due to reasons other than increase in demand then the effect on GDP could be negative, which indicates that rising oil prices are a pointer to the reduced availability of essential input to production, leading to a reduction in prospective output (Barro 1984, Brown and Yucel 1999, Brown and Yucel 2002, Abel and Bernanke 2001). Therefore, there is an upsurge in production cost and the growth of

industrial output and productivity are slowed, which could have negative effect on GDP and Employment. At this juncture the main research question of this study is raised as follows:

(i) Does deregulation of the oil market in Nigeria lead to higher cost of production and therefore affect GDP and employment negatively?

Another empirical study that shows the relationship between oil prices and GDP was the one conducted by Hamilton (2005) and Brown and Yucel (2002). The findings of these studies shows that oil price increases have a negative effect on output. To buttress the importance of oil price on GDP Maeda (2008 pp.1-2) has asserted thus; "rising oil prices can fuel a slump across a country's domestic economy by raising production costs for companies". He further argued that "the International Energy Agency (IEA) calculated the effect of high oil prices on lowering gross domestic product (GDP) using a large scale computer simulation and issued a report on its findings (IEA 2004)". According to him the agency computed the rate of the decline of GDP in; "several major countries by comparing two cases: a base line case showing what would happen if oil prices remained at \$25 per barrel for the five-year period starting in 2004, and a high price case showing what would happen if the price rose by \$10 to hit \$35 per barrel and remain at that level. The result showed that in the high price case, GDP would fall 0.3 per cent in the United State, 0.4 per cent in Japan, and 0.4 per cent in the euro-zone countries" (Maeda 2008 pp.1-2).

However it is worthy of note that the above mentioned countries that were covered by the report are developed industrialised oil importing countries therefore it cannot be concluded that the same scenario would be observed in the net oil exporting developing country like Nigeria. Therefore the effect of high oil price on the GDP in Nigeria is subject to empirical study.

## 2.2 Deregulation of Oil Market and Employment:

Effect of high oil prices on consumption, investment and unemployment was investigated by (Ferderer 1996). The result of the study shows that an increase in oil price may have negative effect on all these variables. According to him the effect on consumption can be understood via its relationship with disposable income, while the effect on investment is felt via raising firms' cost and increasing uncertainties, because a rise in oil prices diminishes the return of sectors that are oil intensive and the usual response to such circumstances by firms is scaling down or folding up leading to higher rate of unemployment.

However, according to scholars like Carruth, et al (1998) who have studied the effect of oil price changes on the labour market, and Davis and Haltiwanger (2001) who investigated the influence of oil price dynamics on the natural rate of unemployment, the effect of oil price increase on the labour market can differ according to considered horizon either short run or long run. Keane and Prasad (1996), in their study entitled 'The Employment and Wage Effects of Oil Price Changes: A Sectorial Analysis' uses micro panel data to study the effect of oil price changes on employment and real wage in the United States of America (USA). Their findings show that increase in oil price negatively affects aggregate employment in the short run but increases it in the long run. According to them this could possibly be an indication of labour energy substitution in the production function they therefore concluded that oil price increases could lead to high unemployment in the short run, but could generate more employment in the long run. The

research question to be raised here is what will be the effect of change in oil prices with regards to Nigeria's labour market?

## **3. ECONOMETRIC FRAMEWORK**

#### 3.1 Data and Variables

This study uses quarterly data from 1980 q1 to 2012 q4. The data used is secondary which was sourced from Central Bank of Nigeria Statistical bulletin (various years), the World Bank (African Development Indicators) and also from Daily Trust newspaper.

Three variables were considered in this study, one independent variable and two dependent variables. Domestic oil price is the independent variable which is a proxy for deregulation presented here as petroleum prices (PEP) while Unemployment and GDP are the dependent variables. Empirical test using time series data will be conducted to find the effect of petroleum price (PEP) change as a result of deregulation on the dependent variables. The data on GDP and PEP are in logarithmic form.

## 3.2 Definition of Variables and Data Sources

**a)** LGDP: Log of Gross Domestic Product at Current Basic Prices (N' Million). Gross Domestic Product is the market value of all goods and services produced in an economy over a period of time usually one year. For the purpose of this study time series data from 1980q1 to 2012q4 on GDP at current basic prices is used to find the effect of changes in domestic petroleum price on the economic growth of Nigeria. Therefore in this study GDP growth is a proxy for economic growth. Quarterly data on GDP was obtained from CBN Statistical Bulletin.

**b) UNEMPRT:** Unemployment is a situation where people who are able and willing to work could not find a work to do. For the purpose of this research unemployment rate is measured as a total number of unemployed as a percentage of total population in Nigeria. Annual data on unemployment rate was obtained from World Bank African Development Indicators which was converted to quarterly data by the researcher using low to high frequency version method (specified in series) by means of e-views7.0 econometrics software.

c) LPEP: This is the log of domestic petroleum prices obtained in Nigeria. For the purpose of this study LPEP is the independent variable and is a proxy for deregulation. Data on changes of LPEP is used to measure the effect of changes on its own lag and the lags of other variables which are GDP and Employment. The data on domestic petroleum price changes was sourced from Daily Trust Newspaper which published a detailed trend of domestic oil price changes from 1966 to 2012 (DailyTrust 2012).

## 3.3 Method of Econometric Measurement

It can be understood from the foregoing therefore, that the variables to be tested in this research are numeric and the data used which is a time series is also numeric, therefore to test the effect of PEP on GDP and UNEMPRT employing time series data makes the method of measurement to be quantitative. This has put the research within the realm of positivist approach in its methodology. According to Wallace et al (2008) positivism in the social sciences research is

mostly characterised by quantitative approaches, while interpretive on the other hand is usually associated with qualitative research methodology.

Therefore in this section and section 4 that follows, the econometric methods and tests carried out on the variables and data used for this paper are presented. The aim is to come up with a standard scientific empirical analysis and arrive at unbiased scientific results which are free from the researcher's value judgement, in line with positivist paradigm.

Sequel to the above, the paper employs an unrestricted Vector Autoregressive model (VAR) to examine the response of macroeconomic variables to changes in domestic petroleum prices in Nigeria. VAR is a system regression model used where there is more than one dependent variable.

Consider the following Vector Autoregressive model:

$$y_t = A_0 + \sum_{i=1}^p A_i y_{t-1} + \mu_t$$

Equation 1

Where  $Y_t$  is a 3x1 vector of variables determined by p lags of all 3 variables in the system,  $\mu t$  is a 3x1 vector of error terms,  $A_0$  is a 3x1 vector of constant term coefficients and  $A_1$  are 3x3 matrices of coefficients on the *i* th lag of y. Where  $Y_t = [LPEP, LGDP$  and UNEMPRT]. Where PEP denotes petroleum price (domestic petroleum price in Nigeria), GDP stands for gross domestic product and UNEMPRT denotes unemployment rate.

## 4. EMPIRICAL ANALYSIS AND DISCUSSION OF RESULTS

To examine the response of the above mentioned macroeconomic variables to changes in domestic oil prices an unrestricted vector autoregressive model (VAR) is used. This model provides a multivariate framework where changes in a particular variable (domestic petroleum prices) are related to changes in its own lags and to changes in other variables (unemployment rate, and GDP) and their lags.

Prior to running the VAR, some diagnostic tests were carried out on the data to check for unit root. Augmented Dickey Fuller (ADF) and Phillip Peron (PP) tests were employed to check for the unit root, while Johansen cointegration test was carried out after the VAR to test for long run relationship of the variables. These tests were carried out in order to avoid the problem of non-stationarity which is mostly associated with time series data.

As mentioned above, the aim of this study is to consider the response of two macroeconomic variables to changes in domestic petroleum prices in Nigeria. These variables are GDP and UNEMPRT for the period 1980q1 to 2012q4, a total of one hundred and thirty two observations. This shows that the data used is a time series data and according to Gujarati and Porter (2009) empirical works based on time series assumed that the series are stationary. But in some cases not all economic variables are stationary in their levels and so some variables are non-stationary which means their mean, variance and covariance are not constant over time. A Nonstationary variable is one which has a trend; the trend could be stochastic or deterministic. If the trend is completely predictive and is not variable then it is called deterministic. On the other hand if the

trend is not predictable and is variable it is called stochastic (Brooks, 2011). It is essential that variables that are non-stationary be treated differently because of unit root problem. In essence non-stationary data suffers from unit root problem or what is called stochastic or random walk. According to Gujarati and Porter (2009), non-stationarity gives rise to the problem of autocorrelation and spurious or nonsense regression. This is a situation where a very high  $R^2$  (an indication of high statistical relationship) is obtained when regressing a time series variable on another even though there is no meaningful relationship between the two variables.

Brooks (2011, pg.318) provides a lengthy explanation on why the concept of non-stationarity is important. He posited that the stationarity or non-stationarity of a series "can strongly influence its behaviour and properties".

If two variables are not related to one another it is expected that when one of the variables is regressed on the other the t-ratio on the slope coefficient would not be significantly different from zero and the value of  $R^2$  would be expected to be very low. But the problem of non-stationary variable is that if two variables are trending over time a regression of one on the other could have a high  $R^2$  meaning they are statistically significant, even though in reality they are completely unrelated. This is because the dependent variable will follow the trend of the independent variable. In relation to this Brooks stated that "if standard regression techniques are applied to non-stationary data, the end result could be a regression that 'looks' good under standard measures (significant coefficient estimates and a high  $R^2$ ), but which is really valueless" (Brooks 2011, 319). Such a model suffers from unit root problem. Therefore there is a need to investigate the time series property of the data by conducting unit root and cointegration tests on the variables before proceeding with estimation of parameters in order to avoid spurious or nonsense regression. If a variable is non-stationary it could be made stationary by differencing. A variable is said to be integrated of order k; denoted as I(k) if it has to be differenced k times to make it stationary.

## 4.1 Augmented Dickey Fuller Unit Root Test

Prior to stationarity test, a graphical presentation of the variables under study in logarithmic form is presented below to find out whether or not they have a unit root at their levels and whether there is trend, intercept or both.





Source: author's computation using eviews7

Graph 2 Trend of GDP in Nigeria from 1980 to 2012



LGDP

Note: vertical axis depict percentage rise while horizontal axis depict years. Source: author's computation using eviews7



Graph 3 Trend of Unemployment rate in Nigeria from 1980 to 2012

Note: vertical axis depict percentage rise while horizontal axis depict years

Source: author's computation using eviews7.0

From the graphs 1, 2 and 3 above, it can be understood that all the variables are trending upward which means they are nonstationary at their level and the graphs also shows that they have an intercept. Therefore there is a need to test for stationarity using both trend and intercept. However, we still resort to formal scientific statistical tests to determine the order of integration of the variables. The stationarity of the variables was examined using Augmented Dickey Fuller and Philip Perron unit root tests to find out whether or not they have a unit root at their levels and the results of both tests are presented in Tables 1 and 2 respectively.

Table 1

(using trend and intercept) Prob $< 0.05$					
VARIABLES	LEVELS	FIRST DIFFERENCE	ORDER OF INTEGRATION		
LPEP	-1.90	-12.85*	I(1)		
LGDP	-2.02	-4.31*	I(1)		
UNEMPRT	-2.53	-11.35*	I(1)		

# Augmented Dickey Fuller Unit Root Test Results

Note:\*, \*\* and\*\*\*, indicates significance at 1%, 5% and 10% respectively.

Source: author's computation using eviews7.0

#### 4.2 Philips Peron Unit Root Test

## Table 4.2 Philips Peron Unit Root Test Results

(Using trend and intercept)

VARIABLES	LEVELS	FIRST DIFFERENCE	ORDER OF INTEGRATION
LPEP	-2.05	-12.77*	I(1)
LGDP	-2.51	-12.61*	I(1)
UNEMPRT	-2.49	-11.51*	I(1)

## Note: \*, \*\* and \*\*\*, indicates significance at 1%, 5% and 10% respectively.

Source: author's computation using eviews7.0

From Tables 1 and 2 above it can be concluded that all the variables are non-stationary in their levels but they are stationary in their first difference. Therefore LPEP, LGDP, and UNEMPRT are characterised as I (1) variables.

Under the above scenario we cannot continue to run a simple regression because it will give us spurious results. Therefore there is the need to run cointegration test in order to see if in the long run, the variables move together having established the fact that they don't move together in the short run because they are characterised as unit root processes.

## 4.3 COINTEGRATION TEST

Given that all our variables suffer from the problem of stationarity which means they are I (1) variables we need to test for a long term relationship by means of Johansen cointegration test. Non stationary series have different properties over time and are difficult to generalize (Kozhan, 2010). As mentioned earlier, econometricians have developed the concept of cointegration to address the problem of non-stationarity in time series data. This is because, even when variables contain unit root, there may exist a linear combination of them which is stationary. If such a stationary linear combination exists, the non-stationary time series are said to be cointegrated. Two or more variables will be cointegrated if they have a long term equilibrium relationship between them. The stationary linear combination is called the cointegrating equation and may be interpreted as a long-run equilibrium relationship among the variables (Brooks 2011).

NT 11 1 41	$\mathbf{T}$ $(\cdot, \cdot)$	0.11.1
Null hypotheses	I race statistics	Critical value
r=0	31.85	29.79
r≤1	10.71	15.49
r≤2	0.56	3.84
Null hypotheses	Max. Eigen Value statistics	Critical value
r=0	21.14	21.13
r≤1	10.15	14.26
r≤2	0.56	3.84

TABLE 3: Johansen Cointegration Tes	TA	E 3: Joha	insen C	ointegra	tion	Test
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Source: author's computation using e-views 7.0 soft ware

Given that our variables of interest each contain a unit root, the Johansen cointegration test was employed to examine their long run relationship. A look at Table 3 reveals that both trace and maximum Eigen value show that there is one cointegration among the variables as we reject the null of no cointegration. To determine the number of cointegrating relations, we can continue successively from zero to k-1 until we fail to reject. To reject the null hypothesis of no cointegration, the Trace statistics and Maximum Eigen Value statistics must be greater than the Critical Value. From Table 3 above, we can observe that the Trace statistic of 31.85 is greater than the Critical Value of 29.79. Thus we reject the null that r=0. Similarly, the Maximum Eigen Value statistic of 31.14 is greater than the critical value of 21.13 and hence we reject the null hypothesis of no cointegration and confirm that there is at least one cointegration and therefore conclude that there is long term relationship between the variables under study.

The above statistical explanation forms the basis for understanding sections 4.5, 4.6 and 4.7 of this paper.

#### 4.4 VAR

The main purpose of employing a VAR for our empirical estimation in this study is to evaluate the dynamic causal relationship and response among the three variables of interest. The generalised impulse response function is employed to find out the mutual impact of innovations in domestic petroleum price on GDP and Unemployment in Nigeria. The impulse responses are illustrated in figure 4.3 and the variance decompositions are given in the table 4. The generalised impulse response shows how long and by what extent Gross Domestic Product (GDP), and Unemployment reacts to unanticipated changes in domestic petroleum prices. The horizontal axis measures the period after the impulse shock and the vertical axis measure the magnitude of the response. The advantage of the generalised impulse response is that causal ordering of the variables doesn't matter. Therefore the problem of reordering of variables to obtain different results does not arise.

#### 4.5 Impulse Response Function

The results of the generalised impulse responses for the unrestricted VAR in levels are presented for twentieth quarter time-intervals. In response to a positive shock in domestic petroleum prices, there is a positive impact on GDP growth in Nigeria. It can be observed that in response to a shock in domestic price of petroleum, GDP responds positively peaking at the 5th quarter and then slowly dying down with spikes in the 9th and 13th quarter. This positive relationship persisted till the twentieth quarter. The response was also statistically significant between the 4th and 8th quarter. This positive relationship is inconsistent with the classic supply side effect which argues that an oil price increase leads to increase in production cost in oil importing economies ultimately leading to reduction in output and productivity (Barro, 1984, Brown and Yucell, 1999, Abel and Bernanke, 2001). However, the observed positive relationship can be explained by the fact that Nigeria is an oil exporting economy. For an oil exporting country like Nigeria, an increase in oil price is expected to generate higher revenue to the government and hence more resources is available for increased government spending, productivity and output in the economy. Furthermore, this positive relationship can be explained by the fact that by withdrawing fuel subsidy in the domestic market, the government will have more money available for other development activities. The observed positive relationship is also inconsistent with the findings of Hamilton (2005), who demonstrates a negative relationship between increased oil prices and output, but is consistent with the findings of Aliyu (2009) who finds a positive relationship between oil price increases and real GDP growth in Nigeria.

Turning to unemployment, a shock from domestic petroleum prices initially has a negative impact on unemployment rate in Nigeria, it becomes positive in the 5th quarter and it persists throughout the remaining quarters. This is consistent with the findings of David and Haltiwanger (2001) Caruth et al (1998), and Keane and Prasead (1996) who show that oil price increases tend to reduce unemployment in the short run but tend to increase it in the long run.

#### Fig. 3 Impulse Response Function

Response to Generalized One S.D. Innovations ± 2 S.E.



Response of LGDP to LPEP

Source: author's computation using eviews7.0

#### 4.6 Variance Decomposition

The variance decomposition offers an alternative of examining the dynamics among the variables under study. It allows us to show the relative importance of an individual variable due to its own shock and the shock to other variables of interest. Table 4 explains the percentages of the variations in GDP and Unemployment rate that are attributed to domestic oil price changes. The variance decomposition indicates that Nigerian Domestic oil price changes are a significant source of variation for Nigerian GDP and unemployment. Coming to GDP, domestic oil price

changes explains more than 11% of variation in GDP in 5th quarter, more than 15% by the tenth quarter, and then declining to more than 9% in the 20th quarter.

Considering unemployment rate the changes in domestic oil prices accounted for over, 7% to more than 24% of variations other than itself under the review period.

Varia Decompos LGD	nce sition of P:			
Period	S.E.	LGDP	LPEP	UNEMPRT SIS
	0.084			
1	784	100.0000	0.000000	0.000000
	0.181			
5	889	86.82531	11.66581	1.508877
	0.281			
10	150	82.91282	15.98647	1.100718
	0.353			
15	024	85.78594	12.44946	1.764606
	0.416			
20	090	87.25534	9.206783	3.537875

#### **Table 4: Variance Decomposition**

Variance Decompositi on of UNEMPRT SIS:				
Period	S.E.	LGDP	LPEP	UNEMPRT SIS
1	0.210 551 0.393	3.635853	7.471538	88.89261
5	436 0 508	2.830170	7.425177	89.74465
10	722 0 562	2.888243	8.863973	88.24778
15	756 0.612	3.752842	16.83921	79.40794
20	393	4.107582	24.47790	71.41452
Cholky Ordering: LGDP LPEP UNEMPRT SIS				

Source: Author's computation using Eviews 7.0

#### 4.7 Causality

In this study granger causality test is employed as against the use of correlation which is frequently the case in most studies; however correlation does not imply causation because in some cases the use of correlation gives spurious results (Eviews 7 Help file). "The Granger (1969) approach to the question of whether x causes y, is to see how much of the current y can be explained by past values of y and then to see whether adding lagged values of x can improve the explanation. Y is said to be Granger-caused by x if x helps in the prediction of y, or equivalently if the coefficients on the lags are statistically significant" (Eviews 7 User Guide I, pp428-429). In light of the above granger causality test was run on the variables LGDP, LPEP, and UNEMPRTSIS and the result is presented in table 4.

#### **Table 4: Causality Analysis**

VAR Granger Causality/Block Exogeneity Wald Tests Date: 11/16/13 Time: 09:04 Sample: 1980Q1 2012Q4 Included observations: 127

Excluded	Excluded Chi-sq		Prob.	
LPEP UNEMPRTS	34.25715	5	0.0000	
IS	15.01636	5	0.0103	
All	55.74405	10	0.0000	

#### Dependent variable: LGDP

#### Dependent variable: LPEP

Excluded	Chi-sq	Df	Prob.
LGDP UNEMPRTS	9.580490	5	0.0880
IS	6.832918	5	0.2334
All	16.76487	10	0.0797

#### Dependent variable: UNEMPRTSIS

Excluded	Chi-sq	Df	Prob.
LGDP LPEP	11.76810 14.53738	5 5	0.0381 0.0125
All	19.74524	10	0.0318

Source: Author's computation using Eviews 7.0

To test for Granger causality, the block exogeneity test using Wald statistics are employed to test for the joint significance of each of the other lagged endogenous variable. The test result in table 4 revealed that there is a unidirectional causation running from LPEP to LGDP as we reject the null hypothesis that LPEP does not granger cause LGDP, but we do not reject the null hypothesis that LGDP does not granger cause LPEP. Therefore it appears that Granger causality between LPEP and LGDP runs one-way.

There is also a unidirectional causation running from UNEMPRTSIS to LPEP. This is because although we cannot reject the null hypothesis that LPEP does not granger cause UNEMPRTSIS but we reject the null hypothesis that UNEMPRTSIS does not granger cause LPEP. Therefore it appears that Granger causality between LPEP and UNEMPRTSIS also runs one-way.

#### 5. Summary, Conclusion and Policy Recommendation

This paper assesses the effect of deregulation of downstream oil sector on the economic growth of Nigeria using quarterly time series data from 1980q1 to 2012q4. The main focus is on the relationship between changes in oil prices as a result of deregulation and two macroeconomic variables namely; GDP and UNEMPRSIS. The main instrument of the data analyses are the Vector Auto regression techniques, Impulse Response Function, Variance decomposition and Granger causality. Added to that, ADF and PP techniques were employed to check the time series characteristics of the data.

The ADF and PP tests indicate that GDP and UNEMPRSIS are non-stationary at their level but are stationary at first difference. Furthermore the Johansen cointegration test was carried out and the result of both the Trace and Maximum Eigen value shows that there is one cointegration among the variables.

The result of the Impulse response function revealed positive impact of deregulation on GDP, while the impact was negative in the short run on UNEMPRT which also became positive in the long run.

The result of Variance decomposition indicates that change in LPEP is a significant source of variation in both the GDP and UNEMPRT.

The result of Granger Causality indicates unidirectional causality running from LPEP to LGDP, and also from LPEP to UNEMRT.

Overall it can be concluded that there is a strong relationship between variation in domestic oil price and these two major macro-economic variables in Nigeria, and variation in domestic oil price is a strong source of variation in the economic growth of Nigeria.

Sequel to this therefore the paper recommend a policy that will guarantee a long term domestic oil price stability in the country which will help in bringing about stability in the macroeconomic environment which will in turn stimulate economic growth, development and employment.

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Sabiu Bariki Sani and Reza Kouhy, The Macrotheme Review 3(3), Spring 2014