

**NIGERIA'S DOWNSTREAM OIL SECTOR DEREGULATION AND EFFICIENT PETROLEUM PRICING: AN ERROR CORRECTION MODEL (ECM) APPROACH**

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**Abstract**

*The paper examines deregulation of downstream oil sector and optimal petroleum pricing in Nigeria. Log linear error correction model was adopted to examine how Custom and excise duties (CED), petroleum profit tax (PPT), and crude oil production (COP) had impacted on petroleum pricing (PR) in Nigeria. Unit root test was carried out on each of the variables to determine their level of stationarity. Three of the variables were however found stationary after first difference and one after second difference, and then it was safe to proceed with Johansen Cointegration Test. The integrated variables were then used for the regression analysis. The cointegration result showed that the variables used in the model have a long term, or equilibrium relationship between them. The result showed that with deregulation of the downstream oil sector, the amount of levies on importation of petroleum would hike the price of domestic sales of petroleum. This shows that, deregulation would discourage the importation of refined fuel and as such it would encourage foreign direct investment in the oil and gas sector. More so, the result showed that the quantity of crude oil production in Nigeria has been far below the optimal capacity and has contributed positively to petroleum pricing increase over the years in Nigeria. The study thus recommends that appropriate policy that would facilitate economic prosperity for an average citizen in Nigeria through petroleum price reduction should be adopted. The caveat issue to keep in mind is that the petroleum downstream sector deregulation should produce efficiently, effectively and equitably, which could result in durable infrastructures and optimal petroleum pricing for sustainable development of the national economy.*

*Keywords: Petroleum sector, Oil, Oil prices, Deregulation, Nigeria*

## INTRODUCTION

Over the years, Nigeria's mono-cultural economy and heavy Dependence on the oil sector and the recent uncertainty in the international oil market has brought mixed economic results. In 2002, the weakening international oil price and a subsequent revenue shortfall culminated in relatively low real GDP growth, deterioration in the fiscal account and pressure on external payments, resulting in a debt crisis. Low economic growth was attributed to the significant fall of crude oil production. In 2003, both an increase in the volume of crude oil exported and a 16 per cent increase in oil prices helped boost economic activity. In 2004 and 2005, low exports are expected to constrain an upswing in investment to levels that would boost growth (OECD, 2004). At the current extraction rates, it is estimated that proven and probable oil and gas reserves will last for more than 50 years, and probable reserves well above 100 years. In 2009, Nigeria's total crude oil and condensate production was 780.4 million barrels with a daily average of 2.14 million barrels. Concomitantly, a total of 788,828,760 barrels (2.16 million barrels per day) of crude oil and condensate was lifted for domestic and export purposes (NNPC, 2009).

An important characteristic of the downstream petroleum sector in Nigeria is the dominance of the government in pricing, supply and investment. Nigeria currently relies heavily on the importation of refined petroleum products despite being a major crude oil exporter. This is due to the inefficiencies in the downstream petroleum sector, as reflected in breakdown and low capacity utilization experienced by the nation's four refineries, price distortions and the accompanying limited incentives to invest in refineries, uncompetitive market structure, high distribution costs and rent-seeking behaviour and the associated smuggling and other forms of leakages.(Ayodele, Obafemi, & Ebong,2013)

Prior to the fall in domestic output of refined petroleum products, successive Nigerian governments have spent so much yearly in subsidizing the importation of the products for onward sale at lower rates to the Nigerian populace. In effect, petroleum subsidy has moved from being an implicit subsidy to explicit cost, which has increased significantly over the years, especially with rising share of imports in domestic supply. Considering the huge amounts spent overtime in subsidizing the consumption of petroleum products in Nigeria, the government decided to fully deregulate the retail price of petroleum having removed the subsidies on diesel and kerosene earlier. This would allow the prices of the petroleum products to fully reflect their market conditions, culminating in the deregulation of the downstream oil sector. An attempt in this regard was met with stiff opposition in January 2012. Effective and optimum petroleum product Pricing is very critical in this country; it has a link with other sectors like Agriculture, Manufacturing, and Services etc. A change in price of petroleum products invariably means a change in these other sectors. The matter of appropriate pricing of petroleum has been

reoccurring since the early 1970s. However, it came to the forefront with the Federal Government's introduction of an economic recovery programme, SAP, in 1986, on the advice of the IMF and the World Bank, underlining the external basis of the current crisis. A major thrust of SAP was the deregulation of goods and services in the economy.(Agba, 2000) However, external pressures operated in consonance with the (internal) tendency of the operators of the states in Nigeria to make expenditure decisions independently of revenue realities, such that when permanently faced with the expenditure obligations exceeding available financial resources, the state strove to expand its financial base, inter-alia, through increasing the prices of petroleum products. Based on the above problems, the paper attempts to examine how optimum petroleum pricing could be achieved via proper deregulation of the downstream oil sector in Nigeria.

## REVIEW OF LITERATURE

### The Concept of Deregulation

To deregulate means to do away with the regulations concerning financial markets and trades. Ernest and Young, (1988) posit that deregulation and privatization are elements of economic reform programmes charged with the ultimate goal of improving the overall economy through properly spelt out ways. For example, freeing government from the bondage of continuous financing of extensive projects which are best suited for private investment by the sale of public enterprises; encouraging efficiency and effectiveness in resources utilization; reducing government borrowing while raising revenue; promoting healthy market competition in a free market environment; improving returns from investment and broadening enterprises share ownership thus engendering capital market development (Izibili & Aiya, 2007).

The concept of deregulation is based on the neoliberal school of thought. It is based on the doctrine of competition and profit motive founded on free market pricing and freedom from the interfering hands of state regulation (Wikipedia, 2011). Deregulation according to this theory could reap the advantages of the market system and competition, namely; effectiveness, productivity, and efficient service. Privatization would thus, strengthen market forces with some degree of deregulation, economic liberalization, relaxation of wage and price controls (Ugorji, 1995). It is derived from the international capitalist imposition, especially the World Bank / IMF, which stipulated economic liberalization/privatization as pre-conditions for providing development loans to the less developed countries (LDCs). According to Ugorji (1995),

Privatization and deregulation has become an acceptable paradigm in the political economy of states. In Nigeria, this theory has not gone unchallenged as to its relevance to many Sub- Sahara African countries. From the view point expressed by Professor Aluko, the assumption of the inherent efficiency of the private sector should be questioned. He argued that

in Nigeria, much of private sector profits are not always the result of efficient operation and increased productivity but rather often represent money that private contractors make through inflated contracts, patronage and corruption. He argues that most of the richest people in Nigeria's private sector make their money, for the most part, through their public sector connections and influence. (Adeyemo, 2005) Those who have presided over the state have tended to personalize power and privatization collective national resources, while being excessively reckless in managing the affairs of the nation. As noted elsewhere, in Nigeria: The ruling class derived both its origin and wealth from the state, around which it gravitates, using every available means to secure power and access. Hence, in the competition and struggles for state power, especially in the period of economic crises. The state, thus, is projected as the critical variable in identity transformation, and the resurgence of identity politics (Jega, 2000).

### **Theoretical Underpinning of Optimum Petroleum Product Pricing**

A broad range of petroleum pricing policies exist across the world. Three basic forms of such fuel pricing are apparent: ad hoc pricing, formula-based automatic price adjustment, and liberalised markets. In most OECD countries, prices are market determined, though high excise taxes are usually levied on petroleum products. In developing countries that are net importers of oil, prices are in some cases fixed by the government or state-owned enterprises. Retail prices of petroleum products are also usually typically higher than in the absence of any taxes and government intervention. In net oil-exporting developing countries, governments maintain petroleum prices well below the free market level. The potential of liberalised systems lies in the high degree of depoliticization of prices and the elimination of direct budgetary impacts. Regardless of the question of price adjustment, the basic requirements for pricing still apply, such as real pricing (i.e. covering purchase costs), a contribution to road maintenance and (at least partial) reflection of external costs (resulting from accidents, emissions etc).

The price of crude petroleum is also subject to fluctuations just like those of other primary commodities like cocoa, coffee e.t.c. the country is not only a price taker but also an output taker as the output quota is collectively fixed by the OPEC secretariat, at Vienna Austria. However, various models and/or approaches have been adopted over the years in pricing petroleum products. These models bear on the following:

- I. The Wealth Maximizing Model:** This model was developed by Hotelling (1931). It was initially developed to deal with the economics of exhaustible resources. It posits that the aim of price and output decisions was the maximization of present value of oil assets. This explanation appeared in Nigeria in the 1970s, but short-lived and gone into extinction later in 1979/80.

- II. The Property Rights Model:** This model was proposed by Johnny-Mead. The model saw price increase of the early 1970s in terms of the transfer of oil fields from major oil companies to producer states, which have a lower time discount rate than the oil companies. Lower time discount rates, limited absorptive capacity and increasing risk of investments in western countries accounted for the limited supply of oil on the world-market by the producing countries. This leads to higher oil prices.
- III. The Target Revenue Model:** This model was developed by Teece (1982). It argues that OPEC member States produce oil to meet their budget needs. However, the weakness of the model is that member countries do not have uniform absorptive capacities as there are low absorbers (Southern Arabia, Kuwait and Libya), moderate absorbers (Iran, Iraq, Venezuela and Algeria) and high absorbers (Nigeria and Indonesia).
- IV. The Market Follower Model:** This model emphasizes that OPEC pricing decisions are largely dependent on the spot market prices. However, the direction of causality between the two is essentially an empirical matter.

In conclusion, it would be discerned that OPEC pricing policy on crude petroleum is ad-hoc, pragmatic and subject to negotiations leading to consensus among member states, the outcome which trickles down to cause domestic price adjustments of petroleum products in the member states' home economies (Osagie, 1984 and Agba, 2000).

### **Impact of Oil Sector Deregulation on Optimum Petroleum Pricing in Nigeria**

Various studies has been conducted by researchers across the world on deregulation and petroleum pricing and mixed results has found been found to that effect. Goto and McKenzie (2002) in their paper 'Price collusion and deregulation in the Japanese retail gasoline market' studied the effect of the deregulation of oil industry on the behavior of retail prices in Tokyo and Osaka (2004). According to them (ibid), in 1994 the Japanese government made it clear that by the end of March 1996 the law relating to the importation of some specified petroleum products (gasoline, kerosene, light oil) which restricts their importation to some certain number of companies will be abolished, the paper estimates model for the domestic retail price of gasoline based on game theory, focusing on forward looking behavior of oil firms in the two towns. Monthly data for the period 1990:11 to 1998:5 was used. The data was divided into two parts; the first half was the pre deregulation period 1990:11 to 1994:5 and the second half period was when the decision to deregulate was made effective from 1994:6 to 1998:5 and the findings were that; notwithstanding the deregulation total imports of the specified petroleum products relative to total production in the country remain very small, and total number of new importers of the said products also remain rather small, furthermore the wholesale price of the products has remained unchanged and yet at around the same time that the decision to deregulate the

importation and abolish the law that restrict the importation to some certain companies was made and announced to the public the retail prices of the products began to fall. It was concluded therefore, that this is consistent with the said game theoretic model which suggests that future changes in the economic environment will affect current price settings by firms if the firms are faced with competition in a repetitive game context.

In essence this theory has shown that expected future changes in the economic environment that exposes firms to competition through market deregulation do have an impact on the current pricing of their products which in the case of this study apply to petroleum products pricing.(Sani, 2014)

Similar findings were made by Clarke and Edwards (1998) using a simplified general equilibrium model on Japan. Their findings revealed that there was a 13.2% reduction in domestic oil price and a consequent rise in the consumption of oil products by 4.6% by final consumer and 17.8% by intermediate users like power stations. Furthermore, domestic oil refining increases by 8.4%. The findings also show that the real GDP rises by about 0.13% and a 0.70% rise in real wage.

Bello and Cavero (2008) conducted a study on the Spanish retail petroleum market which is the downstream sector of the Spain oil industry, and focus on the pattern of liberalization and competition since the deregulation of the market in 1992. According to them the Spain oil industry has been under strict government control from 1927 to 1984, the country's national oil company CAMPSA '*Compania Arrendataria del Monopolio de Petroleos S.A.*' held the concessionary right and conduct the exploration, production, refining and final distribution of petroleum products in the country. The period was characterised by low quality service, managerial, technical, scale and allocation inefficiencies this culminated into the decision to liberalize. However it was discovered that from the year 1992 when the liberalization policy brought about competition in the downstream sector there was significant rise in the number of service stations in the country from 4800 in 1992 to 8600 in 2005, furthermore this brought about structural changes in refining the products in the country.

The main finding of the study was that in only a few years the Spanish oil industry has moved from being a state monopoly condition to the condition of free market competition, which brought about retail market growth, development and modernization. It also gives the national oil company a good platform to compete with the new comers in the industry. Another important finding was that different prices were charged for different quality of products, and deregulation of refineries and retail outlets eases price competition in the final market.

## Brief Overview of Petroleum Products Pricing in Nigeria

Pricing is very critical in this country; it has a link with other sectors like Agriculture, Manufacturing, and Services etc. A change in price of petroleum products invariably means a change in these other sectors. The matter of appropriate pricing of petroleum has been reoccurring since the early 1970s. However, it came to the forefront with the Federal Government's introduction of an economic recovery programme, SAP, in 1986, on the advice of the IMF and the World Bank, underlining the external basis of the current crisis. A major thrust of SAP was the deregulation of goods and services in the economy. However, external pressures operated in consonance with the (internal) tendency of the operators of the states in Nigeria to make expenditure decisions independently of revenue realities, such that when permanently faced with the expenditure obligations exceeding available financial resources, the state strove to expand its financial base, inter-alia, through increasing the prices of petroleum products. This is the euphemism of subsidies withdrawal, or 'correct' 'appropriate' pricing (Ojoawo, 1998).

In October 1973, Nigeria adopted a policy of uniform pricing of petroleum products throughout the country. By 1984, there were already calls for 'selective and systematic de-control' of pump prices of petroleum products to completely remove subsidies on them. In January 1986, nine months before the formal launching of SAP, the price of petrol rose from 30k per liter to 39.5k. In April 1988, government further raised the price of petrol (PMS) by 6.3 percent to 42k. Similar increases were affected for other products like kerosene (DPK) and diesel (AGO). The reasons why government increase the price of petroleum products in Nigeria as enunciated by Ayodele and Falokun (2007) was to make more money available to the government for use in improving the quality of life of ordinary Nigerians.

The Nigeria Labour Congress (NLC) and other popular interests in the society opposed the price hikes. Before the 1988 increases, oil price subsidy was calculated at 80 percent, which was estimated to have cost the government, N6.8 billion annually. The increases were, therefore, expected to save the government about N4 billion, which still fell short of that year's financial gap of about N8.6 billion. In 1989, the government introduced a two-tier pricing system. Private vehicles paid 60k per litre while commercial vehicles paid 42k. This differentiation was in an effort to cushion the effect on ordinary people by avoiding a multiplier effect on the transport sector which would directly affect those people. With the failure of the system later that year, the prices were harmonized at 70k per litre. Table 1 shows other petroleum price movement in Nigeria over the years.

Table 1: Petroleum Products Price Movement in Nigeria

Year	PMS	DPK	HPFO	LPG (Diesel)	LPFO (Fuel Oil)
	(petrol)	(Household Kerosene)	(Aviation fuel oil)	N /Litre	N /Litre
	N /Litre	N /Litre	N /Litre		
1973	0.095	0.081	0.15	0.088	0.026
1975	0.1	0.081	0.18	0.1	0.026
1980	0.125	0.1	0.225	0.12	0.05
1983	0.15	0.1	0.3	0.15	0.1
1985	0.2	0.1	0.4	0.15	0.2
1988	0.42	0.1	0.8	0.3	0.3
1989	0.42	0.15	1	0.35	0.3
1990	0.6	0.4	1	0.5	0.4
1991	0.7	0.5	1.05	0.55	0.5
1992	0.7	0.5	1.05	0.6	0.55
1993	3.25	2.75	5	3	2.5
1994	11	6	7	9	7
1995	11	6	7	9	7
1996	11	6	7	9	7
1997	11	6	7	9	7
1998	11	6	7	9	7
1999	20	17	24.4	19	12.4
2000	22	17	30	21	12.4
2002	26	24	35	26	26
2003	26	26	24	85	28.5
2004	41	43	39	180	125
2005	69	48.5	64	210	180
2006	92	65	76	250	210

Source: Ayodele and Falokun (2007)

## METHODOLOGY

### Data Measurement and Sources

This study examines the relationship between deregulation of downstream oil sector and optimum petroleum pricing of the Nigerian economy. Times series data on unsubsidized petroleum price, custom and excise duties on petroleum, petroleum profit tax and crude oil production are obtained from the Nigerian National Petroleum Cooperation (NNPC) statistical bulletin and from the works of Ekine & Okidim (2013) and Adegbe & Fakie (2011).

## Method of Analysis

To examine the short run and the long run relationship between deregulation and optimum petroleum pricing, this study utilized the co-integration and Error-Correction Methodology (ECM). The cointegration approach provides information about the long run relationship between the variables while the Error-Correction Method (ECM) provides information about the short-run relationship between the variables. The error correction term provides information on the speed of adjustment from the short run disequilibrium to the long run equilibrium in the event of any deviations from the long run equilibrium.

## Model Specification

To examine the relationship between deregulation and optimum petroleum pricing in Nigeria, this study adopted the model framework of Sani (2014). The model is expressed as capturing deregulation by Price per unit of an imported product, which is the custom and excise duties (CED), petroleum profit tax (PPT) which is tax levied on profit proceeds of petroleum sales and Crude oil production; while proxy for optimum petroleum pricing is captured by Retail price per unit of a product, which the price for the unsubsidized Premium Motor Spirit(PMS):

$$PR = f(CED, PPT, COP) \text{-----1}$$

Where;

PR= Retail price per unit of a product, which the price for unsubsidized PMS proxy for optimum petroleum pricing

CED- Price per unit of an imported product proxied by custom and excise duties on petroleum products

PPT= Petroleum profit tax

COP= Crude oil production

Specifying equation one in an exponential form, we have;

$$PR = \lambda_0 CED^{\beta_1} PPT^{\beta_2} COP^{\beta_3} e^{\varepsilon_t} \text{-----2}$$

linearizing equation (2), we obtain;

$$\ln PR = \ln \lambda_0 + \beta_1 \ln CED + \beta_2 \ln PPT + \beta_3 \ln COP + \varepsilon_t \text{-----3}$$

$\lambda_0$ , is intercept,  $\beta_1$  &  $\beta_2$  are the slope of the coefficients of the independent variables to be determined where  $\varepsilon_t$  is the error term at time t. Equation (3) is the long run regression equation to obtain the long run relationship between the variables.

In order to estimate the short-run relationship among variables in equation (3), the corresponding error correction equation is estimated as follows:

$$\Delta \ln PR_t = \lambda_0 + \sum_{i=1}^m \beta_1 \Delta \ln CED_{t-i} + \sum_{i=1}^n \beta_2 \Delta \ln PPT_{t-i} + \sum_{i=1}^0 \beta_3 \Delta \ln COP_{t-i} + \alpha ECM_{t-1} + \varepsilon_t \quad \text{---4}$$

The  $ECM_{t-1}$  is the error correction term of the short run equation (equation 3)

## EMPIRICAL RESULTS AND DISCUSSION

### Unit Root Test

The study commenced its empirical analysis by testing the properties of the variables using the Augmented Dickey-Fuller (ADF). This is to find out if the relationship between economic variables is spurious or nonsensical.

Table 2: Summary of Unit Root Test Results

Variables	ADF Test Statistic(at first difference)	Order of Integration
<i>PR</i>	-4.633401(-4.532598)*	<i>I</i> (1)
<i>CED</i>	-5.219511(-4.532598)*	<i>I</i> (2)
<i>PPT</i>	-6.683998(-4.616209)*	<i>I</i> (1)
<i>COP</i>	-4.024880(-3.690814)**	<i>I</i> (1)

Note: Eview-7 output

From the table 2 above, we found that PR, PPT and COP were found stationary at first difference and at 1% level; and 5 % (for COP). However, the CED was stationary at second difference and at 1% level also. These variables (stationary variables) shall be used for further analysis in computing and analyzing of our results. The next specification test that shall be computed is the co-integration test of these variables.

### Co-integration Estimate

If two or more time series are not stationary, it is important to test whether there is a linear combination of them that is stationary. Economically, variables are cointegrated if they have a long term, or equilibrium relationship between them. It is a pretest to avoid spurious regression situations.

Table 3: Summary of Co-integration Estimates

Sample (adjusted): 1992 2013  
 Included observations: 19 after adjustments  
 Trend assumption: Linear deterministic trend  
 Series: PR CED PPT COP  
 Lags interval (in first differences): 1 to 1

## Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.856095	59.68660	47.85613	0.0027
At most 1	0.545929	22.85314	29.79707	0.2534
At most 2	0.335856	7.852623	15.49471	0.4813
At most 3	0.004032	0.076758	3.841466	0.7817

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

## Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.856095	36.83346	27.58434	0.0025
At most 1	0.545929	15.00052	21.13162	0.2889
At most 2	0.335856	7.775865	14.26460	0.4019
At most 3	0.004032	0.076758	3.841466	0.7817

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

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

From the co-integrated result above in table 3, the trace test indicates one cointegrating equation at 5% level. Also, the Max-eigenvalue test indicates one cointegrating equation at 5 %level. The model thus shows that there exists a long-run equilibrium relationships among the four variables used in the analysis. It shows that the variables move together in the long run.

## Model Estimation

The ECM result shows how the system adjusts to the long-run equilibrium implied by the co-integrating equation 3. A crucial question concerning the ECM is about the optimal lag for the right-hand-side variables. Hendry's (1987) methodology of "general-to-specific" was employed to eliminate all insignificant lags. Accordingly, this led to an initial estimation of an ECM with three lagged differences of the explanatory variables, a constant term and error correction term lagged one ( $ECM_{t-1}$ ). The dimensions of the parameter space were then reduced to a parsimonious ECM specification by using omitted and redundant variable test to exclude the statistically insignificant lags. The results of the reduced short-run dynamic deregulation-optimum petroleum pricing model are presented in table 4.

Table 4: Parsimonious Error Correction Model Result

Dependent Variable: D(PR)				
Method: Least Squares				
Sample (adjusted): 1986- 2013				
Included observations: 18 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.833770	2.750567	1.757372	0.1169
D(PR(-1))	0.597805	0.183274	3.261812	0.0115
D(PR(-2))	-0.687821	0.246556	-2.789709	0.0236
D(CED)	9.84E-05	6.39E-05	1.538515	0.1625
D(PPT)	-1.83E-05	4.53E-06	-4.040122	0.0037
D(PPT(-1))	7.84E-06	6.98E-06	1.123694	0.2937
D(PPT(-2))	-9.51E-06	6.36E-06	-1.496272	0.1730
D(COP)	5.19E-08	2.63E-08	1.975806	0.0836
D(COP(-1))	-5.55E-08	3.26E-08	-1.702649	0.1270
ECM(-1)	-0.803580	0.238473	-3.369692	0.0098
R-squared	0.936287	Mean dependent var	7.000000	
Adjusted R-squared	0.864611	S.D. dependent var	17.56668	
S.E. of regression	6.463709	Akaike info criterion	6.870464	
Sum squared resid	334.2362	Schwarz criterion	7.365115	
Log likelihood	-51.83418	Hannan-Quinn criter.	6.938670	
F-statistic	13.06265	Durbin-Watson stat	2.271322	
Prob(F-statistic)	0.000690			

As expected, the error-correction term ( $ECM_{t-1}$ ) is of the expected negative sign, significant and less than unity in the petroleum price function. This result substantiates the findings of cointegration among the variables reported earlier, but more importantly, it suggests that one cannot overlook the cointegrating relationship among variables in the model; otherwise this could introduce misspecification in the underlying dynamic structure. The absolute value of the coefficient of the error correction term indicates that about 80.3 percent of the disequilibrium in the petroleum pricing model is offset by short run adjustment within a year. In this case, the full adjustment is achieved, and takes twelve months to complete the cycles. Thus, to maintain a long-run equilibrium, it is important to reduce the existing disequilibrium overtime.

Moreso, the parsimonious model is free of serial correlation going by the value of the Durbin-Watson value of 2.27. The coefficient of determination (R-square) at 0.93, used to measure the goodness of fit of the estimated model, indicates that the model is reasonably fit in prediction, that is, the model explains about 93 percent of the petroleum pricing in Nigeria.

The parameter estimate for custom and excise duties (CED) of petroleum shows that it relates positively with petroleum pricing and it's statistically insignificant. It shows that with deregulation of the downstream oil sector, the amount of levies on importation of petroleum would hike the price of domestic sales of petroleum. This shows that, deregulation would discourage the importation of refined fuel and as such it would encourage foreign direct investment in the oil and gas sector. The higher the cost of importation of petroleum, the higher the domestic price of petroleum. The function thus shows that, 1 percent increase in the CED, hold other variables constant, will increase the PR by 9.84 percent.

The petroleum profit tax (PPT) variable was found to be significant in the current period, but in the first and second lags, they were found to be statistically insignificant.

In addition, the current value of PPT shows a negative relationship with petroleum pricing. The significance of PPT shows how effective deregulation would impact on petroleum price. The function thus shows that, a 1 percent change in the PPT would reduce PR by 1.83 percent.

The crude oil production at current period and lagged period were found to be statistically insignificant. This showed that the quantity of crude oil production in Nigeria has been far below the optimal capacity and has contributed positively to petroleum pricing increase over the years in Nigeria. The function thus shows that a 1percent change in crude oil production, leads to 5.19 percentage increase in the petroleum pricing. This result as captured here thus calls for urgent need of deregulating the oil sector via foreign direct investment to cover up for the short fall of crude oil produce.

## CONCLUSION AND RECOMMENDATION

The current state of the oil industry is judged as inefficient in service delivery and ineffective at ensuring optimal petroleum product pricing and overall growth of the economy. The rationale for restructuring the oil and gas sector in a petroleum dependent economy like Nigeria must be to enhance the sustainability of petroleum wealth and its impact on all sectors of the economy. This notwithstanding, such reforms or restructuring must not only focus on enhancing industry effectiveness and efficiency, it must be mindful of equity issues with respect to ensuring optimal pricing of petroleum products. In Nigeria, the focus of the reform should be for the oil and gas institutional structures and regulatory framework to maximize the economic benefits of petroleum resources, for the current and future generations. The policy should facilitate economic prosperity for an average citizen in Nigeria through petroleum price reduction. However, the caveat issue to keep in mind is that the petroleum downstream sector deregulation should produce efficiently, effectively and equitably, which could result in durable infrastructures and optimal petroleum pricing for sustainable development of the national economy. Further works could be carried out in the area of how to effectively manage a deregulated economy with a view of ensuring economic diversification away from oil.

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