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Causality Effect between Crude Oil Price Shocks and the Nigeria Foreign Reserves (1993–2017): An Empirical Measure for Economic Activities

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Abstract

This study is on the empirical assessment of crude oil price shocks on the Nigeria foreign reserves. The Nigeria nation over the years has been tied to the Dutch disease syndrome as observed in its foreign reserve depletion, occasioned by crude oil price shocks. The study assessed the causality effect between crude oil price shocks and the Nigerian foreign reserves as a measure for economic activities. Data were obtained from the World Bank data base and Organisation of Petroleum Exporting Countries data base for a period of 1993 to 2017. The ex post facto research design was employed using the simple time series econometric techniques to carry out the diagnostic tests and inferential analyses of the data. The study ascertained that the depletion in the foreign reserves as a measure for the current economic degradation in Nigeria were not caused by the shocks in crude oil prices but was induced by other factors such as wrong policies implementation. The study recommends among others that the Nigeria government should enact policy on the standard and limit on foreign travels (medical vacations) for government officials including the presidency as well as policies that would promote and adequately regulate activities in the parallel market.

Key words: Crude Oil Price Shocks, Nigeria Foreign Reserves & Economic Activities

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Introduction

The Resource-Curse Theory also known as the Dutch disease or the paradox of plenty has been a syndrome to mostly oil producing African countries. The abundance of mineral resources has been a curse rather than a blessing to oil producing countries (Izekor & Okaro, 2018). Stiglitz and Karl (2005) argued that mining of resources reduces the wealth of a country if the generated funds are not diversified to other areas of investment. The Nigerian nation has been exporting crude oil, making up the main source of revenue for the Nigerian foreign reserves (Odularu, 2008; Alabi & Ntukekpo, 2012). Abubakar (2015) and Stober (2016) stated that economic activities in Nigeria have mainly relied on income from crude oil. Most oil producing African countries accumulated foreign reserves in times of oil price increase while foreign reserves depleted in period of oil price

decrease (Sascha, Maurizio & Livio, 2015). The decrease in crude oil prices consequently foreign reserves depletion was due to low demand and excess supply resulting to significant decrease in the level of foreign exchange inflows (Englama, Duke, Ogunleye & Isma'il, 2010; Uguru, 2015). A nation through accumulated reserves can stabilize its issued currencies from shocks as well as meet unexpected capital outflows (Archer & Halliday, 1998). This research observed from other related studies that were considered did not empirically used data beyond 2015 for their analysis, hence their findings did not capture if the present depletion in the Nigerian foreign reserves which was simultaneous with the instability in economic activities has any causality effect by crude oil price shocks. Thus, the study was motivated by these trends to empirically evaluate if apparently crude oil price shocks was responsible for the depletion in the Nigerian foreign reserves consequently, as a measure of the retrogression in economic activities. Therefore, to empirically determine the causality effect of crude oil price shocks on the Nigeria foreign reserves, this study hypothesized that crude oil price shocks have not granger caused foreign reserves in Nigeria as a measure of economic activities.

Literature Review

Empirical Literature

Attempts have been made by researchers to ascertain the effect of crude oil price shocks on the Nigeria foreign reserves as well as its role in economic activities. Nwoba, Nwonu, and Agbaeze (2017) considered the correlative effect between oil price shocks and economic growth indicators: 2011 - 2015. Using the simple regression analysis, Pearson product moment correlation and chi-square, they observed that oil price has a significant effect on foreign exchange earnings. Osuji and Ebiringa (2012) using vector auto-regression and Granger causality test, examined the long run relationship between crude oil price and external reserve management: 1981 – 2010. The results showed significance between crude oil price and external reserves. Audu and Okumoko (2013) examined the implications of crude oil price on foreign reserves as a measure of the Nigerian economy: 1970 - 2012. The estimated long–run Vector Error Correction Model (VECM) showed that crude oil price was negative with insignificant effect on Nigeria foreign reserves. Osuji (2015) examined the effect of oil price movements on foreign reserves using granger causality for monthly time series data: 2008 - 2014. The result indicates that oil prices granger caused foreign reserves. Uguru (2015) examined the effects of oil price instability, demand for foreign exchange rate instability and external reserves in Nigeria using monthly data: 1999 - 2009. The study reaffirms the direct link between oil price changes and exchange rate instability in which a nation's external account is believed to be prone to fluctuations in the global world oil prices. Akinleye and Ekpo (2013) used the vector autoregressive estimation technique to examine the macroeconomic effects of symmetric and asymmetric oil price and oil revenue shocks in Nigeria. Their results showed that positive and negative oil price shocks affect external reserves indicating stronger implications for real government expenditure only in the long run. Babalola, Akindele and Rotimi (2018) investigated the effect of crude oil prices on government revenue in Nigeria. The Vector Auto-regression (VAR) and impulse response analysis revealed that crude oil price shocks affected government revenue. Aremo, Orisadare and Ekperiware (2012) examined the effect of crude oil price on fiscal policy (money supply and Gross Domestic Product) in Nigeria using structural vector autoregressive model: 1980: Q1 - 2009: Q4. The results showed that crude oil prices have significant effect on fiscal policy in Nigeria. Alley (2014) used the general methods of moment to investigate the impact of oil price shocks on Nigeria economic growth: 1981 – 2012. They observed that crude oil price shocks had insignificant effect on economic growth.

Elmi and Jahadi (2011) used VAR technique to analyse the effect of oil price shocks on economic growth fluctuations in selected Organisation of Petroleum Exporting Countries (OPEC) and Organisation for Economic Co-operation and Development (OECD) countries: 1970 - 2008. They observed that both OPEC and OECD countries were affected by oil price shocks at different magnitude. In a study using the VAR and VECM analyses on the effect of oil price shocks on the Venezuela economy: 1950 – 2001, the results of Anshasy, Bradley and Joutz (2005) established long run and short run relationships between crude oil prices and government revenues, government spending, GDP, investment. Jin (2008) comparative analysis revealed that increase in oil price had negative effect on economic growth in Japan and China with a positive effect on economic growth of Russia. Chang and Wong (2003) used co-integrated VECM technique, impulse response analysis and Virtual Design and Construction (VDC) to study the effect of oil price shocks on the Singapore economy. The results suggest that oil price shocks only had a marginal effect on Singapore's macroeconomic performance. Berument, Ceylan and Dogan (2010) study on the effects of oil price shocks on GDP found Algeria, Iraq, Jordan, Kuwait, Oman, Qatar, Syria, Tunisia, and United Arab Emirates (UAE) to be significantly positive, while Bahrain, Egypt, Lebanon, Morocco and Yemen were insignificantly positive. Raguindin and Reyes (2005) results showed that oil price shock leads to a prolonged decrease in real GDP of the Philippine economy using the impulse response analysis. Jbir and Zouari-Ghorbel (2009) using the linear and non-linear analyses revealed no direct impact of oil price shocks on the economic activity for Tunisia. Jiménez-Rodríguez and Sánchez (2004) adopted the multivariate VAR analysis on some major industrialised OECD countries. Their results showed positive and significant impact of oil prices on real GDP during the period of increase in oil prices with an insignificant impact in period of declining oil prices. Cunado and de Gracia (2005) investigated on Malaysia, South Korea, Thailand and Japan on the effects of oil price shocks on economic activity and inflation. There results proved to be significant in the long run but insignificant in the short-run.

Research Methodology

This study adopts the ex post facto research design using the simple time series econometric techniques. The model was estimated using the Jarque-Bera statistic (test for normality of the data) and Granger Causality (hypothesis test for determining the effect of one variable on another). The data used were sourced from World Bank data base and Organisation of Petroleum Exporting Countries data base for 25 years: 1993 – 2017. The study considered 1993 as its base year due to the series of significant political activities that took place in Nigeria. For instance, the annulled June 12, 1993 election as well as the August 1993 purported rescheduled election. In the same year 1993, power was transferred to an interim civilian national government and the subsequent takeover by the military. Also, significant fluctuations were observed to have started in 1993. The hypotheses were tested at 5% level of significance using p-value statistic.

Model Specification

This study adopted the work of Umeora (2013) who used the simple regression model as specified thus; $FER = \alpha_o + \alpha_1 EXR + e_i$; and $FER = \beta_o + \beta_1 INF + m_i$. This study is specified as:

$$FORES_t = F\{COILPSH_t\} \quad (1)$$

The variables in equation 1 were transformed into log linear forms in order to eliminate abnormality as well as to avoid heterosedacticity in the data as shown in equation 2:

$$LFORES_t = \beta_0 + \beta_1 LCOILPSH_t + U_t \quad (2)$$

Where:

β_o = constant

β_1 = coefficient of the variable

$LFORES_t$ = log of Nigeria foreign reserves as a measure of economic activities

$LCOILPSH_t$ = log of crude oil price shocks expressed in United States dollar per barrel of oil

U_t = error term with a zero-mean showing the adjustment on $LFORES_t$.

The a-priori expectation: $\beta_1 > 0$.

Analysis of Empirical Results

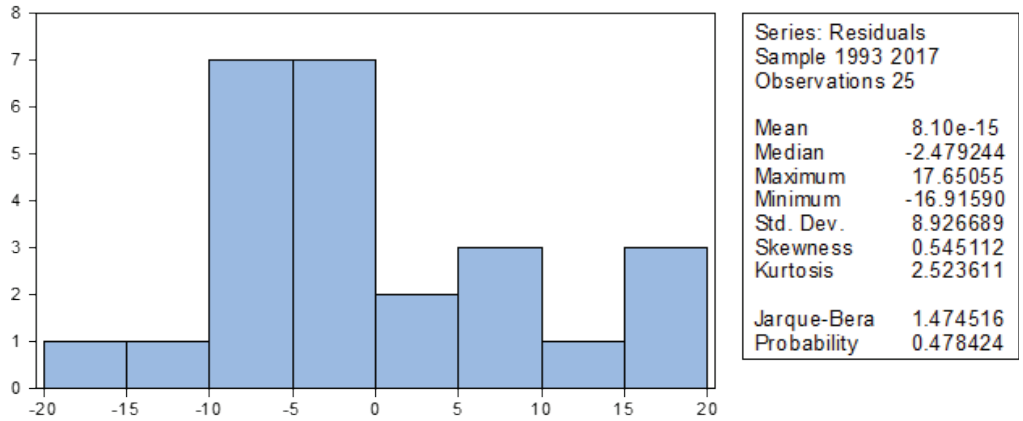
Table 1: Data for Crude Oil Price Shocks and Nigeria Foreign Reserves

YEAR	FORES ($'Billion)	COILPSH ($)
1993	1.64	16.33
1994	1.649	15.53
1995	1.709	16.86
1996	4.329	20.29
1997	7.781	18.86
1998	7.299	12.28
1999	5.65	17.44
2000	10.099	27.6
2001	10.647	23.12
2002	7.567	24.36
2003	7.415	28.1
2004	17.257	36.05
2005	28.632	50.59
2006	42.735	61
2007	51.907	69.04
2008	53.599	94.1
2009	45.51	60.86
2010	35.885	77.38
2011	36.264	107.46
2012	47.548	109.45
2013	46.255	105.87
2014	37.497	96.29
2015	31.335	49.49
2016	30.03	40.68
2017	42.63	52.51

Source: Organisation of Petroleum Exporting Countries Data (2017) and World Bank Data Base (2017)

Analysis of Empirical Results

Figure 1: Jarque-Bera Normality test Statistic



Source: Researcher's Computation (2018) using E-view 7.0

Figure 1 showed p-value of 0.478424 (P > 0.05) which is not significant at 5% level for Jarque-Bera statistic of 1.474516. Thus, the test results for the p-value of the Jarque-Bera statistic established that there is normality in the distribution.

Test of Hypothesis

The hypothesis of this study is that there is no significant causality of crude oil price shocks on Nigeria foreign reserves as shown in Table 2 using granger causality test.

Table 2: Granger Causality Test Result

Sample: 1993 2017
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
LCOILPSH does not Granger Cause LFORES	24	0.43218	0.5181
LFORES does not Granger Cause LCOILPSH		1.40492	0.2491

Source: Researcher's Computation (2018) using E-view 7.0

Table 2 indicates that LCOILPSH do not granger cause LFORES. Thus, the variations in the Nigeria foreign reserves as a measure of economic activity were not caused by crude oil price shocks due to the p-value greater than 0.05.

Discussion of Findings

The study used crude oil price shocks to assess the causality effect on Nigeria foreign reserves as a measure of economic activities. The findings of this study from the granger causality test indicated that crude oil price shocks have no causal effect on the Nigeria foreign reserves. Thus, crude oil price shocks do not granger cause economic activity which is in line with the Resource-Curse Theory. This implies that plenty of mineral resources are more often a curse than blessings to mostly oil producing African countries. It is therefore inferred that crude oil price shocks do not

influence productivity and investment. The overall impact of this reduces output. A reduction in output means low productive capacity of the economy, low productive capacity of the economy implies low foreign exchange earnings. This result is not in line with the study of Osuji (2015) which showed that oil prices granger caused foreign reserves. Thus, this study agrees with the work of Audu and Okumoko (2013) such that crude oil price had no significant effect on the Nigeria foreign reserves.

Conclusion

This study infers that the shocks in crude oil prices for the period considered was not responsible for the depletion of the Nigerian foreign reserves neither was it the transcending force of the current economic retrogression in Nigeria. Thus, the economic degradation was induced by other factors such as wrong policies implementation.

Recommendations

Based on the empirical result obtained from the granger causality test and consequently the conclusion drawn from the result, the study recommends that:

- The Nigeria Government should enact policy such as on the standard and limit of foreign travels (medical vacations) for government officials including the presidency.
- The Government should enact policy that would declare a state of emergency on agriculture, parallel market and medical standards in Nigeria which would help to boost economic activities.
- The Nigerian Government should genuinely remove the alleged oil subsidy to prevent excess capital leakages from the foreign reserves.

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