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The Effect of Gasoline Price on Economic Sectors in Nigeria

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ABSTRACT: This paper examined the long-run and short-run relationship between gasoline price and sectoral output in Nigeria for the period from 1980 to 2010. Six sectors (agriculture; manufacturing; building and construction; wholesale and retail; transportation and communication) of the economy were examined. The long run regression estimate showed that gasoline price is a significant determinant output in all sectors examined with exception to the building and construction sector while the short run error correction estimate revealed that only output of the agriculture and the manufacturing sectors of the Nigerian economy is affect by gasoline price increase in the short run. The study recommended among others the need for the government to ensure adequate power supply in order to reduce the over reliance of economics sectors on gasoline as a prime source of power.

Keywords: Gasoline Price; Sectoral Output; Error-Correction Method; Nigeria.
JEL Classifications: Q43

1. Introduction

It is no gain to say that the Nigeria economy is beleaguered with epileptic power supply and this has constitute a major bottleneck to smooth productive activity across various sectors of the Nigerian economy. To meet local demand for energy, firms have relied heavily on the consumption of gasoline to power their numerous production plants. With such heavy reliance on gasoline as an input in the production process, a significant proportion of firms earning which otherwise would have been channelled into investment is used to meet energy shortage in the form of demand for gasoline. Therefore, such extensive use of gasoline makes the various sectors of the economy prone to unexpected price increase in gasoline. In Nigeria, gasoline price have been adjusted upward abruptly by different political administration over the years since the early 1970s to date. Such upward oil price review at various times has witnessed the outcry of producers and owners of business firms on its implication on production cost and output. Consequently, intense debates and articles on the media have also been frequent on the possible adverse impact of such oil price reviews on firms production cost and output of different sectors of the economy. Analysing the effect of gasoline price on sectoral output rather than on aggregate output (Gross Domestic Product (GDP)) is pertinent because the effect of changes in gasoline price on aggregate output may be the weighted total of the effects on sectoral output, and simply analysing aggregate analysis will ignore the individual response of sectoral output to changes in gasoline price. Indigenous studies in this regard (reviewed herein) such as Ehinomen and Adeleke (2012), Nwosa (2012), Arinze (2011), Aigbedion and Iyayi (2007) among others have equally neglected this issue in their analysis. Thus, this is study seeks to fill this empirical gap in literature by examining the effect of gasoline price on the various sectors of the Nigerian economy for the period 1980 to 2010.

This paper is divided into five sections, section one is the introduction while section two deals with a review of literature. Section three focused on the research methodology while section four focused on the analysis and interpretation empirical results. The conclusion and recommendations for policy makers is the main focus of section five.

2. Literature Review

Ehinomen and Adeleke (2012) assessed the distribution of petroleum products in Nigeria, covering the period 1960 to 2007. The authors shared the view that the distribution of petroleum products in the Nigerian economy is fraught with complex problems resulting sometimes in petroleum products outages, inflated prices of products and contentions on the pump price of products. The authors recommended that the downstream activities of the oil industry be completely deregulated to allow private sector and entrepreneurs' full participation in the distribution of the products. It was hypothesized that the participation of entrepreneurs will drive effectiveness in the sector. Effectiveness will bring about reduced operational cost with a consequent reduction in the price of petroleum products for the benefit of all the stakeholders in the industry.

Nwosa (2012) examined empirically a one-to-one nexus between domestic fuel price and various macroeconomic variables in Nigeria for the period spanning 1986 to 2011. The study adopted both a vector auto-regressive (VAR) and a vector error correction (VEC) models for appropriate analysis. For pairs of variables that are integrated of the same order but not co-integrated, the VAR model revealed that a unidirectional causation exist from domestic fuel price to short term interest rate while for the pair of variables that are integrated of the same order and are co-integrated the VEC model revealed the existence of causality from domestic fuel price to inflation rate in the long run and in the short run. The study recommended that serious caution should be taking by the government on domestic fuel price increase especially in an attempt to remove fuel subsidy and deregulate the downstream sector of the oil industry.

Arinze (2011) examined the impact of oil price on the Nigerian economy. Specifically, the study analysed the effect of change in petroleum product prices (that is petrol) on inflation rate between 1990 and 2007. Using a simple ordinary least square regression method, the study found that increases in petroleum prices leads to an increase in inflation rate. Thus, the study recommended that more resources should be tapped to diversify the economy.

Hui-Siang et al., (2011) examined the relationship between domestic petrol price and the ten major economic sectors in Malaysia, using quarterly data for the period 1990:Q1 to 2007:Q4. The study utilised a vector error correction model and it was found that: first, out of 10 economic sectors, only the agriculture sector, trade sector and other services sectors have a co-movement with fuel prices. Second, the significant coefficient for error correction term (ect) in the sectoral equations showed that fuel price is the leading variable for these three economic sectors in the long run. Third, through the standard Granger causality test, unidirectional causality running from mining sector to fuel price was discovered. Lastly, using the generalized variance decomposition (GVDCs), it was established that the fuel price is able to influence some of these sectors over a longer period.

Edelstein and Kilian (2007) examined the effect of retail energy prices on consumer expenditure in the United States economy using monthly data for the period 1978:1 to 2006:5. The paper utilised the vector autoregressive model and concluded that in the absence of a major disruption in spending by consumers and firms, the effects of energy price shocks on the economy will be small. The paper also found that despite the evidence of changing expenditure patterns based on a detailed analysis of more than 130 expenditure items, there is no compelling evidence for an allocative effect on consumer spending, aggregate unemployment, or consumer expectations. The absence of such an effect, despite a comparatively large effect of energy price shocks on the consumption of new domestically produced automobiles, was consistent with the small share of the U.S. auto-industry in real domestic GDP and employment. It was also consistent with the symmetric behaviour of real consumption in 1979 (when energy prices rose sharply) and in 1986 (when they fell equally sharply).

Aigbedion and Iyayi (2007) in a historical review on the diversification of the Nigeria's petroleum industry covering the periods between 1970 and 2000 shared the view that the petroleum industry in Nigeria has brought unprecedented changes to the Nigerian economy, particularly in the past five decades when it replaced agriculture as the cornerstone of the Nigeria economy. According to the study, the oil industry has risen to the commanding heights of the Nigerian economy, contributing the lion share to gross domestic product and accounting for the bulk of federal government revenue and foreign exchange earnings since early 1970. However, the study noted that Nigeria's considerable endowment in fossil fuel has not translated into an enviable economic performance; rather, the nation's mono-cultural has assumed a precarious dimension in the past decades susceptible to the vagaries of the international oil markets. The study further noted that, Nigeria's extreme reliance on the crude oil market has triggered structural difficulties for the economy, as earnings from crude oil fluctuate along with market trends which are exacerbated by the country's neglect of other productive sectors of the economy. This negative trend has persisted despite various economic reforms embraced by successive Nigerian governments since 1980. Based on the review, the study recommended that the country should deepen its economic reform initiatives to include effective diversification of the petroleum sector. Diversification of the economy should also extend beyond the petroleum sector so that the country can become a major force in the emergent global economic order of the 21st century. The study also recommended that policymakers should develop the nation's vast resources in the agricultural and solid mineral sectors for the global markets and reap the benefits that accompany economic diversification.

As argued in the introductory section, it is apparent from the above review that there has been neglect among the previous studies on effect of gasoline (that is, petrol) price on output of the various sectors of the Nigerian economy. This study therefore fills this gap in literature by examining the effect of gasoline price on sectoral output in Nigeria.

3. Research Methodology

3.1 Data Measurement and Sources

This study examines the relationship between gasoline price and output growth of the various sectors of the Nigerian economy. Data on gasoline price (that is petrol) is obtained from the Nigerian National Petroleum Cooperation (NNPC) statistical bulletin. Outputs of the five key sectors of the Nigerian economy namely; agriculture (AGR), manufacturing (MAN), building and construction (BOC), wholesale and retail (WOR) and the service (SER) are utilized. However, with respect to the service sector, emphasis is placed on the road transport (TRAS), and communications (COM) sub-sectors. Data on these sectors are obtained from the Central Bank of Nigeria (CBN) statistical bulletin 2010 edition. Also, data on capital stock (measured by the gross fixed capital formation) and labour force (measured by the total labour force) are obtained from the World Development Indicator (WDI). All variables are transformed into logarithms form.

3.2 Method of Analysis

To examine the short run and the long run relationship between gasoline price and sectoral output, this study utilized the co-integration and Error-Correction Methodology (ECM). The co-integration 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.

3.3 Model Specification

To examine the relationship between gasoline price and sectoral output, this study adopted the multifactor neoclassical production function framework proposed by Ghali and El-Sakka (2004). The model is expressed as:

$$InY_{ti} = f\{In(K_t, L_t, EC_t)\} \quad (1)$$

where: Y = output; i = the various sectors (agriculture; manufacturing; building and construction; wholesale and retail; transportation and communication); L = labour *(LAB)*; K = capital *(CAP)*; and EC = Energy Consumption and subscript "t" refers to current time. In this study energy consumption is represented by gasoline price (lgas). Thus, re-writing equation (1), we obtain:

$$InY_{ti} = f\{In(CAP_t, LAB_t, GAS_t)\} \quad (2)$$

linearizing equation (2), we obtain:

$$InY_{ti} = \alpha_0 + \alpha_1 InCAP_t + \alpha_2 InLAB_t + \alpha_3 InGAS_t + \varepsilon_t \quad (3)$$

α_0, is intercept, α_1 to α_3 are the slope of the coefficients of the independent variables to be determined where ε_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:

$$\Delta InY_t = \alpha_0 + \sum_{i=1}^{n} \alpha_1 \Delta InY_{t-i} + \sum_{i=1}^{n} \alpha_2 \Delta InCAP_{t-i} + \sum_{i=1}^{n} \alpha_3 \Delta InLAB_{t-i} + \sum_{i=1}^{n} \alpha_4 \Delta InGAS_{t-i}$$

$$+\psi ECT_{t-1} + \varepsilon_t \qquad (4)$$

The ECT_{t-1} is the error correction term of the short run equation.

4. Empirical Results

4.1 Unit Root Test

This study commenced it empirical analysis by testing the properties of the variables using the Augmented Dickey-Fuller (ADF) and the Philip-Perron tests. From table 1, using the ADF test on the left hand of the table, it is observed that the variables; gasoline (lgas), capital formation (lcap), labour force (lab), building and construction (lboc) and communication (lcom) are integrated of order one while agriculture (lagr), wholesale and retail (lwor) and transport (ltrn) are integrated of order zero. With respect to variable lman, the ADF and PP tests give conflicting results on the order of integration. The ADF test indicated that the variable (lman) is integrated of order two while the PP test showed it to be integrated of order zero. However, for the purpose of this study, the variable lman, would be treated as an I(0) variable, in line with the Phillips-Perron estimate. With respect to other variables, the finding of the ADF test is confirmed with that of the Phillip-Perron result on the other column (right hand) of table 1.

Table 1. Unit Root Test Results

Augmented Dickey-Fuller (ADF) Test				**Phillip-Perron (PP) Test**		
Variables	Level	1st / 2nd Diff	Status	Level	1st /2nd Diff	Status
Lgas	-0.7684	-4.1708*	I(1)	-0.7640	-4.0267*	I(1)
Lcap	-2.2973	-5.0361*	I(1)	-2.3533	-5.0315*	I(1)
Llab	-0.2927	-6.7909*	I(1)	1.0817	-7.0058*	I(1)
Lagr	-4.7868*	-	I(0)	-4.2074	-	I(0)
Lman	-1.1089	-13.1683*	I(2)	-4.0492*	-	I(0)
Lboc	-1.0251	-9.8655*	I(1)	-1.1104	-7.7208*	I(1)
Lwor	-3.0794**	-	I(0)	-2.9843**	-	I(0)
Lcom	0.3084	-6.1288*	I(1)	0.3233	-5.9674*	I(1)
Ltrn	-3.5273**	-	I(0)	-3.5204**	-	I(0)

Note: *=1% and **=5% significance level.

4.2 Co-integration Estimate

Using the co-integration estimate in table 2 below, it is observed that in agricultural output model (that is model I involving *lagr, lgas, lcap and llab*), the trace statistic and the maximum-eigen statistics gave conflicting results. The trace statistics showed the existence of two co-integrating equations while the maximum-eigen statistics showed no evidence of co-integration among the variables in the model. For the purpose of this study and with respect to the agricultural model, the co-integration estimate by the trace statistic is adopted. This implies that there exist two co-integrating equations in the model and suggests the existence of a long run relationship among the variables in the model. With respect to the manufacturing model (that is model II involving *lman, lgas, lcap and llab*), the trace statistic and the maximum-eigen statistic also gave conflicting results. The trace statistics showed the existence of one co-integrating equation while the maximum-eigen statistics showed no evidence of co-integration among the variables in the model. For the purpose of this study and with respect to the manufacturing model, the co-integration estimate by the trace statistic is adopted. This suggests the existence of a long run relationship among the variables in the manufacturing model. From the building and construction model (that is model III involving *lboc, lgas, lcap and llab*), it is revealed that the null hypothesis of no co-integration, for r=0 was rejected by the trace statistic and the maximum-eigen statistic. The statistic values of both the trace and maximum-eigenvalue statistic were greater than their critical values at r=0. The null hypothesis of no co-integration, for $r \leq 1$ was rejected by trace statistics but not by the maximum eigen-value statistics. The statistical value of the trace statistics at r≤1 was greater than its critical value while the maximum eigen-value statistics at r≤1 was less than its critical value. However, the null hypothesis of no co-integration at r≤2 could not be rejected by the trace statistics because its value was less than the critical value. This result therefore indicates that there is one co-integrating equation by the maximum eigen-value statistics while the trace statistics indicated two co-integrating equations at five percent. The implication of this is that there is the possibility of a long run relationship among the variables in the manufacturing model.

With respect to models IV and V (that is, wholesale and retail and transport models), it is revealed that the null hypothesis of no co-integration, for r=0 was rejected by the trace statistic and the maximum-eigen statistic. The statistic values of both the trace and maximum-eigen value statistic were greater than their critical values at r=0. However, the null hypothesis of no co-integration at r≤1 could not be rejected by both the trace statistics and the maximum eigen-value statistic because their statistic values were less than their critical values. This result therefore indicates that there is one co-integrating equation by the maximum eigen-value statistics and the trace statistics. The implication of this is that there is the possibility of a long run relationship among the variables in the wholesale and retail model as well as in the transport model. Finally, model VI (that is, communication model), revealed that the null hypothesis of no co-integration, for r=0 and r≤1 was rejected by the trace statistic and the maximum-eigen statistic. The statistic values of both the trace and maximum-eigen value statistic were greater than their critical values at r=0 and r≤1. However, the null hypothesis of no co-integration at r≤2 could not be rejected by both the trace statistics and the maximum eigen-value statistic because their statistic values were less than their critical values. This result therefore indicates that there are two co-integrating equations by the maximum eigen-value statistics and the trace statistics. The implication of this is that there is the possibility of a long run relationship among the variables in the communication model.

Table 2. Summary of the Co-integration Estimates

	Trace Test				Maximum Eigen value Test			
	Null	alternative	Statistics	95% critical values	Null	alternative	Statistics	95% critical values
Model I	r=0	r≥1	58.407	47.856	r=0	r=1	26.626	27.583
	r≤1	r≥2	31.781	29.797	r≤1	r=2	18.648	21.132
	r≤2	r≥3	13.133	15.495	r≤2	r=3	12.203	14.265
Model II	r=0	r≥1	53.198	47.856	r=0	r=1	24.823	27.583
	r≤1	r≥2	28.373	29.797	r≤1	r=2	18.104	21.132
	r≤2	r≥3	10.269	15.495	r≤2	r=3	10.113	14.265
Model III	r=0	r≥1	66.301	47.856	r=0	r=1	36.115	27.583
	r≤1	r≥2	30.186	29.797	r≤1	r=2	15.658	21.132
	r≤2	r≥3	14.527	15.495	r≤2	r=3	11.902	14.265
Model IV	r=0	r≥1	57.861	47.856	r=0	r=1	30.292	27.583
	r≤1	r≥2	27.569	29.797	r≤1	r=2	15.256	21.132
	r≤2	r≥3	12.313	15.495	r≤2	r=3	11.094	14.265
Model V	r=0	r≥1	56.913	47.856	r=0	r=1	30.465	27.583
	r≤1	r≥2	26.448	29.797	r≤1	r=2	14.217	21.132
	r≤2	r≥3	12.231	15.495	r≤2	r=3	11.411	14.265
Model VI	r=0	r≥1	77.046	47.856	r=0	r=1	41.665	27.583
	r≤1	r≥2	35.381	29.797	r≤1	r=2	21.904	21.132
	r≤2	r≥3	13.477	15.495	r≤2	r=3	12.750	14.265

4.3. *Long run Estimate between Gasoline Price and Sectoral Output*

The co-integration results for the six models (that is agriculture; manufacturing; building and construction; wholesale and retail; transport; communication) reported above showed the existence of long run co-integration relationships among the variables. The long-run relationship (co-integrating equations) in each of the model is presented in table 3 below. With respect to the variable of interest (that is gasoline price (lgas)) and exception to the building and construction (lboc) model, table 3 revealed that gasoline price is a key determinant of output in the agriculture, manufacturing, wholesale and retail, transport and communication sectors of the Nigeria economy in the long run. A one percent increase in gasoline price would result in a decline in agricultural and transportation outputs by 22% and 20% respectively, at ten percent significant level. Also, an increase in gasoline price by one percent would culminate in a decline in manufacturing (lman) and wholesale and retail (lwor) outputs by 19.4% and 23.1% respectively, at five percent significant level. Finally, the communication model revealed that an increase in gasoline price by one percent would culminate in a decline in communication output by 89.0% at one percent significant level. The implication of the above result is that gasoline price plays an important role in the productivity of most sectors of the Nigerian economy in the long run. This impact however differed among the sectors with the telecommunication sector having the most adverse impact of any increase in gasoline price in Nigeria.

In addition to the long run estimate discussed above, this study also examined the short run relationship between gasoline price and sectoral output by utilizing the short run error correction model of equation (4) above.

Table 3. Long-run Regression Estimates

INDEPENDENT VARIABLES	**DEPENDENT VARIABLES**					
	1	**2**	**3**	**4**	**5**	**6**
	AGR	**MAN**	**BOC**	**WOR**	**TRN**	**COM**
LGAS	**-0.222 (0.085)*** **	**-0.194 (0.025)** **	-0.090 (0.234)	**-0.231 (0.017)** **	**-0.204 (0.052)*** **	**-0.890 (0.000)* **
LLAB	4.700 (0.000)	3.098 (0.000)	2.321 (0.003)	4.317 (0.000)	3.885 (0.000)	15.109 (0.000)
LCAP	-0.099 (0.337)	0.049 (0.466)	0.191 (0.004)	0.096 (0.202)	0.114 (0.173)	0.279 (0.133)
R^2	0.791	0.680	0.764	0.822	0.760	0.888
S.E of Reg.	0.362	0.239	0.216	0.265	0.292	0.687
F-Stat.	33.97	19.16	29.08	41.55	28.42	71.20
Prob.(F-stat)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
D.W	1.33	1.32	1.15	1.13	1.55	0.72

Notes: numbers above parentheses are coefficient values while numbers in the parentheses are Probability values*/**/*** denotes significance level at 1%, 5% and 10% respectively.

4.5 Short run Estimate

Before, analysing the short run regression estimate (that is equation (IV)), the stationarity property of the residuals from the long run estimates were examined and the results are presented on table 4 below. A key criterion for the estimation of the short run estimate (or error correction model) is that the residual from the long run estimate must be stationary at levels and at five percent. Thus, using the Augmented Dickey Fuller and the Phillip-Perron tests, it is revealed that the residuals from individual models (with exception to the telecommunication model) are stationary at levels (that is integrated of order one) and at one percent significant level. In contrast, the residual from the telecommunication model (Resid-Com) was observed not to be stationary in levels at five percent critical value. This is because its statistic value using the ADF and PP tests is less than the critical value at five percent. Consequently, the telecommunication model is dropped from the short run estimate.

Table 4. Residual Stationairty Test

Augmented Dickey-Fuller (ADF) Test			Phillip-Perron (PP) Test	
Variables	Level	Status	Level	Status
Resid-Agr	-11.1576*	I(1)	-8.5560*	I(1)
Resid-Man	-8.6141*	I(1)	-7.3907*	I(1)
Resid-Boc	-3.6936*	I(1)	-3.8544*	I(1)
Resid-Wor	-9.1895*	I(1)	-7.2315*	I(1)
Resid-Trn	-9.4308*	I(1)	-7.5927*	I(1)
Resid-Com	-2.4866	-	-2.6237	-

Note: *=1% significance level. The critical values of the residual are -3.6702, -2.9640 and -2.6210 at 1%, 5% and 10% significant levels respectively.

Following the residual stationarity test, we over parameterized the first differenced form of the variables in equation (4) and used Schwarz Information Criteria to guide parsimonious reduction of the model. This helps to identify the main dynamic pattern in the model and to ensure that the dynamics of the model have not been constrained by inappropriate lag length specification. The lag length on all variables in each model is set at three to ensure sufficient degrees of freedom.

With respect to the parsimonious regression estimate capturing the short run analysis, it is observed from table 5 that there are significant improvement in the parsimonious model of the over parameterized model (see appendix). From the table, it was observed that the various models were fit and appropriate for the analysis. The adjusted R-squared of the model ranged from about 0.51 percent (manufacturing sector) to 0.74 percent (wholesale and retail sector); suggesting that a relatively high proportion of variations in output across the sectors was explained by the explanatory variables in the models. The high and significant value of the F-Statistics further confirmed the fitness of the model. The Durbin Watson Statistics in all the models were close to 2.0 (ranging from 1.88 (agricultural sector) to 2.09 transportation sector)).The robustness of the models estimates were further ascertained by carrying out various diagnostic tests on the residual of the ECM model; namely the histogram and normality test, the serial correlation LM test and the ARCH LM Test. The Jarque-Bera statistic from the histogram and normality test on all the models were insignificant (see appendix), implying that the residual from the error correction model is normally distributed. More so, both the Serial Correlation and ARCH LM tests confirmed that there is no serial correlation in the residuals of the ECM regression (see appendix). This is because the F-statistics of both tests on all the five models were insignificant. This shows that there are no lagged forecast variances in the conditional variance equation. In other words, the errors are conditionally normally distributed, and can be used for inference (Nwachukwu and Odigie, 2009).

The coefficients of error correction term in each model (with exception to the transport sector model) were both statistically significant at one percent and negative. The negative sign of the error correction term indicates a backward movement toward long run equilibrium from short run disequilibrium. This feedback movement ranged from about 23% (wholesale and retail sector) to 73% (agricultural sector) across the six models. With respect to transportation sector, the error correction term was observed to be negative but was insignificant. With regard to the variable of interest (that is gasoline price (lgas)), it was observed that in the agriculture model, the current value of gasoline price had a significant negative effect on agricultural output while the coefficients of the first and second lagged values of the gasoline price had significant positive effect on current agricultural output. Thus, a one percent increase in current gasoline price would result in a decline in current agricultural output by 6.2% while a one percent increase in the first and second lagged values of gasoline price would bring about an increase in agricultural output by about 8.6% and 8.4% respectively in the short run. With respect to the manufacturing output, it is revealed that in the short run only the current value of gasoline price had significant and negative effect on current manufacturing output. Therefore, a one percent increase in current gasoline price would result in a decline in current manufacturing output by 7.3%. With respect to the remaining sectoral models (that is, building and construction; wholesale and retail; transportation; and communication), both current and the lagged values of gasoline price were observed to have insignificant effects on output. This implies that gasoline price does not have a significant impact on the outputs of the building and construction; wholesale and retail; transportation; and communication sectors in the long run.

The import from the above findings is that the impact of a change in gasoline price has a long run effect on the output on most sectors of the Nigerian economy than a short run effect. This could result from rigidities of adjustment to price changes in the short run, however in the long run such price change would be absorbed in the production decision of firms, thereby resulting in a decline in output of firms.

Table 5.Parsimonious Short-run Regression Estimate

INDEPENDENT VARIABLES	DEPENDENT VARIABLES				
	1	2	3	4	5
	ΔLAGR	ΔLMAN	ΔLBOC	ΔLWOR	ΔLTRN
ECM(-1)	**-0.725 (0.000)***	**-0.650 (0.000)***	**-0.513 (0.000)***	**-0.234 (0.004)***	-0.194 (0.138)
ΔY(-1)	-	0.146 (0.161)	0.905 (0.000)	0.400 (0.004)	-
ΔY(-2)	-0.333 (0.018)	-	-	0.298 (0.032)	-
ΔY(-3)	-	-	-0.087 (0.260)	-	-
ΔLGAS	**-0.062 (0.027)****	**-0.073 (0.020)****	-	-0.022 (0.304)	-0.048 (0.162)
ΔLGAS(-1)	**0.086 (0.009)***	0.067 (0.068)	-	-	-
ΔLGAS(-2)	**0.084 (0.011)****	0.053 (0.118)	-	0.034 (0.145)	-
ΔLGAS(-3)	0.027 (0.321)	0.044 (0.183)	-	-	-
ΔLCAP	0.067 (0.009)	0.049 (0.044)	-	0.047 (0.013)	0.075 (0.009)
ΔLCAP(-1)	-	-	-	-	-
ΔLCAP(-2)	0.021 (0.269)	-	-0.049 (0.094)	-	-0.053 (0.044)
ΔLCAP(-3)	-	-	-	-0.058 (0.004)	-0.055 (0.058)
ΔLLAB	-	-	-	-	-
ΔLLAB(-1)	-15.057 (0.000)	-	-	-	-11.132 (0.099)
ΔLLAB(-2)	-	-	-16.421 (0.023)	-	15.765 (0.015)
ΔLLAB(-3)	-	-11.533 (0.002)	22.162 (0.004)	-4.155 (0.074)	-
Adjusted-R^2	0.725	0.507	0.681	0.737	0.552
S.E of Reg.	0.045	0.052	0.060	0.037	0.061
F-Stat.	8.611	4.343	10.264	10.104	5.590
Prob.(F-stat)	(0.000)	(0.005)	(0.000)	(0.000)	(0.001)
D.W	1.88	1.84	1.92	1.96	2.09

Notes: numbers above parentheses are coefficient values while numbers in the parentheses are Probability-values*/**/*** denotes significance level at 1%, 5% and 10% respectively.

Y refers to output of the various sectors (that is Agriculture (AGR), Manufacturing (MAN), Building and Construction (BOC), Wholesale and retail (WOR) and Transportation (TRN))

5. Conclusion and Policy Recommendations

This paper examined the relationship between gasoline price and sectoral output in Nigeria for the period 1980 to 2010. The long run regression estimate showed that gasoline price is a significant determinant of output growth in the agricultural; manufacturing; wholesale and retail; transportation and communication sectors of the Nigerian economy. In addition, the short run error correction estimate showed that only output of the agriculture and the manufacturing sectors of the Nigerian economy is affect by gasoline price increase in the short run. Based on these findings, the study recommended that paramount care should be taken on future changes in gasoline price given the harmful effect on the various sectors of the Nigerian economy. Apart from the above, there is also the need for government to continue subsidizing gasoline price meant for productive purpose as this would not only serve as incentive for more productivity but also reduce the cost of production incurred by indigenous firms in these sectors. Finally, there is the need for the government to stabilize power supply to reduce the over reliance of the sectors on gasoline as a prime source of power. This would reduce the cost incurred on gasoline as an input in the production process and also aggregate production cost.

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APPENDIX

DIAGNOSTIC TESTS

Agricultural Model

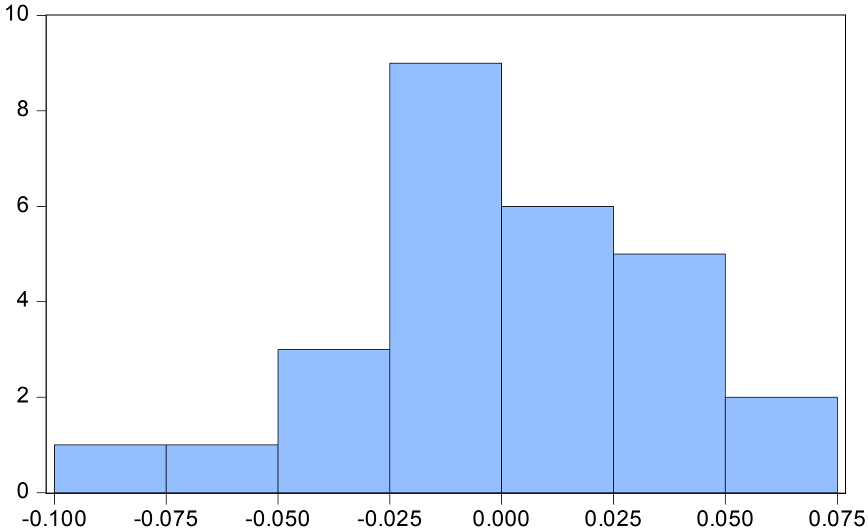
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.899181	Prob. F(2,15)	0.4277
Obs*R-squared	2.890506	Prob. Chi-Square(2)	0.2357

Heteroskedasticity Test: ARCH

F-statistic	1.136245	Prob. F(1,24)	0.2971
Obs*R-squared	1.175290	Prob. Chi-Square(1)	0.2783

Histogram-Normality Test



Series: Residuals	
Sample 1984 2010	
Observations 27	
Mean	0.000000
Median	-0.003624
Maximum	0.064514
Minimum	-0.095118
Std. Dev.	0.036089
Skewness	-0.458388
Kurtosis	3.263560
Jarque-Bera	1.023684
Probability	0.599390

Manufacturing Model

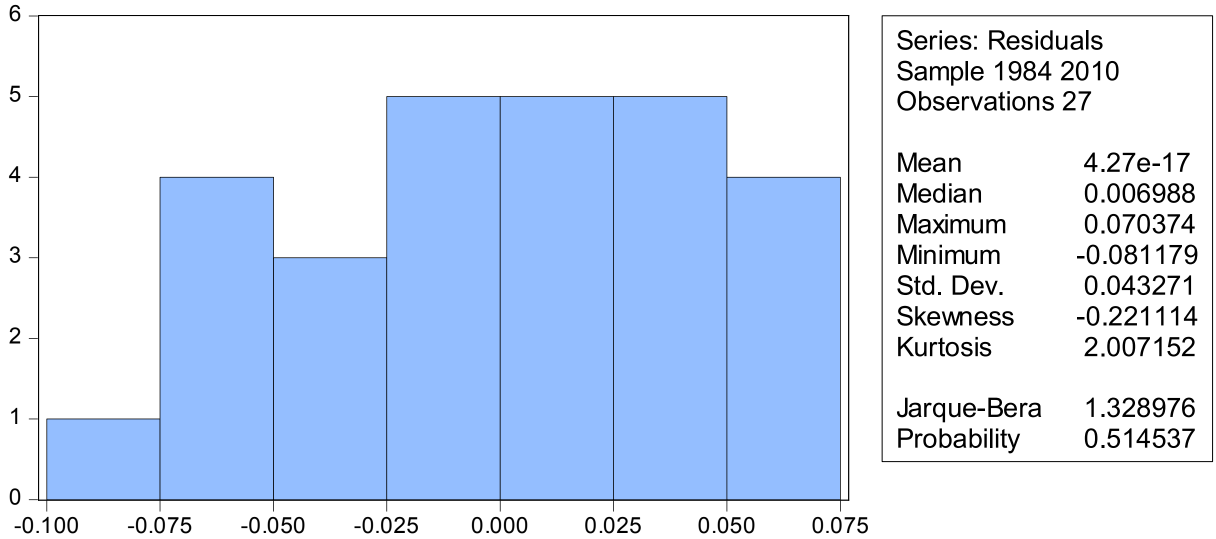
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.031015	Prob. F(2,16)	0.9695
Obs*R-squared	0.104271	Prob. Chi-Square(2)	0.9492

Heteroskedasticity Test: ARCH

F-statistic	0.063353	Prob. F(1,24)	0.8034
Obs*R-squared	0.068452	Prob. Chi-Square(1)	0.7936

Histogram-Normality Test



Building and Construction Model

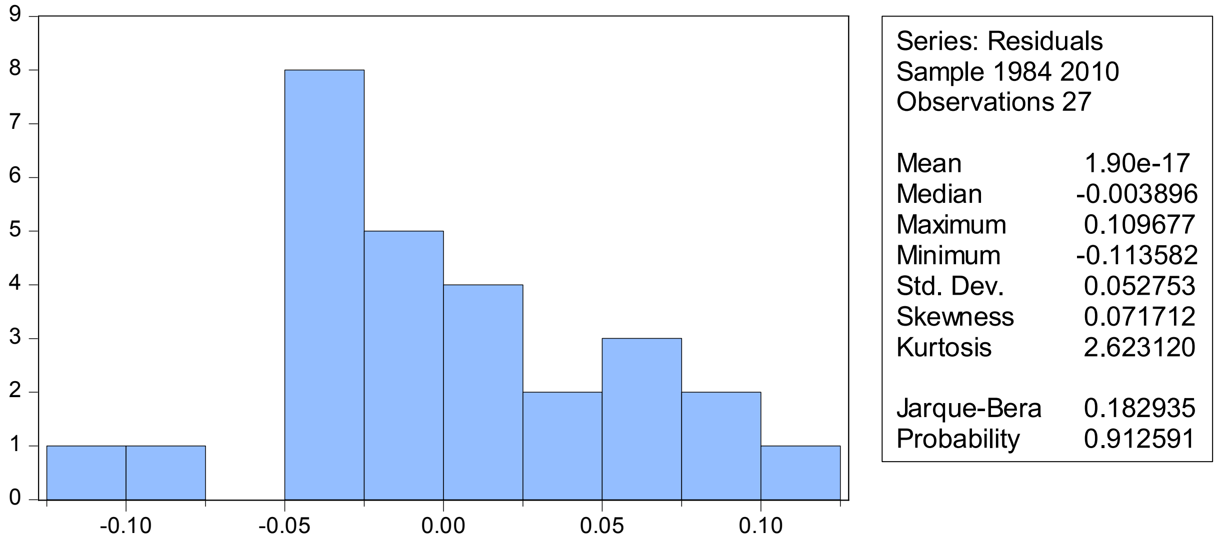
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.004507	Prob. F(2,18)	0.9955
Obs*R-squared	0.013514	Prob. Chi-Square(2)	0.9933

Heteroskedasticity Test: ARCH

F-statistic	1.023957	Prob. F(1,24)	0.3217
Obs*R-squared	1.063896	Prob. Chi-Square(1)	0.3023

Histogram-Normality Test



Wholesale and Retail Model

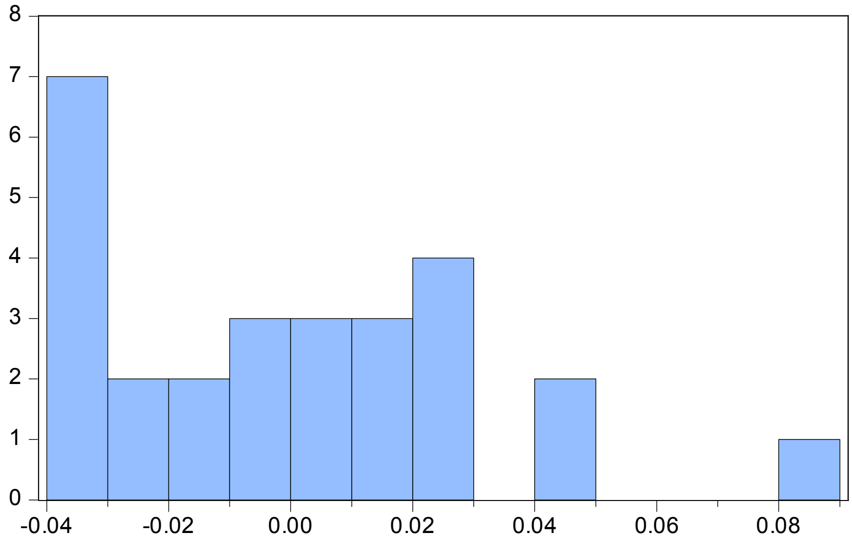
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.004489	Prob. F(2,16)	0.9955
Obs*R-squared	0.015142	Prob. Chi-Square(2)	0.9925

Heteroskedasticity Test: ARCH

F-statistic	0.001181	Prob. F(1,24)	0.9729
Obs*R-squared	0.001279	Prob. Chi-Square(1)	0.9715

Histogram-Normality Test



Series: Residuals	
Sample 1984 2010	
Observations 27	
Mean	2.03e-17
Median	-0.000541
Maximum	0.088410
Minimum	-0.037177
Std. Dev.	0.030609
Skewness	0.860546
Kurtosis	3.679841
Jarque-Bera	3.852387
Probability	0.145702

Transport Model

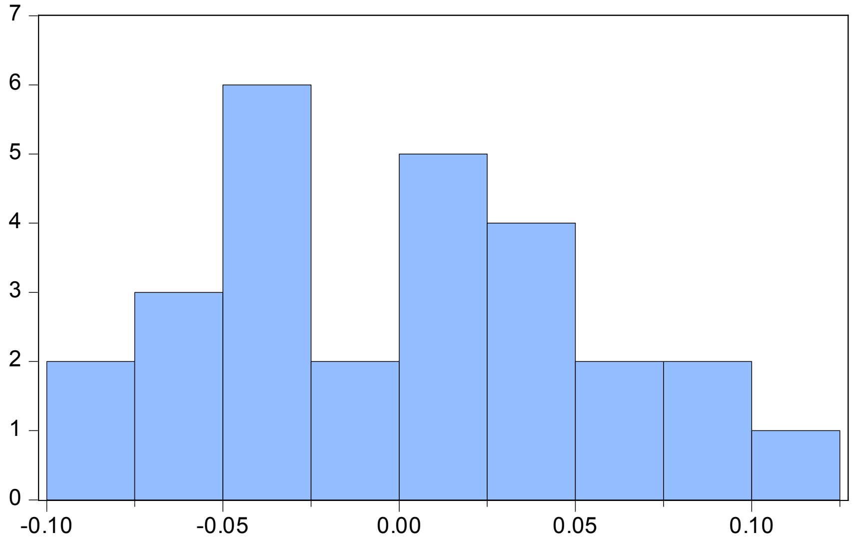
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.183013	Prob. F(2,17)	0.8344
Obs*R-squared	0.569081	Prob. Chi-Square(2)	0.7524

Heteroskedasticity Test: ARCH

F-statistic	2.83E-05	Prob. F(1,24)	0.9958
Obs*R-squared	3.06E-05	Prob. Chi-Square(1)	0.9956

Histogram-Normality Test



Series: Residuals	
Sample 1984 2010	
Observations 27	
Mean	2.07e-17
Median	0.005112
Maximum	0.100159
Minimum	-0.086511
Std. Dev.	0.052299
Skewness	0.168727
Kurtosis	2.052840
Jarque-Bera	1.137361
Probability	0.566272