

“THE IMPACT OF DOMESTIC PRICING OF PETROL ON ECONOMIC GROWTH OF NIGERIA (1970 – 2013)”

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(Received 21 April 2016; Revision Accepted 27 February 2017)

ABSTRACT

The study investigated the impact of Premium Motor Spirit (PMS) Price on the growth of Nigerian economy as well as the effect of gross domestic investment (GDI), labour employment (LEMP) and lending interest rate (LIR) between 1970 and 2013 on economic growth of Nigeria. The study focused on PMS pricing due to government foot dragging on the deregulation of PMS Price in Nigeria. For this study, secondary data were obtained from Statistical fact sheets of National Bureau of Statistics (NBS) and Central Bank of Nigeria (CBN) publications. Using the Error Correction Mechanism approach, the study reveals that increase in PMS Price had a negative significant impact on the Nigerian economy (Real GDP) at 5% level of significance. This indicates that 1% rise in PMS price of one year lag leads to 0.7% decrease in Real GDP. That is, increase in energy (PMS) price will negatively impact on the production of the firms, individuals (household) or Government Institutions, which will consequently lead to a fall in real GDP. GDI indicated a positive and significant impact on Real GDP at 5% level of significance, indicating that 1% rise in GDI of one year lag will lead to 8.5% rise in Real GDP. LEMP of one year lag showed a positive and significant impact on Real GDP at 5% level of significance, suggesting that 1% rise in LEMP will lead to 2% increase in Real GDP. Also, LIR of two and three-year lags indicated a negative and significant impact on Real GDP at 5% level of significance, implying that any percentage rise in LIR will lead to a corresponding percentage decrease in Real GDP. Based on the findings, the study concludes that PMS price, GDI, LEMP and LIR are drivers of RGDP in Nigeria.

Hence, the study recommends that government should reduce the PMS pump price by deregulating PMS and encourage the private sector to participate actively in the downstream of the petroleum sector in order to create competition in the sector, thereby tackling the continuous rise in PMS pump Price.

KEYWORDS: PMS pump Price, petroleum Product, Deregulation, Gross Domestic Product, Error Correction Model.

INTRODUCTION

Nigeria is like other nations where the domestic price of oil has been on the rising side ever since 1970s. The challenges in the downstream section of the nations' petroleum sector is a serious worry to most persons in the country. Experience has shown that adjustment in PMS pump price has been on the increase (upward trend) since 1970. Between 1970 and 1980 it increased from 3 kobo to 15 kobo, in 1981, it increased from 20 kobo to 70 kobo in

1990, in 1991 it also increased from 70 kobo to N22 in the year 2000. Also, it was adjusted upward in the year 2001 from N26 to N97 in 2013. Dike (2007) observed that in the past ten years, Nigeria as a nation has been adjusting the price of petroleum products upwardly with the aim of eliminating fuel consumption subsidy in accordance to the free market system. The rise in fuel price could be of great challenge to firms who depend more on fuel as an input to power the factory machines in their production process. This situation may affect the productivity of such

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firms that may be finding it hard to take care of their rising energy cost.

This incessant increase in fuel price and its attendant effects on the economy and Government foot dragging in full deregulation of the Premium Motor Spirit (PMS) informed the interest of the researcher in conducting this study. The study examined the impact of domestic pricing of petrol on economic growth of Nigeria, with a forty four years time frame (1970-2013). The study is divided into four sections which include; the introduction, review of literature, empirical model and methodology, conclusion and policy recommendations and references.

2 Literature review

Rasche and Tatom (1977, 1981) as well as Lardic and Mignon (2006), conducted a study on long-term link between price of oil and economic activity by employing Cobb-Douglas production function to appraise the effect of prices of energy on possible output for few European countries as well as Canada and United States of America (USA). They discovered that asymmetric co-integration exist between the prices of oil and GDP in the European countries and USA.

Abel and Bernanke (2001), observed in their study that there exist an interaction between prices of oil and GDP, through the classic supply-side effect which accepts that rising price of oil increases the cost of petroleum products. Relationship between oil pricing and GDP is widely studied; Hamilton (2005), discovered that increase in price of oil has an inverse impact on output. Burbidge and Harrison (1984), studied the short-run relationship between price of oil and the activity in the economy and identified a causative link between price of oil fluctuations and the rate of unemployment in USA, with causation moving from oil price fluctuations to unemployment rate.

Valadkhani and Mitchell (2001), assessed the effect of oil price variation on consumer goods and services between 1996 and 1997 in Australian economy. The study found that the effect of increase in oil prices on the economy of Australia between 1996 and 1997 has been on the increase. The result also indicated that the poor expend a greater part of their entire consumption expenses on basic goods than the rich. The poor spend on kerosene, heating oil, lubricants, diesel fuel, other oils, meat, food products, dairy products, Liquefied Petroleum Gas (LPG) as well as other gas fuels. The rise in petroleum prices is

comparatively higher than other products that are less in demand. Hence, it can be said that rise in price of petroleum products impact negatively on both the producers and consumers.

Observed by Jones and Paik (2004), among others, there is an existence of several transmission channels through which price of oil could affect the activities in the economy. Any increase in crude oil price is transferred to the price of PMS (Premium Motor Spirit), consequently consumers and firms experience increase in their energy bill. Generally, any increase in the price of energy results to a decrease in productivity that is transferred to real wages which affects labour employment. François and Mignon (2008), carried out a study on the effect of price of oil on the economy to investigate the interaction between prices of oil and some macroeconomic variables for several countries, comprising of oil-importing as well as oil-exporting countries. The study considered GDP, household consumption, CPI and unemployment rate as well as share prices. The results indicated the presence of interactions between prices of oil and macro-economic variables. In particular, there is short run linkage between oil and share prices. Also long-term interaction was discovered with the causation running from the prices of oil to the macroeconomic variables.

Kojima (2013), in his study of Petroleum Product Pricing and Complementary Policies: Experience of 65 Under-developed Countries, discovered that since 2009, there have been policy reversals by governments in order to keep up with world oil price increases. The economic difficulties have been compounded by rising food prices. Between January 2004, when world oil prices began to soar, and January 2013, energy and food prices on the world market rose and fell in tandem, with a correlation coefficient of 0.89. In countries with high experience of petroleum price rise, public protests were often against high fuel and food prices. Some governments, such as Egypt and the Islamic Republic of Iran, resorted to growing fuel subsidy as well as rising food subsidy.

Ayadi (2005), explored the interaction between price of oil variations and economic development in Nigeria. The study revealed that the volatile nature of the output in the oil industry can be seen through the influence of oil price on the exchange rate. The study thus, concludes in his words "the discovery, of oil has been a curse rather than a blessing". Aliyu (2009), examined the effect of oil price shock as well as real

exchange rate volatility on the real GDP of Nigerian economy. The outcome of the long-term analysis shows that a 10 percent increase in the prices of crude oil will move the real GDP upward by 7.72 per cent, likewise a 10 percent rise in exchange rate leads to a rise in GDP by 0.35 per cent. Edame, Effiong, Adaba, and Uwoghiren (2014), in their study of the relationship between energy pricing and finance as well as investment discovered that energy price has a positive influence on investment as well as finance.

Thus, there exist a link between international oil price and domestic price of petrol in petrol-import dependent countries like Nigeria. Since the cost of crude oil is part of the cost element included in the production of petrol. Petrol exporting countries would factor in the price (cost) at which they bought crude oil at the international market into the price of the refined product (petrol) to be exported. This suggests that any change in international price of oil will affect the international price of petrol and consequently affect the domestic price of petrol for petrol-import dependent countries like Nigeria. The link between international and domestic price of petrol can also be observed in the PPPRA (Petroleum Product Price Regulatory Agency) template cost element of 2006, 2007 and 2008, which is anchored on the importation of petrol. This implies that change in international price of petrol will eventually lead to a change in its domestic price. The PPPRA template showed that in December of 2006, 2007 and 2008, the product costs (international price of petrol) measured in dollar per metric ton (\$/Mt.) were 552.00, 819.47 and 330.96 respectively while its expected domestic prices measured in Naira per litre (N/Lit.) in December of the same years above were 68.43, 95.23 and 54.53 respectively, showing a direct relationship between international and domestic price of petrol. This indicates that international price of petrol which is one of the cost element included in the domestic pricing of petrol as is evidenced in the PPPRA template influences domestic price of petrol.

Some analysts such as Antai (2008) and Ajumogobia (2008), have concluded that the misery of the Nigerian state with oil is associated with internal factors. These factors have been identified to include, irregularities in the maintenance of petroleum refineries, poor governance, corruption, gross mismanagement and inefficiency in the management and pricing of the nation’s petroleum products. One of the major strategic options considered by

government in tackling the problems in this sector is to deregulate the downstream sector.

Hence this study investigates the impact of domestic pricing of petrol on economic growth of Nigeria. The study provides additional suggestions that will guide the pending policy on deregulation of petroleum prices in Nigeria.

3 Methodology and empirical modelling

The ex-post facto design used employed econometric techniques of unit root and cointegration test as well as error correction mechanism as the main analytical tools. The unit root test was adopted to ascertain the stationarity condition of the variables in the model. The cointegration test was employed to examine the long run relationship between the variables in the model and thereafter the model was estimated in the contest of error correction mechanism (ECM) to correct for any short run disequilibrium.

The model in this study is anchored on the endogenous growth theory. Rebelo (1991) and Barry (1996), modified the endogenous growth model such that consumable commodity segment of the economy uses energy as an input including capital. Also, Van and Yetkiner (2003), in their study employed the same model by using energy as an input in the intermediate goods sector.

Hence, adopting Rebelo (1991) and Barry (1996) modified endogenous growth model, with a simple production function:

$$y = f(K, L, E) \dots\dots\dots 1$$

Y = output
K = Capital
L = Labour

K is total capital. Capital herein includes physical capital and human capital.

The model for this study is therefore specified thus;

$$RGDP = f(LEMP, LIR, GDI, PMSP) \dots\dots\dots 2$$

where:

RGDP = Real gross domestic product (to capture output “y”). RGDP (dependent variable in this study) which is the monetary value of the entire finished goods and service produced within a country’s borders in a year and is measured at market price. Real gross domestic product accounts for changes that may have occurred as a result of inflation. That is real GDP is a nominal

GDP adjusted for inflation, which is calculated as nominal GDP divided by GDP deflator/inflation multiplied by 100. Real GDP is employed to determine economic activity/performance of any country and its economic apriori expectation is positive. According to the neoclassical growth theory, it believes that output growth happens via three factors such as rise in labour, savings and investment as well as enhanced technological level.

LEMP = Labour employment (L). This is a factor of production deployed in the production of goods and services to create output. It's economic apriori expectation is positive since it is expected to boost output (RGDP) based on the neoclassical growth theory.

LIR = Lending interest rate (to capture cost of capital –'K'). This is the rate at which financial institution lend money to their customers. The economic apriori expectation is negative since any rise will lead to a discouragement to borrow for any productive investment given the rise in the cost of capital according to neoclassical growth theory.

GDI = Gross domestic investment (proxy by gross fixed capital formation). This is the estimation of physical investment employed in calculating GDP when measuring nations' economic activity. This is a vital element of GDP since it gives a signal of the prospective productive economic capacity. Fixed capital formation which GDI is proxied by, is referred to a process of a firm raising it's stock of fixed capital. Fixed capital are assets employed in the production process which firms hold for more than one year. It excludes current raw materials used in the production process. According to neoclassical growth theory, increase in

investment leads to growth in the economy hence the economic apriori expectation is positive.

PMSP = Premium motor spirit price, also known as petrol is a complex mixture of hydrocarbons, volatile in nature, gotten from the refining of crude oil. PMS is mostly used as fuel for light road vehicles, to power machines in the factories for production, etc. It's economic apriori expectation is negative since any increase in it's price will discourage production in terms of increase in the cost of input in production, according to classical supply-side theory.

Incorporating the variables into the Cobb-douglas production function, we have:

$$Y = AL^a K^{1-a} \dots\dots\dots 3$$

Where A is a vector of control variables.

To include a vector of LIR and PMS, then

$$RGDP = \beta_0 L^{\beta_1} K^{\beta_2} LIR^{\beta_3} PMSP^{\beta_4} \dots\dots\dots 4$$

Replacing L with LEMP and K with and GDI, we have;

$$RGDP = \beta_0 LEMP^{\beta_1} GDI^{\beta_2} LIR^{\beta_3} PMSP^{\beta_4} \dots\dots 5$$

Equation (3.5) is specified in a log-linear econometric form as:

$$\ln RGDP = \log\beta_0 + \beta_1 \ln LEMP + \beta_2 \ln GDI + \beta_3 \ln LIR + \beta_4 \ln PMSP + ut \dots\dots\dots 6$$

where: $\log\beta_0 = \beta_0^*$
 $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4$ = parameters of the model.

Ut = error term
 Apriori $\beta_0^* > 0, \beta_1 > 0, \beta_2 > 0, \beta_3 < 0, \beta_4 < 0$

4. EMPIRICAL RESULTS

4.1 Unit root tests

Table 1: Unit root using Phillips-peron test

Variables	Phillips-Peron (PP) Statistics		
	Level	1 st Difference	Order of Integration
RGDP	2.284	-4.981	I(0)
GDI	-1.974	-4.723	I(0)
LEMP	-1.446	-6.579	I(0)
PMSP	-0.437	-9.183	I(1)
LIR	-1.821	-7.284	I(0)

Source: Author's Computation

The time series characteristics of each of the series is presented in Table 1 above, using the P–P tests at both level and first difference of the series. The results presented in Table 1

above shows that all the variables are integrated at level except Premium Motor Spirit (PMS) which is at first difference.

4.2 Cointegration test result

Table 2: Cointegration result

Trace Test				Maximum Eigenvalues Test			
k = 2				k = 2			
Ho	H _A	(λ trace)	Critical values (5%)	Ho	H _A	(λ Max)	Critical values (5%)
r ≤ 0	r > 0	95.09017*	69.81889	r ≤ 0	r > 0	39.91652*	33.87687
r ≤ 1	r > 1	55.17365*	47.85613	r ≤ 1	r > 1	26.74687	27.58434
r ≤ 2	r > 2	28.42679	29.79707	r ≤ 2	r > 2	17.11194	21.13162
r ≤ 3	r > 3	11.31484	15.49471	r ≤ 3	r > 3	11.21848	14.26460
r ≤ 4	r > 4	0.096362	3.841466	r ≤ 4	r > 4	0.096362	3.841466

Source: Authors computation

r represents number of cointegrating vectors and k represents the number of lags in the unrestricted VAR model. *denotes rejection of the null hypothesis at the 5% level.

Based on the cointegration test results in Table 2, the trace statistic shows that there exists two cointegrating equations at five percent level of significance. According to the results, the trace statistic values of 95.09017 and 55.17365 are greater than the critical values of 69.81889 and 47.85613 respectively. Also, following the cointegration test based on maximum Eigen value, there exists one cointegrating equation at five percent level of significance. The maximum

Eigen value of 39.91652 is greater than it's critical value of 33.87687. Thus, it reaffirms that there exists a long run equilibrium relationship between the variables of the model.

The cointegration results show that the null hypothesis of no cointegration among the variables could be rejected. On the ground that the variables are co-integrated, there is, thus, a long term interaction amongst the variables. It also implies that the study can progress to the estimation of the short run dynamics using Error Correction Mechanism (ECM). The result of error correction mechanism is presented in Tables 3.

4.3 Error-correction modeling

Table 3: Parsimonious Result for Error correction model predicting RGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.191250	0.014780	5.192516	0.0000
D(RGDP(-1))	0.743493	0.354437	0.020977	0.9852
D(GDI(-1))	0.085466	0.034135	3.201760	0.0138
D(LEMP(-1))	0.020295	0.101679	1.796810	0.0119
D(LIR(-1))	-0.010610	0.002017	-1.140935	0.1451
D(PMSP(-1))	-0.007155	0.002105	-2.099049	0.0106
D(GDI(-2))	0.170512	0.038069	3.091790	0.0010
D(LEMP(-2))	0.185061	0.201039	1.501327	0.1059
D(LIR(-2))	-0.005790	0.002417	-1.865102	0.0753
D(PMSP(-2))	-0.005019	0.003137	-2.110418	0.0509
D(LIR(-3))	-0.018041	0.004017	-2.175100	0.0201
ECT(-1)	-0.590018	0.106062	-4.758815	0.0000
R-squared	0.591011			
Adjusted R-squared	0.431143			
F-statistic	3.412918			
Durbin-Watson stat	2.331016			

Critical values:

- (a) T-statistic, $T_{0.025} = 2.0345$
- (a) T-statistic, $T_{0.05} = 1.6924$
- (b) F-statistic, $F_{0.05} = 2.133$

Source: Author's computation based on E-views result in Appendices

The Error Correction Mechanism (ECM) is assessed with respect to the dependent variable Real GDP (RGDP). The error correction term indicates that there is convergence to equilibrium.

The parsimonious results presented in Table 3 are evaluated based on the economic criteria, statistical criteria and the econometric criteria.

The one year lag coefficient of the error correction term has the correct negative sign which satisfies the a priori criteria. The estimated coefficient of the error correction term (ECM) is -0.590018. This implies that in one year, deviations in real GDP levels adjust by 59 percent of the past year's deviations from equilibrium. This is vital for sustaining long term equilibrium to adjust the current disequilibrium over time. The estimated coefficient is statistically significant at five percent level of significance. The coefficient of determination for the model indicates that 59 percent of the variations in the

current level of real GDP in Nigeria are explained by changes in the explanatory variables (i.e., labour employment, lending interest rate, gross domestic investment, premium motor spirit price). However, the adjusted R-squared which is a more robust measure, indicates that 43 percent of the changes in the current level of real GDP is accounted for by the explanatory variables. This implies that 57 percent of the variations in the current level of real GDP are explained by other variables not incorporated in the model. The estimated value of F-statistic which is 3.412918 is greater than the critical value which is 2.133 at five percent level of significance. This means that the entire estimated model is statistically significant.

The estimated value of Durbin-watson statistic of 2.331016 shows that there is no evidence of first-order positive autocorrelation.

The t-statistic of 0.020977 indicates that the Real GDP one year lag is statistically insignificant at five percent level of significance.

We also, observed that the labour employment (LEMP) of one and two-year lags have positive sign respectively which is consistent with economic a priori expectation. The results show that the labour employment of one year lag with t-statistic of 1.7968610 is statistically significant while its' two-year lag with t-statistic of 1.501327 is statistically insignificant at five percent level of significance. This implies that one percent increase in labour employment of one year lag will lead to 2 percent increase in real GDP in Nigeria. Also, it is observed that gross domestic investment (GDI) of one and two-year lags have positive sign respectively which is consistent with economic a priori expectation. This implies that one percent increase in GDI of one year lag will lead to 8.5 per cent increase in real GDP in Nigeria. The t-statistic shows that the GDI of one year and two-year lag are statistically significant at five percent level of significance given their t-statistic of 3.201760 and 3.091790 respectively. This implies that real GDP in Nigeria is driven positively by GDI even up to a two-year lag.

Furthermore, the results showed that the coefficient of prime lending rate or lending interest rate (LIR) of one, two and three-year lags have negative sign respectively. This is consistent with economic expectations. It indicates that any percent increase in lending interest rate will lead to a specify percent decrease in real GDP in Nigeria as a result of a consequential decrease in the level of investment. However, lending interest rate (LIR) of one year lag with t-statistics of 1.140935 is statistically insignificant, while the lending interest rate (LIR) of two and three-year lags with t-statistics of 1.865102 and 2.175100 respectively are statistically significant. By this, it implies that lending interest rate of two and three-year lags respectively drives real GDP in Nigeria.

The result further indicated that premium motor spirit price (PMSP) coefficient of one and two-year lags have negative sign respectively, which is consistent with economic expectation. This implies that one percent rise in PMS price of one year lag will lead to 0.7 per cent decrease in real GDP due to increased cost of production for the firms, individuals (household) or government institutions, which will eventually lead to a fall in output and consequently a fall in real GDP.

CONCLUSION AND POLICY IMPLICATIONS

Specifically, this study examined the impact of domestic price of PMS on the growth of

the economy (real GDP) as well as the effects of labour employment, GDI, and lending interest rate on real GDP. In order to achieve the above, the study adopted an error correction mechanism approach. The empirical results showed that there exist a significant relationship between the price of PMS and RGDP, between GDI and RGDP, between LEMP and RGDP as well as between LIR and RGDP, with 43 percent variations in the RGDP explained by the model. The study, thus, indicates that PMS price, GDI, LEMP and LIR are drivers of RGDP in Nigeria.

These findings and conclusions suggest the need for government to reduce PMS price by deregulating the downstream sector and at the same time encouraging private company participation in crude oil refining in order to encourage competition thereby bringing down the price of PMS. Equally, Government should boost investment by encouraging local and foreign investments in Nigeria through the provision of desired infrastructural facilities. Government to reduce the LIR through the Central Bank of Nigeria (CBN) monetary policy as it will lead to an increase in RGDP by encouraging private sector borrowing to invest in the petroleum downstream sector which is capital intensive, this will create employment and increase output (RGDP).

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