

Empirical Investigation of the Effect of Export Price Fluctuations on Fiscal and Monetary Policies in Nigeria, 1981-2017

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Abstract:

This study investigated the effect of export price fluctuations on fiscal and monetary policies in Nigeria from 1981 to 2017. It adopted a Parsimonious Error correction model to analyze the variables. Data were obtained from various statistical bulletin. The study found that in the long run, fiscal deficit responded positively to crude oil export price while in the short run it had a negative response to agriculture and solid mineral export prices contrary to its positive response to changes in crude oil export price. The study also found that in the short run, money supply had significant and negative response to agriculture export price. In the long run however, M2 responded positively to agriculture variation, prices of solid mineral and crude oil. The paper recommended the need for government to review its fiscal consideration.

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I. INTRODUCTION

At independence in 1960, agriculture played a prominent role in Nigerian economy. Agriculture was a major contributor to the nation's gross domestic product, GDP. It also generated significant percentage of employment to the population and foreign exchange. Besides, Nigeria boasted of food security (Godwin & Dagogo, 2013). At this point in history, the growth of manufacture industry was at the lowest ebb hence agricultural products became the major commodity for international trade. In as much as prices of agriculture products are at the mercy and vagaries of world market, the fluctuating prices expectedly affected the fiscal and monetary policies of Nigerian government. As time went by, oil was discovered in the 1970s. this discovery in large quantity led to the neglect of agriculture sector as emphasis was then shifted to the oil sector.

This study considers four sectors export prices that affected fiscal and monetary policies over the last three decades. Of the four crude oil price is relatively more pronounced as it has shaped the structure of the Nigerian economy. According to Proshare (2017), the decline in oil price in world market has a negative significant impact on Nigerian economy starting from 2014.

This paper therefore examined the effect of export price fluctuations on government policies and programmes can be better imagined. For instance, the government fiscal deficit which stood at -33% in 2011 rose to about 40% in 2017. This affected the economy as the economic growth rate declined from 7.4% to less than 3% in the same period. These disturbances remain unabated in Nigeria and policies to address them have been ineffective. It is against this back drop that the current study is germane

II. CONCEPTUAL AND EMPIRICAL REVIEW

Export price instability, according to Tariq and Najeeb (1995) is a "contemporaneous year to year fluctuations in export prices corrected for trend". They emphasize the importance of trend correction as it prevents instability. Suffice it to say that there exists a strong link between fiscal deficit and monetary condition all over the globe. Omoke and Oruta (2010) argued that the economic growth achieved by the evolving economies has increased the interest of not a few scholars on fiscal deficit. A country is said to engage in deficit spending when its planned expenditure for a year is in excess of its anticipated income for that particular year.

There seems to be no consensus among the economists on the role or impact of export prices on economies of

both developed and emerging nations and the extent to which they affect fiscal and monetary policies. In this regards, Uwe, Andre and Adalbert (2007) assessed the role of prices in 24 African countries. The study found that countries that export oil experienced growth rate higher than countries that import oil.

Ehrhart and Guerineau (2011)

In a study titled impact of commodity export prices on public finance in developing countries, Ehrhart and Guerineau (2011) established a positive relationship between tax revenue and commodity prices. The paper asserted that as prices of imported goods increase, trade tax and commodity tax also increase. In addition to this, it was also discovered that price fluctuation has a negative impact on tax revenue.

In a study by Aremo, Orisadare and Ekperiware (2012) using (SVAR) method it was discovered that oil price fluctuation affects government revenue. Adenuga, Hilili and Evbuomwan (2012) argue that the monetization of oil proceeds affected supply of money and, by extension, price level. They discovered that price fluctuation in oil sector generates inflation. The study which employed autoregressive distributed lag (ARDL) model utilized quarterly data from 1990-2010.

Tidiane, Montfort and Rasmane (2016) scrutinized it. Apere (2017) assessed the effect of crude oil on fiscal policy in Nigeria using a quarterly data sample for a period of 30 years. The vector auto regression (VAR) model and granger test were utilized for the study. The study found that the existence of bi-directional causality between natural gas and fiscal policy as well as oil revenue. Also, it found a unidirectional causality running from crude oil to fiscal policy (i.e., government total expenditure). The Variance Decomposition results showed that oil shocks exerted noticeable influence on Nigeria fiscal policy. Also, the impact of crude oil and natural gas on innovations in fiscal policy shock was positive from the first, second, third forecast periods and was steady throughout the long run. The study recommended devotion of resources to developing the non-oil sector such as the manufacturing, agriculture and the service sector

III. THE MODEL

This study adopts a variant of financial programming framework developed by Garba (2003) for the analysis of fiscal and monetary policies. The choice of this model is justified as the two variables, namely fiscal and monetary

policies are component of FPF. Thus, fiscal and monetary policy models are specified as follows:

Fiscal Policy Model

$$G - T = \Delta D^G + \Delta D^{PX} + \Delta R \dots \dots \dots (1)$$

Where

G-T = govt spending - taxes,

ΔD^G = change in deficit,

ΔD^{PX} = export prices and

ΔR = foreign reserve.

Modifying eqn 1 we have

$$\Delta D^G = \Delta D^{PX} + \Delta R + \varepsilon \dots \dots \dots (2)$$

Where

ε = error term.

The above equation is modified to accommodate our variables for the purpose of this study hence:

$$\ln GFD_t = \partial_0 + \partial_1 \ln IAP_t + \partial_2 \ln ISMP_t + \partial_3 \ln IMP_t + \partial_4 \ln ICOP_t + \mu_t \dots \dots \dots (3)$$

Equation 4 below represents the short run error correction model.

$$\Delta GFD_t = \alpha_0 + \sum_{i=0}^m \alpha_{1i} \Delta GFD_{t-i} + \sum_{i=0}^n \alpha_{2i} \Delta IAP_{t-i} + \sum_{i=0}^o \alpha_{3i} \Delta ISMP_{t-i} + \sum_{i=0}^p \alpha_{4i} \Delta IMP_{t-i} + \sum_{i=0}^q \alpha_{5i} \Delta ICOP_{t-i} + 4\beta_1 GFD_{t-1} + \beta_2 IAP_{t-1} + \beta_3 ISMP_{t-1} + \beta_4 IMP_{t-1} + \beta_5 ICOP_{t-1} + \lambda ECT(-i) \dots \dots \dots (4)$$

Monetary Policy Model

Similarly, the monetary sector model is also built on Table 1 as follows:

$$\Delta M = \Delta D + \Delta DR \dots \dots \dots (5)$$

Where ΔD is domestic credit and ΔDR is change in domestic reserve. Similarly, the stochastic form of the model is presented thus:

$$\Delta M = \Delta Z + v \dots \dots \dots (6)$$

Where Z is the vector of broad money supply which is expanded to incorporate sectoral export prices and v equals error term. The long run model is presented below.

$$\ln M2_t = \partial_0 + \partial_1 \ln IAP_t + \partial_2 \ln ISMP_t + \partial_3 \ln IMP_t + \partial_4 \ln ICOP_t + \mu_t \dots \dots \dots (7)$$

The error correction model is estimated thus;

$$\ln M2_t = \beta_0 + \sum_{i=1}^{n=1} \beta_{1i} \Delta \ln M2_{t-i} + \sum_{i=1}^{n=1} \beta_{2i} \Delta \ln IAP_{t-i} + \sum_{i=1}^{n=1} \beta_{3i} \Delta \ln ISMP_{t-i} + \sum_{i=1}^{n=1} \beta_{4i} \Delta \ln IMP_{t-i} + \sum_{i=1}^{n=1} \beta_{5i} \Delta \ln ICOP_{t-i} + \lambda ECT(-i) \dots \dots \dots (8)$$

Where:

M2 = log of broad money supply (i.e. net change in foreign asset (NFA) plus change in net domestic asset (NDA)). Where: α_0 = constant, $\alpha_1 - \alpha_4$ = parameters to be

estimated and $t =$ time trend. A priori expectation $= \alpha_1 - \alpha_4 < 0$

Unit root test analysis

The purpose of this test is to test for the stationarity of the variable. This preliminary test is so important as there is need for the variables to be stationary. The study engaged the Augmented Dickey Fuller (ADF) test in this respect. The ADF test statistic is:

$$\Delta Y_t = \alpha + \beta t + \delta Y_{t-1} + \sum_{i=1}^m \delta_i \Delta Y_{t-i} + U_t \dots \dots \dots (9)$$

Where

$\Delta Y_{t-1} = Y_{t-1} - Y_{t-2}$, and

$\Delta Y_{t-2} = Y_{t-2} - Y_{t-3}$

IV. RESULTS AND DISCUSSION

Table 1: The Results of Stationarity Test

Variable	ADF Test			P-Test		
	Level	First Dif	Order	Level	First Diff	Order
LGFD	-2.36	-4.44	I(2)	-2.66	-5.52	I(2)
LM2	-2.28	-4.55	I(2)	-2.37	-7.79	I(2)
LPRAG	-0.88	-4.79	I(1)	-0.81	-6.08	I(1)
LPRSM	-3.88	-5.98	I(0)	-5.09	-5.09	I(0)
LPRMF	-2.22	-4.29	I(1)	-3.11	-7.45	I(1)
LPROL	-2.08	-6.28	I(1)	-2.62	-11.17	I(1)
C.V = 5%	-3.56	-3.56		-3.55	-3.56	

Source: Author's computation using Eview 8.0

Table 1 showed that solid mineral export price was stationary at level while agriculture, manufacturing and crude oil export prices were integrated at order 1. In the case of fiscal and monetary policies, the variables were stationary at second differencing.

Table 2: Engle-Granger co-integration test

Variable	ADF	5% Critical Value	Order
ECM	-5.65	-3.57	I(1)

Eview 8

The table 2 above confirmed co-integration relationship as the ADF statistics exceeded the critical value at 5% level, an indication of a long run relationship between GFD and export prices. In Table 3, the long run model was estimated with one autocorrelation. The result explained the 61% of government deficit. Also, the DW of 1.61 falls within the range of 1.59-2.41 of no autocorrelation while the F-statistic suggests that the model is statistical significant. The result further reveals that only manufacturing export price exerted negative impact on government fiscal deficit but statistically insignificant. Agriculture, solid mineral and crude oil export prices exerted positive impact on GFD and only crude oil export

price is significant. For instance, a 1% increase in crude oil export price led to about 2.3% increase in GFD and vice versa.

Table 3: Long run dynamic estimate
LGFD

Variable	Coefficient	Std Error	t-statistics	Probability
Constant	-10.684	0.670	-11.35	0.00
IAP	1.110	0.886	1.25	0.26
ISMP	2.725	4.216	0.65	0.53
IMP	-2.927	3.019	-0.97	0.34
ICOP	2.321	0.895	2.59	0.02

Diagnostic Test

R ²	0.61
DW	1.61
F-stat	5.82

Eview 8

In table 4, the result of the test shows that the model is not correlated. Thus, it is free from heteroscedasticity. The value of the DW which is 1.87 revealed absence of autocorrelation. The F-stat of 7.75 revealed the joint significant of the model. The R² showed that the explanatory variables explained 74% of the variations in GFD. The ECM term means that any disequilibrium is corrected with a speed of 23% within a year.

Table 4: Parsimonious
DLGFD

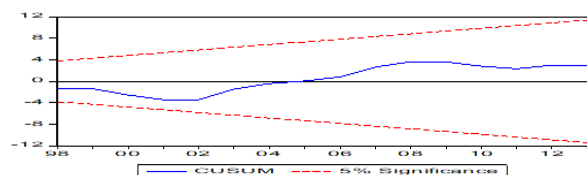
Variables	Coef	std error	t-stats	Prob
Constant	0.2160	0.2500	0.870	0.400
Δ LGFD (-1)	0.4640	0.1380	3.350	0.000
Δ IAP	-2.0240	0.6200	-	0.000
			3.260	
Δ ISMP(-2)	-6.1220	2.5880	-	0.030
			2.370	
Δ LIMP(-1)	2.0100	2.6440	0.760	0.460
Δ LICOP(-1)	3.8040	0.6590	5.780	0.000
ECT(-1)	-0.2300	0.0970	-	0.030
			2.360	

Diagnostic Test

R ²	0.74
DW	1.87
F-stat	7.75
Serial Correlation LM Test F-stat	0.27(0.76)
ARCH LM Test F-stat	0.54(0.47)

Eview 8

Fig 1: Stability test



Broad Money Supply (M2) and Sectoral Export Prices
Based on stationarity test in Tables 1, we tested for cointegration using Engle-Granger test and estimated the error correction model. As can be seen in table 5 there exists a deep relationship between M2 and prices of the three export commodities as the ADF statistic exceeded the critical value of 5% level.

Table 5: Engle-Granger test for cointegration

Variable	ADF	5 % Critical Value	Order
ECM	-6.32	-3.56	I(1)

The long run estimates in Table 6 showed that agriculture, solid mineral and crude oil export price exerted significant positive impact on M2 as against manufacture export price whose sign is negative and statistically insignificant.

Table 6: Long run dynamic estimate

LM2				
Variable	Coefficient	Std Error	t-statistic	Probability
Constant	-3.2839	3.300	-0.99	0.33
IAP	0.9123	0.090	10.13	0.0000
ISMP	1.0045	0.467	2.15	0.0068
IMP	-0.0968	0.656	-0.15	0.8838
ICOP	1.4581	0.165	8.79	0.0000
Diagnostic Test				
R ²				0.95
F-stat				146.72
DW				1.84

Source: Author's computation using Eview 8.0

For instance, a unit increase in agriculture export price led to an increase in M2 of 0.91% over the long run. Table 7 presented the ECM and the battery of tests revealed that the model is serially uncorrelated and has no heteroscedasticity problems. The F-stat showed that the model is jointly significant.

Table 7: Parsimonious DM2

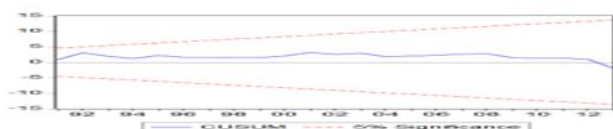
Variable	Coefficient	std error	t-statistics	Probability
Constant	0.0880	0.0428	2.06	0.05
ΔM2(-1)	0.6308	0.1761	3.58	0.00
ΔIAP(-2)	-2.2701	1.0020	-2.26	0.03
ΔISMP(-2)	0.0011	0.0010	1.11	0.28
ΔIMP(-2)	-0.0025	0.0019	-1.34	0.19
ΔICOP	0.0013	0.0010	1.23	0.23
ΔICOP(-2)	0.0012	0.0010	1.15	0.26
ECM(-1)	-0.0846	0.0337	-2.51	0.02
Diagnostic Test				
R ²				0.67
F-stat				2.94
DW				1.65
Serial correlation Test F-stat				0.39(0.68)
ARCH LM Test F-stat				0.17(0.68)

Source: Author's computation using Eview 8.0

Table 7 further showed that the explanatory variables explained 67% of the variations in M2. Agriculture and manufacturing export prices have negative impact on money supply with only the former being significant. By implication, a unit increase in agriculture export price led to 2.27% decrease in M2 in the short run. On the other

hand, solid mineral and crude oil export prices as well as a one year lag of money supply exert positive but insignificant impacts on M2 with only the lag of M2 being statistically significant. A unit increase in previous M2 led to an increase in current M2 by 0.09%.

Fig 2: Test of Model Stability



Over the years, government's aim has always been to reduce deficit and increase or boost revenue in scope and dept. government can only achieve this laudable aim when prices of exports are favourable (Alan, 2010). During the period under review, we observed that the government was accumulating deficits as a result of meager amount realized from non-oil export due to export prices instability. It was observed that crude oil export price had significant impact during the course of study. For example, from 2007 to 2010, the government was always fixing its budget benchmark below the price of crude oil in the world market, thereby resulting in reduction of government revenue. Apparently, government has no option but to finance its programmes through deficit spending.

In the case of monetary policy, the target of government over the years has been to increase oil and non-oil revenue with a view to reducing excess liquidity; but export price fluctuations have dampened this objective. Similarly, export revenue has not effectively lead to slowdown in the continuous rise in M2 except for agricultural sector which tended to reduce money supply in the short run as the largest non oil sector. Notably, agriculture is the largest contributor to GDP and largest employer of labour. That its contribution to government revenue helps to reduce liquidity in the short run.

V. CONCLUDING REMARKS

The paper examines export monetary in Nigeria for the period, 1981-2017. The fluctuation associated with export prices has caused persistent fiscal deficits, huge public debts and rising inflation occasioned by persistent increase in money supply. Therefore, the study employed econometric methods to analyze the data. The study found that in the short run, previous lag of fiscal deficit, agriculture, solid mineral and crude oil export prices were determinants of fiscal deficit. In the long run, only crude oil export price affected fiscal deficit. Also, it was found that agriculture, solid mineral and crude oil export prices were determinants of money.

The negative sign of agriculture and solid mineral showed that they have the potential to reduce deficit but this was made difficult because of their low revenue yielding due to years of neglect. Thus, the economy was sustained mainly by revenue from crude oil whose international oil price was highly volatile. The periods of declining oil price was accompanied with severe revenue short falls. Consequently, government resorted to deficit to carry on with its policies and programmes. Essentially, resources were channeled into servicing the loans borrowed to finance the deficits thereby curtailing the government's ability to provide adequate employment to absolve the teeming youths roaming the streets. The result is armies of unemployed that have constitute security threat and economic saboteur to Nigeria. Thus, there is the militancy in the Niger Delta, Boko Haram in the North East, Indigenous People of Biafra (IPOB) in the South East and the herders/farmers clashes all over Nigeria for which countless number of lives have been lost.

From the monetary policy corridor, output price of agriculture in the short run shows it could minimize expansionary monetary policy, in the long run crude oil export price and solid mineral including agriculture export prices increase M2. While the inability of the non oil sector to stem the tide of continuous increase in money supply could be attributed to price fluctuations and low revenue yielding for the government, volatility and the Dutch Disease syndrome were the major factors associated crude oil price. Thus, within the period under review government runs expansionary monetary policy by floating treasury bills at the money market, increase credit to government and private sectors as well as commercial banks with implication on other monetary variables. For instance, the economy witnessed high inflation rate even as interest rate remained double digit for most of the periods. Consequently, exchange rate increased leading to a fall in the value of the Naira. The rise in exchange rate is one singular factor that affected the economy as it increases costs of production.

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