

Crude Oil Price, Stock Price and Some Selected Macroeconomic Indicators: Implications on the Growth of Nigeria Economy

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Abstract

This paper analyses the impact of crude oil price, stock price and some selected macro economics variables on the growth of Nigeria economy from 1980 – 2010. Using Johansen cointegration, unit root test and error correction model, it was found that crude oil price, stock price and exchange rate have significant influence on the growth of the Nigeria economy. In the final analysis, the study recommends that central bank of Nigeria should manage the dwindling nature of the interest rate, ensure transparency and accountability in the stock exchange market to boost the confidence of the investors and further as a matter of urgency diversify Nigeria economy from oil reliance to gainful manufacturing so as to minimize negative effects of oil shock.

Keywords: crude oil prices, stock prices; macroeconomics; economic development.

1. 0 Introduction

The degree of relationship among Macroeconomic variables, crude oil prices, and asset values have long been topic of active Economic research since the United States triggered financial crises in 2008. Stemming from the Lehman Brothers filing for bankruptcy, the sharp fluctuation of Crude oil prices and volatile swings in the major stock market have caused great concern regarding economic growth in both developed and developing countries. Therefore, the provision of plausible explanations for the relationship between oil price movement and macroeconomic performance has occupied the attention of Economists over the last four decades.

According to Hamilton (2003), the bulk of pioneering studies on oil price and Macroeconomic interactions were targeted at establishing causal links owing to the fact that the oil price episode was viewed as a permanent event with the attendant effects on recessions in oil dependent economies. First, transmission mechanism through which oil price impacts real economic activity includes both supply and demand channels. The supply – side effects are related to the fact that crude oil is a basic input of production, and an increase (decrease) in oil price leads to a rise (fall) in production cost, which induces firms' lower(higher) output. On the Demand side, the effect is on consumption closely tied to disposable income and investment which is attached to the firm's cost.

Second, Economic theory suggests that stock prices reflect expectations about future firms' earnings. The fundamental value of a firm's stock equals the present value of expected future dividends. Hence, firms' profits are important parts of Gross Domestic Product (GDP), consumption and investment. The nature of stock prices therefore, should be a valuable indicator of economic activities.

The oil boom of the early 1970s had a persuasive effect on the growth & development of the economy. Oil suddenly accounted for more than 90 percent of export, contributed about 80 percent to total revenue and this substantially affected the scope and content of investment, production and consumption patterns as well as government's policies and programmes. Despite all these, Economic problems began to manifest in 1978 and went through 1983/84 when oil prices declined remarkably by 45%. There was negative growth rate of 6.7%, external current account deficit grew to 6 percent of GDP, fiscal imbalance and high rate of indebtedness emerged. This in a way ushered in the Structural Adjustment Programme (SAP) with currency devalued and worsened inflation to 72 percent in 1995.

Between 1997 and 2010, the rate has been moderated remarkably reaching a single digit. However, as at September 2011, the inflation rate stood at 10.3 percent.

Currently, the banking industry is being prudentially restructured to ensure soundness and transparency. The various policies of the Central Bank of Nigeria (CBN) adumbrated in the Federal budget as well as the entire financial system restructuring contained therein the implications and uses of surpluses achieved. The global recession that occurred in 2008 affected sub prime lending and shattered the stock market because the peak had been reached according to the business cycle theory. Therefore, the growing need of the sophisticated stock market is justified and the impact of oil and stock prices on economic activities in Nigeria can not but be analyzed.

Emanating from the above, the aim of this Paper is to examine the impact of oil price shocks and stock prices movement on Nigeria economy. The paper has sections; Section One is the Introduction; Section Two contains the Literature review and theoretical framework; Section Three is the Methodology, Section Four is Empirical results and discussion while Section Five is Conclusion and recommendation. unplanned absences from workplace due to some reasons like personal emergency, accident, illness, etc. Turnover occurs when an active worker resigns from the company of his own accord, thus leaving a vacant post until a replacement is found. If such disturbance has caused a large number of tasks become unattended and overdue, the company is then vulnerable to overtime cost, shrunk capacity and productivity, extra queuing time, lost business income, etc. In order to prevent these deteriorative effects, optimising the number of workers can be helpful. As a fundamental branch of knowledge in manufacturing business, workforce management will never fall behind the times. Therefore, it is worth an attempt to incorporate a novel methodology, such as HMS, into the state of the art of workforce sizing.

2.0 Literature Review and Theoretical Framework

This section examines relevant related literature and theoretical framework on the relationship between oil price shocks, stock price movement and economic growth.

Traditionally, oil prices have been more volatile than many other commodity or asset prices since World War II. The trend of demand and supply in the Global economy coupled with the activities of OPEC consistently affect the price of oil. In this current year, crude oil price oscillates between US \$110/b and US\$140/b. This rapid increase has become a great concern to academics as well as policy makers because it has not translated to changes in domestic end-user prices of Kerosene, gasoline, petrol and diesel neither has it improved the standard of living of Nigerians. Sequentially, the mobilization of resources from National savings and investment for the purpose of economic growth is the central focus of Development Economists. To further strengthen growth, the stock market promotes efficiency in capital formation and allocation from surplus to deficit areas.

According to Okereke (2000), provision of equity capital to the market enables companies to avoid over – reliance on debt financing, thus improving corporate debt to equity ratio since deregulation has exposed them to capital market in sourcing cheap and flexible finance. In the same vein Nyang (1997) pointed out that the financial structure of a firm, that is the mix of debt and equity finances change as the economy develops.

Alile (1997) opined that the determination of the overall growth of an economy depends on how efficiently the stock market performs its allocative function of capital. As the stock market mobilizes savings, concurrently it allocates to a larger proportion of it to the firms with relatively high prospects as indicated by its rate of returns and level of risk. This is done by the mechanism of demand and supply.

The pioneering work of Hamilton (1983) established the existence of a negative relationship between oil price increases and economic activities. This submission was confirmed in related studies by Hooker (2002), Hamilton (2003); and Rodriquez and Sanchez (2005).

Mock et al (1994) using data spanning 1967:3 – 1992:4 for seven OECD countries found that all the countries except Norway experienced negative association between oil price increases and GDP growth. Cavallo and Wu (2006) used a VAR model of three variables, they found out that following an oil price shock, output declined and prices increased. Similarly, Raguindin and Reyes (2005) examined the effects of oil price shocks on the Philippine economy. Their impulse response function for a linear specification of oil prices revealed that oil price shocks lead to prolonged declines in real GDP. In the non – linear VAR however, oil price decreases play a greater role in fluctuation of model variables than oil price increase.

Rober (2008) used MA method with OLS to find the relationship between stock prices and macroeconomic variables effects on four emerging economies; India, Russia, Brazil and China. He used oil price, exchange rate and moving average lag values as explanatory variables but the results were insignificant and this showed inefficiency in the market. He concluded that these economies are emerging so domestic factors are more influenced by outside factors of oil price and exchange rate. To Jin (2008), sharp increase in the international oil price and violent fluctuation of the exchange rate are generally regarded as factors discouraging economic growth. He submitted that oil price increase, all other things being equal, should be considered positive in oil exporting countries and negative in oil importing countries while the reverse should be.

Ahhmed (2009), in his study found that there is unidirectional causal relationship between stock prices and investment spending in the case of India and Bangladesh while Xiufang Wang (2010) in the course of studying the relationship between economic activities, stock price and oil price in three Economies: Russia, China and Japan, evidence of cointegrating relationship among the real economic activities, stock price and oil price in Russia suggest that there is a long run stationary relationship among the three variables. However, unlike Russia, no cointegrating relationship among the variables was in both China and Japan.

In Nigeria, a few scholars have studied the impact of oil and stock prices on Nigeria economy. For instance Ayadi et al (2000) examined the effects of oil production shocks on the net oil exporting country using a standard VAR which includes oil production, output real exchange rate and inflation over 1975 – 1992 period, the impact responses show that a positive oil production shock was followed by rise in output, reduction in inflation and a depreciation of the domestic currency. In a similar study, Olomola and Adejumo (2006) examined the effects of oil price shocks on output, inflation, real exchange rate and money supply in Nigeria within a VAR framework. They found no substantial role of oil price shocks in explaining movements in output and inflation, but on the long run money supply and real exchange rate are significantly affected following a shock to oil prices.

According to the Hotelling`s theory on oil price, if non – renewable resources must compete with other assets, there is a systematic way to forecast their future prices. It further proposed that owners of non – renewable resources will only produce a supply of their product if it will yield more than instrument available to them in the market – specifically bonds and other interest bearing securities.

The export land model put forward by Dallas Geologist – Jeffrey Brown modelled the decline in oil exports that result when an exporting nation experience both peak in oil production and an increase in domestic oil consumption. He concluded that exports decline at a faster rate than the decline in oil production and also outpaced increase in oil price thereby slowing domestic growth.

On the other hand, the theory on stock price hinges on the Efficient-Market Hypothesis (EMH). The theory asserts that financial markets are information efficient. That is one cannot consistently achieve returns in excess of average market returns on a risk – adjustment basis, given the information publicly available at the time the investment is made. The theory specified three major versions: ``weak``, ``semi-strong``, and ``strong``.

``Weak`` EMH claims that prices on traded assets already reflect all past publicly available information. ``Semi strong`` EMH claims that prices instantly change to reflect new public information

while ``strong`` EMH additionally claims that prices instantly reflect even hidden or insider information.

The Random Walk Hypothesis put forward by a French Broker Jules Regnault also states that stock market prices evolve according to a random walk and thus price of the stock market cannot be predicted. Thus, no exact regularities or patterns in security prices that repeat themselves overtime as to predict future stock prices from past prices.

Finally, in a recent study by Gunu (2010) using VAR to find the impact of crude oil price changes on four key Macroeconomic variables concluded that oil prices have significant impact on real GDP, money supply and unemployment but its impact on the fourth variable, consumer price index is not significant.

3.0 Methodology Workforce Sizing Plan (WOZIP)

From the foregoing review, the paper adopts the co-integration, unit root test and Error correction model to analyse the impact of oil and stock prices on Nigeria economy, using E-views 7. This approach follows the work of Gunu (2010) in his paper presentation titled ``oil price shocks and the Nigeria Economy``. The choice of his model is not unconnected with the fact that it actually captured the main variables under study. Thus, the model is stated below:

$$GDP = b_0 + b_1oil_price01(-1) + b_2sp(-1) + b_3GDP(-2) + b_4oil_price01(-2) + b_5sp(-2).$$

From the above, our model is specified as:

$$RGDP = f(RSP, ROP, INT, RER)$$

Where RGDP = Growth rate of Gross Domestic Product

RSP = Growth rate of stock price indexed by GDP

ROP = Growth rate of oil price indexed by GDP

INT = Interest rate

RER = Real exchange rate

The structural form is

$$RGDP = a_0 + a_1RSP + a_2ROP + a_3INT + a_4RER + u$$

3.1 Data

The data on the variables chosen were sourced from the Nigerian Stock Exchange (NSE), International Monetary Fund Energy Statistics, National Bureau of Statistics (NBS) and Central Bank of Nigeria Statistical Bulletin between 1980 – 2010. Though, the crude oil price is usually quoted in US dollars but for the purpose of this research, conversion is made with the current exchange rate of \$1 to N156.75. Also, variables like SP and OP were indexed by GDP.

4.0 Empirical Results

Having employed the ordinary least square (OLS) method, other tests carried out include the unit root, co-integration and Error correction model (ECM). The tables below show our various results.

Table 1: **Ordinary Least Square**

Dependent Variable: RGDP

Method: Least Squares

Sample(adjusted): 1985 2010

Included observations: 26 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.010487	0.010859	0.965721	0.3452
ROP	-0.002502	0.001083	-2.310660	0.0311
RSP	19.92830	0.014832	1343.613	0.0000
INT	-0.000931	0.000558	-1.668257	0.1101
EXR	0.000295	6.12E-05	4.815721	0.0001

R-squared	0.999991	Mean dependent var	4.811538
Adjusted R-squared	0.999989	S.D. dependent var	3.466679
S.E. of regression	0.011310	Akaike info criterion	-5.955300
Sum squared resid	0.002686	Schwarz criterion	-5.713358
Log likelihood	82.41890	F-statistic	587237.5
Durbin-Watson stat	1.300026	Prob(F-statistic)	0.000000

$$RGDP = a_0 + a_1ROP + a_2SP + a_3INT + a_4EXR + u$$

$$RGDP = 0.010487 - 0.002502ROP + 19.92830RSP - 0.000931INT + 0.000295EXR$$

R-squared = 0.999 Durbin Watson = 1.3

From the model above, RGDP is positively related to SP and EXR on one hand and negatively related to ROP and INT on the other hand.

The implication of this is that 1 percent increase in RSP and EXR will bring about 19.9 percent and 0.000295 percent increase in RGDP respectively while 1 percent increase in ROP and INT will reduce RGDP by 0.0025 and 0.00093 percent respectively. The R-squared showed that the explanatory variables can explain RGDP to the tune of 99%. The Durbin Watson of 1.3 show that there is presence of positive serial correlation among the variables.

Table 2: Stationarity Test (Unit Root)

Variable	ADF – Statistics	Critical Value	Order of integration
RGDP	-11.37220	1% = -3.6752* 5% = -2.9665 10% = -2.6220	I(0) Stationary at level
ROP	-56.38463	1% = -3.6752 5% = -2.9665 10% = -2.6220	I(0) Stationary at level
RSP	-2.740027	10% = -2.6348	I(0) Stationary at level
INT	-2.038214	5% = -1.953858 10% = -1.609571	I(1) Stationary at first difference
EXR	-3.598319	5% = -2.9705 10% = -2.6242	I(1) Stationary at first difference

* Mackinnon critical value for rejection of hypothesis of a unit root.

The ADF unit root test indicates that RGDP, ROP and RSP are stationary at level and significant at all levels while INT and EXR are stationary at first difference and significant at 5 and 10 percent. All variables are integration of order 1.

Table 3: Cointegration Test

Johansen Cointegrating Test.

Eigen Value	Likelihood Ratio	5 percent Critical Value	1 percent Critical Value	Hypothesized No of CE(s)
0.931045	83.58755	29.68	35.65	None **
0.483171	16.73004	15.41	20.04	At most 1*
0.009116	0.228940	3.76	6.65	At most 2

*(**) denotes rejection of the hypothesis at 5%(1%) significance level.

L.R test indicates 2 cointegrating equation(s) at 5% significance level.

From the above, the Eigen Statistics show that there are two cointegrating vectors among the variables (RGDP, ROP and RSP) at 5 percent level of significance. Therefore, this suggests that there will be long run relationship among the variables. Thus,

$$RGDP = 0.104113 - 0.076847ROP + 20.01230RSP$$

Table 4: Error Correction Model

Dependent Variable: RGDP
 Method: Least Squares
 Sample (adjusted): 1987 2010
 Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.014745	0.042884	-0.343840	0.7361
RGDP(-1)	2.101726	4.774978	0.440154	0.6665
ROP	0.006850	0.016248	0.421550	0.6798
RSP	19.91753	0.015925	1250.715	0.0000
RSP(-1)	-41.89516	95.19540	-0.440096	0.6666
EXR	2.46E-05	0.000165	0.148884	0.8838
EXR(-1)	-0.000316	0.001499	-0.210466	0.8363
INT	-0.000907	0.000800	-1.133789	0.2759
INT(-1)	0.002262	0.004658	0.485556	0.6348
ECM	-1.810843	4.701831	-0.385136	0.7059
R-squared	0.999994	Mean dependent var	4.712500	
Adjusted R-squared	0.999990	S.D. dependent var	3.444506	
S.E. of regression	0.010723	Akaike info criterion	-5.938422	
Sum squared resid	0.001610	Schwarz criterion	-5.447566	
Log likelihood	81.26106	Hannan-Quinn criter.	-5.808197	
F-statistic	263671.7	Durbin-Watson stat	2.096957	
Prob(F-statistic)	0.000000			

From the results estimated above, ROP, RSP and INT are statistically significant in the short run while EXR is not. For instance, 1 percent increase in ROP and RSP will improve RGDP by 0.00685 and 19.92 percent respectively while 1 percent increase in INT will slow down growth by 0.000907 percent. An increase in EXR by 1 percent will improve RGDP by 2.46 percent. These however conform to economic theory.

In the long run, the ECM coefficient of -1.811(negative) and RGDP(-2) coefficient of 2.101726(positive) are significant, implying that a long run relationship exist among the variables (lag 1) at equilibrium.

The model;

$$RGDP = a_0 + a_1RGDP(-1) + a_2ROP + a_3RSP + a_4RSP(-1) + a_5EXR + a_6EXR(-1) + a_7INT + a_8INT(-2) + a_9ECM$$

$$RGDP = -0.014745 + 2.101726RGDP(-1) + 0.006850ROP + 19.91753RSP - 41.89516RSP(-1) + 2.46E-05EXR - 0.000316EXR(-1) - 0.000907INT + 0.002262INT(-1) - 1.810843ECM$$

The model has a good fit with the explanatory variable jointly account for 99.9 percent improvement in the RGDP. The Durbin Watson Statistics (2.096957) shows that there is no first order autocorrelation.

5. Conclusion and Recommendation

Following the results of the empirical analysis, the study concludes that growth rate of GDP is significantly affected by the RSP, ROP and EXR. However, it is interesting to note that the explanatory power of the growth rate of stock price (RSP) is larger than other variables. While it plays a prominent role in the economic activities, the world oil price provides information to Nigeria stock market efficiently.

Moreover, both RSP and ROP explain each other because they are connected by interest and exchange rates. Finally, the central bank of Nigeria (CBN) should steadily manage the dwindling nature of the interest rate to enable individuals save thereby providing funds for investors to make their investment decisions when returns are greater than interest rate.

Second, the CBN should ensure transparency and accountability in the Stock Exchange Market (NSE) so as to boost the confidence of the investors.

Third, government should as a matter of urgency diversify the economy from oil reliance to gainful manufacturing in order to minimize negative effects of oil shocks. This should be done with adequate planning, proper implementation and firm control of some macroeconomic variables like exchange rate, inflation and so on to encourage manufacturers boost productivity and fast - track growth.

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