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**DOWNSTREAM OIL DEREGULATION AND NIGERIAN ECONOMY****James U. MONDAY***Obafemi Awolowo University, Ile-Ife, Nigeria***Moses C. EKPERIWARE***Obafemi Awolowo University, Ile-Ife, Nigeria***Bamidele R. MURITALA***Obafemi Awolowo University, Ile-Ife, Nigeria***Abstract**

*The Nigerian oil and gas industry has been experiencing a showdown since the announcement of the downstream oil deregulation policy. This paper, therefore, seeks to analyse the relationship between deregulation of the downstream sector and Nigerian economic performance using annual data from 1980 to 2009. The Ordinary Least Squares (OLS) regression method was employed to analyze the data. Chow Test was used to determine parameter stability of the regression model, while Granger Causality Test was used to predict the direction of influence. The findings reveal that increase in price of petroleum products and inflation rate were not as a result of deregulation, and deregulating price of petroleum products significantly influence economic growth with marginal inflation. The paper recommends that government should encourage private sector participation in the oil and gas industry.*

**Key words:** Deregulation, Downstream sector, Economic Growth, Unemployment and Inflation.

**I. INTRODUCTION**

Oil and gas industry has continued to serve the mainstay of the Nigerian economy since 1956 when oil was discovered at Oloibiri in the Niger Delta region. The industry, no doubt, is widely acknowledged at the nation's live-wire because it creates employment opportunities for Nigerians (particularly with the enactment of the Local Content policy), contributes to Nigeria's gross domestic product as well as government revenue, boosts foreign exchange reserves, provides cheap and readily available sources of energy for industry and commerce through the operations of the local refinery and the utilization of locally discovered natural gas (Odularu, 2008). Nonetheless, despite this benefit, the oil industry is plagued by various problems which the Federal government believed that deregulation of the downstream sector was a solution.

In recent years, deregulation of the downstream sector of the oil and gas industry has become a controversial issue in Nigeria. In 2003, the Federal government bedevilled with fiscal deficit, high external debt, unfavourable balance of payment and inability to sustain the huge subsidy for fuels announced her intention to deregulate the downstream sector of the petroleum industry. Since the announcement, Nigerians have lost count about how many times organized Labour went on strike over downstream oil deregulation policy.

Nigeria, OPEC's sixth largest crude oil producer, with her abundant natural resources still import and pay international prices for a natural resources it has in abundance. The Federal Government complained that the cost of subsidizing importation which was estimated to be as high as \$1.5 billion annually (Ibanga, 2006) has become unbearable to sustain, and that deregulation of the downstream sector would attract investors into the oil and gas industry and provoke competition which would result in reduction in the prices of petroleum products.

As part of the deregulation policy, the Federal Government stopped the sale of oil to Nigerian National Petroleum Corporation (NNPC) as the government was buying refined products at huge international prices only to sell at a heavily subsidized rate. NNPC now buys at the prevailing international price, since its refineries are almost down. Thus, it exports and uses the proceeds to import refined fuel for local consumption. Nigerians are saddled with continuous increase in the cost of locally consumed fuel as international oil prices rise. NNPC, major and independent marketers, have become importers of petroleum products, leaving pricing at the mercy of market forces. Therefore, it has become imperative to evaluate the impact of deregulation of the downstream sector on the Nigerian economy.

## **II. LITERATURE REVIEW/THEORETICAL FRAMEWORK**

The Nigerian Oil and gas industry can be categorized into two main sub-sectors, namely, upstream and downstream sectors. The upstream sector covers all the activities leading to the exploration and drilling of crude oil, while the downstream sector covers the processing of crude oil, its distribution as well as sales. In other words, the downstream oil industry is the business of importing, exporting, re-exporting, shipping, transporting, processing, refining, storing, distributing, marketing and/or selling, crude oil, gasoline, diesel, liquefied petroleum gas, kerosene, and other petroleum and crude oil products (Philippine RA 8180, Sec.4).

Deregulation is the process of complete removal of government regulations or control on an industry, especially with regard to pricing of products. It is the deliberate removal of monopoly rights enjoyed by an enterprise in a particular sector of any economy. According to Kupolokun (2005), deregulation is the process of transforming an economy to one that is open to all interested players and is usually driven by the market forces. Thus, there is minimal role of government in economic sector and industries.

Downstream oil deregulation refers to the removal of protection with regard to importation, processing and retailing of petroleum products as well as the determination of prices of petroleum products. Kupolokun (2005) noted that the main goals of deregulation initiatives include to:

- Dismantle the natural monopoly of the state owned enterprise by privatizing and deregulating price controls.
- Create competition in the downstream sector by encouraging more companies to get involved and eventually supplying the market at competitive pricing levels.
- Reduce the cost government incurs on subsidizing the sector which runs as high as \$1.5 billion annually, and can consequently use the resources freed up to handle the socio-economic and welfare needs of the Nigerian people.
- Boost Foreign Direct Investment (FDI) to the Nigerian economy.
- Reduce transportation costs of petroleum products and people.

In a nutshell, deregulation is to promote competition in areas previously considered to be natural monopoly of an individual, group of people or government enterprises.

From literatures, there are two phases of deregulation - partial and full deregulation. In partial deregulation, there is less government regulation in order to increase efficiency and protect consumer's rights, while full deregulation is the complete removal of controls on oil price setting (PIDS, 2000; DPCGP, 2007). Currently, the Nigerian petroleum industry is still exercising partial deregulation where government intervenes in order to increase efficiency and protect consumers from exorbitant prices of petroleum products. This minimal intervention also helps to promote and protect employment within the industry and to facilitate the entry of disadvantaged communities in the sector.

The concept of downstream oil deregulation is neither new nor restricted to Nigeria, as it has for long been operated in several other oil-producing countries. Most developed countries that deregulated their oil sector had experienced or achieved economic growth. The countries include Canada, Japan, United States, Brazil, to mention but a few. However, countries like Argentina, Philippine, South Africa, etc did not find downstream oil deregulation favourable.

In Nigeria, there have been divergent opinions expressed by the public since the introduction of deregulation policy to the downstream sector. Some Nigerians see the policy as a way of introducing high fuel prices by the government, while other people view it as a way of ending the scarcity and shortages of petroleum products.

The government believes that subsidy for fuels distort the system, and encourages corruption; that deregulation will offer more benefits to Nigerians because the oil market will become more competitive and efficient, and the resulting benefits will be passed on to Nigerians in the form of lower product prices, better quality of service and ease as well as constant availability of the product (Yar'adua, 2009). Odidison (2003) stated that deregulation would bring sanity into the oil and gas industry since smuggling of petroleum products, vandalization of pipelines and all other vices in the sector will be totally removed. According to him, domestic price of oil will increase and the smugglers being irrational are likely to reduce their activities. Consequent upon this, the neighbouring countries that rely on smuggled petroleum products would experience scarcity and as such would be forced to take the legal and normal route to buy fuel. Akinmade (2003) explained that the emergence of the private refineries will create a better maintenance culture of the refinery and this will likely reduce unemployment by employing both skilled and unskilled labour. They would also engage in the training of manpower in Nigeria and thereby contribute to human development in the country.

In the other hand, some scholars and pressure groups in the country strongly believed that deregulation of the downstream oil sector will have negative effects on the Nigeria economy. Eson (2002) sees deregulation in Nigeria as a measure that might give marketers of petroleum products the opportunity to fix prices, which in most cases lead to exploitation of the average Nigerian. Ogunbodede, Ilesanmi and Olurankinse (2010) explained that deregulation which results in increase in fuel price have a multiplier effects on the economy; that is, the ensuing inflation would rubbish the income of the worker in such a way that greater percentage of their income would be spent on consumption. This in

effect limits their ability to save and thus leads to little or no incentives to save. Therefore, for this paper, multivariate linear regression model of the Nigerian economy is constructed to examine the impact of downstream oil deregulation policy on Nigerian economic performance.

**III. METHODOLOGY**

**Model Specification:**

This study employs annual data from 1980 to 2009, obtained from two sources: Central Bank of Nigeria Statistical Bulletin and National Bureau of Statistics. The method of analysis is that of Ordinary Least Squares regression. The economic model used in the study is given as:

$$Y_i = \beta_0 + \beta_i X_i + \varepsilon_i$$

Where Y is the dependent variable,  $\beta_0$  is constant,  $\beta_i$  is the coefficient of the explanatory variable,  $X_{it}$  is the explanatory variable, and  $\varepsilon_{it}$  is the error term which comprises all other unobserved variables. The study employs indicators such as price of Premium Motor Spirit (PMS), Inflation rate (INFLA), and Unemployment rate (UNEMPL) as the independent (explanatory) variable to measure effect of downstream oil deregulation, while real GDP as the dependent (explained) variable to measure economic growth. Adopting a log-linear specification and assuming linearity among variables, thus, the economic model evolves as:

$$\text{LogRGDP}_i = \beta_0 + \beta_1 \text{LogPMS}_i + \beta_2 \text{LogINFLA}_i + \beta_3 \text{LogUNEMPL}_i + \varepsilon_i$$

A priori **Specification:** the expected signs of the coefficients of the explanatory variables are:

$$\beta_1 > 0, \beta_2 > 0, \beta_3 > 0$$

**Chow Test: Testing for Structural/Parameter Stability of Regression Model**

Chow Test was applied to determine if there was structural break in the period from 1980 to 2009 due to the introduction of the downstream oil deregulation policy. Two periods were observed: pre- and post-deregulation periods. Thus we have three possible regressions:

Time period 1980-2002:  $\text{Log}Y_t = \lambda_1 + \lambda_2 \text{Log}X_t + \dots + \varepsilon_{1t}$  .....(1)

Time period 2003-2009:  $\text{Log}Y_t = \gamma_1 + \gamma_2 \text{Log}X_t + \dots + \varepsilon_{2t}$  .....(2)

Time period 1980-2009:  $\text{Log}Y_t = \alpha_1 + \alpha_2 \text{Log}X_t + \dots + \varepsilon_t$  .....(3)

Regression (3) assumes there is no difference between the two time periods; that is, no structural break over the entire period (1980-2009) caused by the deregulation policy. Therefore, the null hypothesis is given as:

$H_0$ : Regressions (1) and (2) are statistically the same (i.e. no structural break)

To test this hypothesis, *F*-statistic is computed using the residual sum of squares of the above regressions:

$$F = \frac{(RSS_R - RSS_{UR})/k}{(RSS_{UR})/(n_1 + n_2 - 2k)} \sim F_{[k, (n_1 + n_2 - 2k)]}$$

where  $RSS_{UR}$  = Unrestricted Residual Sum of Squares =  $RSS_1 + RSS_2$

$RSS_R$  = Restricted Residual Sum of Squares =  $R_3$

k = number of parameters estimated

The null hypothesis of parameter stability is accepted if computed *F* value does not exceed the critical *F* value; otherwise, it is rejected.

**Granger Causality Test: Testing for Direction of Influence**

In order to determine whether changes in one variable are a cause of changes in another, we employed the Granger (1969) causality test. Granger causality method of investigating whether A causes B is to see how much of current B can be explained by past values of B and then to see whether by including lagged values of A we can improve the explanation of B. B is said to be Granger-caused by variable A if A helps in the prediction of B, or if the coefficients on the lagged A's are statistically significant (Eviews User's Guide 1994-1997). The main idea of causality is quite simple, if A causes B, then changes in A should precede changes in B (Pindyck and Rubinfeld, 1998). This characteristic makes causality test an important one in the test of endogeneity.

If A causes B, then A should help to predict B. in other words, in a regression of B against past values of B, the addition of past values of A as explanatory variables should contribute significantly to the explanatory power of the regression. To test the null hypothesis of "A does not cause B", we regress B against its lagged values and the lagged

values of A (unrestricted regression) and then regress B only against lagged value of B (the restricted regression) as follows:

Unrestricted regression:

$$B_t = \sum_{i=1}^n \alpha_i A_{t-i} + \sum_{j=1}^n \beta_j B_{t-j} + \varepsilon_t$$

Restricted regression:

$$B_t = \sum_{j=1}^n \beta_j B_{t-j} + \varepsilon_t$$

An example of a pairwise causality test to determine whether GDP “causes” fuel price or fuel price “causes” GDP this study is given as:

$$RGDP_t = \sum_{i=1}^n \alpha_i PMS_{t-i} + \sum_{j=1}^n \beta_j RGDP_{t-j} + \varepsilon_{1t}$$

$$PMS_t = \sum_{i=1}^n \varphi_i PMS_{t-i} + \sum_{j=1}^n \delta_j RGDP_{t-j} + \varepsilon_{2t}$$

From the above, a simple *F*-test which uses the sum of squared residuals (RSS) from equation the above equations is then computed using the following formular:

$$F = \frac{(RSS_R - RSS_{UR})/m}{RSS_{UR}/(n - k)} \sim F_{[m,(n-k)]}$$

Where *m* is the number of parameter restrictions, *n* is the number of observations, and *k* is the number of estimated parameters in the unrestricted regression.

The resultant *F* is then used to determine whether or not the lagged values of A contribute significantly to the explanatory power of the unrestricted regression. If they do, we can reject the hypothesis of “A causes B” and conclude that the data are consistent with A causing B (Pindyck and Rubinfeld, 1998).

**Presentation of Data**

Price of Premium Motor Spirit, Real Gross Domestic Product, Unemployment Rate and Inflation Rate in Nigeria, 1980 - 2009

<b>YEAR</b>	<b>PMS PRICE (N/Litre)</b>	<b>REAL GDP (N' Million)</b>	<b>UNEMPLOYMENT RATE (%)</b>	<b>INFLATION RATE (%)</b>
1980	0.15	31546.8	6.4	9.9
1981	0.15	205222.1	6.4	20.9
1982	0.20	199685.3	6.4	7.7
1983	0.30	185598.1	6.4	23.2
1984	0.30	183563.0	6.2	39.6
1985	0.39	201036.3	6.1	5.5
1986	0.39	205971.4	5.3	5.4
1987	0.42	204806.5	7.0	10.2
1988	0.60	219875.6	5.3	38.3
1989	0.60	236729.6	4.5	40.9
1990	0.70	267550.0	3.5	7.5
1991	0.70	265379.1	3.1	13.0
1992	5.00	271365.5	3.4	44.5
1993	3.25	274833.3	2.7	57.2
1994	11.00	275450.6	2.0	57.0
1995	11.00	281407.4	1.8	72.8
1996	11.00	293745.4	3.4	29.3
1997	15.00	302022.5	3.2	8.5
1998	15.00	310890.1	3.2	10.0
1999	20.00	312183.5	3.1	6.6
2000	22.00	329178.7	4.7	6.9
2001	26.00	356994.3	4.2	18.9
2002	30.00	433203.5	3.0	12.9
2003	40.00	477533.0	2.9	14.0
2004	49.00	527576.0	2.8	15.0
2005	52.00	561931.4	3.3	17.9
2006	64.50	595821.6	3.5	8.2
2007	75.00	634251.1	3.5	5.4
2008	75.00	674889.0	4.9	11.6
2009	65.00	657771.4	4.9	12.4

Source: Central Bank of Nigeria, Statistical Bulletin (2009) and National Bureau of Statistics (2009)

IV. FINDINGS/POLICY IMPLICATIONS

Using E-View3.1 statistical package, we obtain the following results:

**Table 1: Pre-deregulation (1980-2002)**

Dependent Variable: LOGRGDP

Method: Least Squares

Independent Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	307180.4	49923.72	6.152995	0.0000
LOGPMS	4947.615	1199.138	4.125977	0.0006
LOGINFLA	-236.9013	540.9394	-0.437944	0.6664
LOGUNEMPL	-19240.12	7783.941	-2.471771	0.0231
R-squared	0.760259	Mean dependent var		254271.2
Adjusted R-squared	0.722405	S.D. dependent var		78215.65
S.E. of regression	41209.68	Akaike info criterion		24.24750
Sum squared resid	3.23E+10	Schwarz criterion		24.44498
Log likelihood	-274.8463	F-statistic		20.08407
Durbin-Watson stat	1.243078	Prob(F-statistic)		0.000004

$$\begin{aligned}
 \text{LogRGDP} &= 307180.4 + 4947.6\text{LogPMS} - 236.9\text{LogINFLA} - 19240.1\text{LogUNEMPL} \\
 t &= (6.153)^* \quad (4.126)^* \quad (-0.438) \quad (-2.472)^* \\
 R^2 &= 0.76, \quad \text{RSS}_1 = 3.23\text{E}+10, \quad F = 20.084^*, \quad d = 1.243, \quad n_1 = 23
 \end{aligned}$$

**Table 2: Post-deregulation (2003-2009)**

Dependent Variable: LOGRGDP

Method: Least Squares

Independent Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	192627.5	49014.89	3.929980	0.0293
LOGPMS	4373.321	821.0368	5.326584	0.0129
LOGINFLA	2637.104	1911.432	1.379648	0.2615
LOGUNEMPL	27890.08	9089.550	3.068367	0.0546
R-squared	0.987619	Mean dependent var		589967.6
Adjusted R-squared	0.975239	S.D. dependent var		72023.81
S.E. of regression	11333.46	Akaike info criterion		21.80447
Sum squared resid	3.85E+08	Schwarz criterion		21.77356
Log likelihood	-72.31563	F-statistic		79.77129
Durbin-Watson stat	2.430263	Prob(F-statistic)		0.002330

$$\begin{aligned}
 \text{LogRGDP} &= 192627.5 + 4373.3\text{LogPMS} + 2637.1\text{LogINFLA} + 27890.1\text{LogUNEMPL} \\
 t &= (3.930)^* \quad (5.327)^* \quad (1.380) \quad (3.068)^* \\
 R^2 &= 0.99, \quad \text{RSS}_2 = 3.85\text{E}+8, \quad F = 79.771^*, \quad d = 2.430, \quad n_2 = 7
 \end{aligned}$$

**Table 3: Entire Period (1980-2009)**

Dependent Variable: LOGRGDP

Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	264460.7	35577.13	7.433446	0.0000
LOGPMS	6124.086	347.5520	17.62063	0.0000

LOGINFLA	61.04787	480.0581	0.127168	0.8998
LOGUNEMPL	-12871.99	5839.870	-2.204157	0.0366
R-squared	0.947617	Mean dependent var		332600.4
Adjusted R-squared	0.941573	S.D. dependent var		162999.3
S.E. of regression	39399.76	Akaike info criterion		24.12447
Sum squared resid	4.04E+10	Schwarz criterion		24.31130
Log likelihood	-357.8671	F-statistic		156.7812
Durbin-Watson stat	1.190183	Prob(F-statistic)		0.000000

$$\text{LogRGDP} = 264460.7 + 6124.1\text{LogPMS} + 61.04\text{LogINFLA} - 12871.9\text{LogUNEMPL}$$

$$t = (7.433)^* \quad (17.620)^* \quad (0.127) \quad (-2.204)^*$$

$$R^2 = 0.95, \quad \text{RSS}_3 = 4.04E+10, \quad F = 156.781^*, \quad d = 1.190, \quad n_3 = 30$$

\* Shows statistical significance at 1% and/or 5%

**Chow Test:** The computed  $F$  value is obtained as

$$F = \frac{(4.04 \times 10^{10} - 3.27 \times 10^{10})/4}{(3.27 \times 10^{10})/22} = 1.30$$

and the critical  $F$  value is  $F_{(4,22)} = 4.31$

Since the computed  $F$  value is less than the critical  $F$  value, the null hypothesis is accepted that there is no structural break between 1980 and 2009 as a result of the downstream oil deregulation policy. Thus, the increase in prices of petroleum products was not as a result of the deregulation. After deregulation took effect, prices of petroleum products still continued to rise. The country has been experiencing fuel price increases even before deregulation took effect because Nigeria is a net importer of petroleum. Therefore, when the prices of petroleum products in the international market increase, the local oil industry has little choice but to adopt the risen prices. Any changes in the international oil prices directly affect pump price. The analysis of this study is, therefore, based on regression (3).

The  $t$ -statistics shows that price of petroleum products ( $t = 17.62, p = 0.000$ ) and unemployment rate ( $t = -2.2, p = 0.036$ ) are individually statistically significant to economic growth at 5% level of significance, except inflation rate ( $t = 0.13, p = 0.900$ ). The  $F$ -statistics value ( $156.781$ ) shows that the overall model is statistically significant at 1% and 5% levels of significance. This implies that prices of petroleum products (especially, fuel), inflation rate and unemployment rate are crucial indicators to consider during the deregulation of the downstream sector. This is corroborated by the  $R^2$  value of  $0.95$  which shows that about 95 percent of the variation in Nigerian economic performance is explained by price of petroleum products, inflation and unemployment rates.

The model in Table 3 further reveals that since the period of economic reforms like the Structural Adjustment Programme (SAP) in the 1980's, there has been a strong positive relationship between price of petroleum products and economic growth. So, deregulating the downstream sector will result in increase in the price of petroleum products in the short-run which will consequently lead to a boost in economic growth but with marginal inflation in the long-run. Thus, the economy enjoys decrease in unemployment rate as private sector participation will encourage competition and efficiency by employing both skilled and unskilled labour to sustain the competition.

**Table 4: Granger Causality Tests**

Null Hypothesis:	F-Statistic	P-value	Decision
LogINFLA does not Granger Cause LogRGDP	0.80766	0.37706	Do not reject
LogRGDP does not Granger Cause LogINFLA	0.82613	0.37174	Do not reject
LogPMS does not Granger Cause LogRGDP	25.8604	2.7E-05	Reject
LogRGDP does not Granger Cause LogPMS	1.90417	0.17936	Do not reject
LogUNEMPL does not Granger Cause LogRGDP	0.04205	0.83912	Do not reject
LogRGDP does not Granger Cause LogUNEMPL	0.24418	0.62535	Do not reject
LogPMS does not Granger Cause LogINFLA	1.06069	0.31254	Do not reject
LogINFLA does not Granger Cause LogPMS	0.01059	0.91884	Do not reject

LogUNEMPL does not Granger Cause LogINFLA	0.00941	0.92349	Do not reject
LogINFLA does not Granger Cause LogUNEMPL	1.18094	0.28714	Do not reject
LogUNEMPL does not Granger Cause LogPMS	3.95926	0.05723	Do not reject
LogPMS does not Granger Cause LogUNEMPL	0.97268	0.33310	Do not reject

Table 4 presents the results of pairwise Granger causality among the real GDP, fuel price, inflation and unemployment rates. The results show that only the null hypothesis that fuel price does not granger cause real GDP could be safely rejected at 1 percent level – a unidirectional causality emanates from fuel prices to real GDP. Thus, the prices of petroleum products Granger cause (influence) economic growth. This implies that deregulating prices of petroleum products in Nigeria caused a boost in the economic performance as the huge subsidy which was formerly used for fuel importation is now diverted to tackle socio-economic and welfare needs of the Nigerians.

## V. RECOMMENDATION/CONCLUSION

The econometric findings presented in this study reveal that increase in prices of petroleum products was not due to deregulation, but increase in international oil prices. Increase in prices of petroleum products significantly influence economic growth within the period of study, because petroleum products are demand inelastic. Although the inflation rate marginally increased, the rate of unemployment decreased with increase in economic growth.

Based on these findings, it is inevitable to provide a policy recommendation that would be applicable to the Nigerian economy:

- Government should get all the four refineries working at all costs. This will help to reduce the huge subsidy burden and the money spent on refined fuel importation will be diverted to infrastructural development for the economy.
- Government should encourage more private sector participation so that better equipped oil infrastructures (refineries and pipelines) can be built and the cost of refining crude oil and its distribution will reduce.
- Government, through the Petroleum Product Regulatory Agency (PPPRA), should fix prices of petroleum products, and any corrupt official or firm that wants to make abnormal profit should be made to face the law.
- Securities should be beefed-up to check the smuggling of refined oil across the borders.
- Special attention should be given to indigenes of the Niger-delta region to reduce unrest as well as vandalization of petroleum infrastructures.

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