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TERMS OF TRADE, TRADE OPENNESS AND GOVERNMENT SPENDING IN NIGERIA

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Abstract

In this study, we estimated the short-run and long-run effect of terms of trade, trade openness and government spending in Nigeria from 1981 to 2019. Data for this study was sourced from the World Bank's World Development Indicators (WDI), Central Bank of Nigeria's (CBN) Statistical Bulletin, and FRED Economic Data. Using the ARDL estimation method, the study found that terms of trade do not significantly determine government spending in both the short-run and long-run. The short-run effect of trade openness on government was not significant, but its long-run effect was negative and statistically significant, confirming the efficiency hypothesis in the relationship between trade openness and government spending.

Keywords: Terms of trade, Trade openness, ARDL

JEL Classification: F10, C22, H10

1.0 Introduction

Nigeria trades very heavily on primary commodities whose prices (and in some cases, quantities) are not determined by it. Consequently, Nigeria is prone to fluctuations in the global commodities market, which would often prompt a response in government spending, either upwards or downwards.

An increase in export prices relative to import prices allows a larger volume of imports to be purchased with a given volume of exports. The implied increase in the real purchasing power of domestic production is equivalent to a transfer of income from the rest of the world and can have large impacts on consumption, savings and investment. The terms of trade can also be thought of as a rate of return on investment and therefore a secular improvement in the terms of trade leads to an increase in investment and hence economic growth (Borkin, 2006). Still in line with causal effect running from terms of trade to economic growth, Brueckner and Carneiro (2017) interacted government spending and terms of trade volatility to find its effect on economic growth. The study found that volatility has significant negative effects

on economic growth in countries with procyclical government spending. In countries where government spending is countercyclical, terms of trade volatility has no significant effect on growth.

Besides terms of trade, another important external sector variable is trade openness. Trade openness measures the degree to which a country interacts with the rest of the world through trade. The effect that trade openness has on government expenditure or size can either be positive or negative. If it is positive, trade openness is said to be “compensating”, while a negative relationship is “efficient”. When trade openness has a compensating effect on the size of government, it means that exposure to risks that come with interacting with the rest of the world is made up for (compensated), by increased domestic spending (Dixit, 2014, Jacquet, 2018). On the other hand, when trade openness has an efficient effect on the size of government, it means that the increased competition that comes from firms abroad will make domestic companies put pressure on the government not to implement policies that will make labour more expensive, thus driving up production cost and making their products less competitive. The pressure from the companies will make the government reduce taxes such as company income tax, payroll taxes, etc.; reducing the public expenditure (Dixit, 2014).

This study aims to compare the extent to which terms of trade and trade openness – indicators of the external sector of the Nigerian economy – influence the size of government. In the case of terms of trade, we hope to unravel if it leads to higher or lower government spending, while in the case of trade openness, we hope to evaluate if it leads to compensating or efficient effects in government. The rest of this study is organized thus- Section 2 contains the literature review, the methodology is situated in Section 3, while Section 4 is where results are presented and discussions done; finally, Section 5 concludes the study.

2. Literature Review

2.1 *Relationship between terms of trade and government expenditure*

Studies on the effect of terms of trade on government spending are varied given that Feehan (1996) posits that governments can respond to changes in terms of trade by increasing or decreasing spending. That is, government spending responding to changes in terms of trade. The study further posits that substantial changes in the terms of trade may force macroeconomic adjustments.

Rodrik (1997) noted a positive relationship between openness and size of government. He posited that governments will have to spend more domestically to insulate the domestic economy from external risks. Studying the volatility of terms of trade further and how it is related to government spending, Benarroch and Pandey (2008) found that there is no association between the size of government and terms of trade volatility in a cross-section of 96 countries. However, a granger causality test indicated that a reverse causality going from government size to volatility is found, suggesting that an increase in government size causes a decrease in terms of trade volatility.

Bourdet (2004) studied the effect of terms of trade shocks on economic growth in Burkina Faso and Mali limiting its analysis to shocks in commodities prices. The study confirmed that external shocks had adverse negative effects on the economic performance of the two countries, fuelled by counter-cyclical foreign official assistance. Bower, Geis and Winkler (2007) narrowed their study to the monetary and fiscal policies effect of commodity price fluctuations in Western and central Africa (WCA). In their study, they confirmed that

following the rise in commodity prices between 1999 and 2005, net oil exporters recorded strong growth rates while net oil-importing countries displayed somewhat lower growth. For most WCA economies, inflation rates appeared less affected by commodity price changes and more determined by exchange rate regimes as well as monetary and fiscal policies. While pass-through effects from international to domestic energy prices were significant, notably in oil importing countries, second-round effects on overall prices seem limited. Governments of oil-rich countries reacted prudently to windfall revenues, partly running sizable fiscal surpluses.

Kaminsky (2009) in a study on terms of trade shocks and fiscal policies in 74 countries using panel OLS and 2SLS found that booms in the terms of trade did not necessarily lead to larger government surpluses in developing countries, particularly in emerging markets and especially during capital flow bonanzas. However, in OECD countries, fiscal policy was of an acyclical nature. Jaaskela and Smith (2011) studied the effect of terms of trade shocks on inflation, output, interest rate and exchange rates in Australia adopting the VAR technique. The study found that a higher terms of trade tends to be expansionary but is not always inflationary. A key result is that the floating exchange rate had provided an important buffer to the external shocks that move the terms of trade.

Kassouri and Altintas (2020) disaggregated the response of real effective exchange to exchange rate appreciation and depreciation. Using the panel ARDL estimation technique, the study found that positive changes in commodity terms of trade had a more pronounced effect on real currency exchange rate depreciation in the long-run than negative shocks; while negative shocks in commodity terms of trade in the short-run had a significant effect on real effective exchange rate depreciation.

2.2 *Relationship between Trade Openness and government expenditure*

Using disaggregated government expenditure data, Benarroch and Pandy (2012) established that the only causal link between trade openness and government expenditure ran from trade openness to educational expenditure in low-income countries. Dixit (2014) investigated the relationship that existed between trade openness and the size of government in India from 1980 to 1981 and 2009 to 2010. Adopting the ARDL estimation method, the study found that trade openness was negatively related to size of government. Oyeleke and Akinlo (2016) studied the relationship between trade openness and government expenditure in Nigeria from 1980 to 2013. Using the ARDL bounds testing approach, the study found that there is no cointegration between trade openness and government expenditure, the same conclusion was arrived at by Aydogus and Topcu (2013) for their study on Turkey.

In Farhad and Jetter (2019), there was a positive relationship between trade openness and government expenditure on housing for countries that are democratic, and face high global price volatility. The study was conducted for 143 countries from 2000 to 2016. In de Mendonça and de Oliveira (2019), the relationship between trade openness and government size was examined in 124 countries from 1980 to 2016. Findings from the study show that while trade openness was important determinant of government size in developing economies, it was not so for high income economies; trade openness as a determinant of government spending in Nigeria is confirmed by Jibir and Aluthge (2019). Maluleke (2020) investigated the causal link between trade openness and government size in South Africa from 1980 to 2018 using the Granger test of causality. Findings from the study indicated that there is a long-run unidirectional relationship between government size and trade openness, running from trade openness to government size.

Given the close relationship that has been established to exist between government spending and terms of trade on the hand and trade openness on the other, it is imperative to control for these two variables in a study on government spending to avoid overestimation by considering just one. The reviewed literature fall short of this especially those on Nigeria. Thus, this study aims to bridge this gap by estimating the impact of terms of trade and trade openness on government expenditure in Nigeria.

2.3 *Theoretical Literature*

J.S Mill had propounded the theory of reciprocal demand that seeks to explain the relationship between two trading countries. It is this reciprocal demand that actually determines the prevailing terms of trade and how much gains obtained by a particular country. The reciprocal demand can be defined as the demand for imports in terms of the export of the country. Mill argued, acquisition of imports from abroad is the purpose of trade while exports are just means of payment for imports. In order to import some useful commodities from abroad exports of a country should have a real demand in the other countries. So a country should produce both for itself and for consumers in the other countries. Otherwise its exports could not be sold in international market and consequently the country could not import any commodities at all (Varma and Chacko, 2011).

Keynesian models provide the rationale for countercyclical fiscal policy. In these models, the fiscal authority has an objective function that penalizes deviations of output from trend. Since an increase in government spending and/or a reduction in tax rates would expand output (and vice versa), fiscal policy will be countercyclical. In contrast, neoclassical models rationalise acyclical fiscal policy since roughly constant tax rates over the business cycle reduce distortions (Chari and Kehoe, 1999).

Furthermore, Rodrik (1998) postulates that overall, governments with more open economies are bigger. That is, there is a positive relationship between trade openness and government spending. This is so because government spending serve to minimize the risk that exposure to the international market bring.

3. **Methodology**

3.1 *Data Issues*

Secondary data was used for this study. Yearly data from 1981 to 2019 was sourced on all the variables. Data on terms of trade (*tot*) index and trade openness (*to*) was sourced from the World Bank's World Development Indicators (WDI). Data on inflation (*inf*), oil export earnings (*oile*) and government expenditure (*ge*) were sourced from the Central Bank of Nigeria's (CBN) Statistical Bulletin while annual global oil price (Brent, a popular global barometer for the movement in the price of oil) (*oilp*) was sourced from FRED Economic Data¹

Government expenditure (*ge*) is government total recurrent and capital expenditure in Billions of naira; terms of trade (*tot*) is the percentage ratio of the expert unit value indexes to import unit value indexes for Nigeria; trade openness (*to*) is measured as the share of GDP accounted for by exports and imports; inflation (*inf*) is measured as percentage change in

¹ This data was sourced via <https://fred.stlouisfed.org/series/POILBREUSDM#0>

consumer price index; oil export earnings (oile) is the amount in billions of naira of Nigeria's crude export; oil price (oilp) is the international price of Brent in dollar per barrel. The variables used for estimation are expressed in their natural logarithmic forms with l as prefix for the abbreviated forms of the variables.

3.2 Model Specification

This paper will follow the linear Autoregressive Distributed Lag (ARDL) modelling developed by Pesaran *et al.* (2001) to examine the relationship among terms of trade, trade openness and government expenditure in Nigeria. This is to ascertain both the short-run and long-run dynamics of the relationship in Nigeria. The analytical model proceeds as follows:

$$\begin{aligned} \Delta ge_t = & \alpha_0 + \sum_{i=1}^p \alpha_i \Delta tot_{t-i} + \sum_{i=0}^q \beta_i \Delta to_{t-i} + \sum_{i=0}^r \delta_i \Delta inf_{t-i} + \sum_{i=0}^s \chi_i \Delta oile_{t-i} + \sum_{i=0}^t \phi_i \Delta oilp_{t-i} \\ & + \varphi_1 ge_{t-1} + \varphi_2 tot_{t-1} + \varphi_3 to_{t-1} + \varphi_4 inf_{t-1} + \varphi_5 oile_{t-1} + \varphi_6 oilp_{t-1} + \varepsilon_t \end{aligned} \quad \dots (1)$$

where:

$-\frac{\alpha_0}{\varphi_1}, -\frac{\varphi_2}{\varphi_1}, -\frac{\varphi_3}{\varphi_1}, -\frac{\varphi_4}{\varphi_1}, -\frac{\varphi_5}{\varphi_1}$ and $-\frac{\varphi_6}{\varphi_1}$ are the long-run coefficients for the intercept and slope respectively, while $\alpha_i, \beta_i, \delta_i, \chi_i,$ and ϕ_i are short-run coefficients. $p, q, r, s,$ and t are the first-differenced optimal lags for the variables selected by the Schwarz Information Criterion (SIC). We impose zero restrictions on the long-run estimated coefficients of the one-period lag of TO, ToT and other independent variables to achieve long-run relationship among government spending, terms of trade and trade openness in line with Pesaran *et al.* (2001). By this, the null hypotheses of no long-run relationship is stated thus: $H_0: \varphi_1 = \varphi_2 = \varphi_3 = \varphi_4 = \varphi_5 = \varphi_6 = 0,$ against the alternative hypothesis of $H_1: \varphi_1 \neq \varphi_2 \neq \varphi_3 \neq \varphi_4 \neq \varphi_5 \neq \varphi_6 \neq 0.$ Using the Wald (F-statistic) test, this hypothesis of a long-run relationship is tested. We calculate two critical bounds values are for any significance of long-run relationship: the lower value where all the variables are $I(0)$ and the upper value where they are $I(1)$. If the calculated F-statistics is greater than the upper bound, there is long-run relationship or cointegration, otherwise there is none.

To capture the speed of adjustment into the long-run between terms of trade, trade openness and government expenditure, an error correction model of equation (1) will be specified thus:

$$\begin{aligned} \Delta ge_t = & \alpha_0 + \sum_{i=1}^p \alpha_i \Delta tot_{t-i} + \sum_{i=0}^q \beta_i \Delta to_{t-i} + \sum_{i=0}^r \delta_i \Delta inf_{t-i} \\ & + \sum_{i=0}^s \chi_i \Delta oile_{t-i} + \sum_{i=0}^t \phi_i \Delta oilp_{t-i} + ecm_{t-1} + v_t \end{aligned} \quad \dots (2)$$

Pesaran, Smith and Shin (1996, 2001) show that the ARDL framework allows for series integrated of both order 0 and 1 to be estimated at once. The variables selected in this analysis were made on the basis of the reviewed theoretical literature and empirical studies such as Jibir & Aluthge (2019) and Maluleke (2020).

4. Results

4.1 Preliminary analysis

The descriptive statistics in Table (1) shows that apart from oil price and trade openness, the other variables have average values that are quite smaller than their maximum. Furthermore, the standard deviation for the variables show considerable variations in the series, with oil export earnings being the most volatile. The Jarque-Bera statistics show that government expenditure and inflation are the series that are not normally distributed.

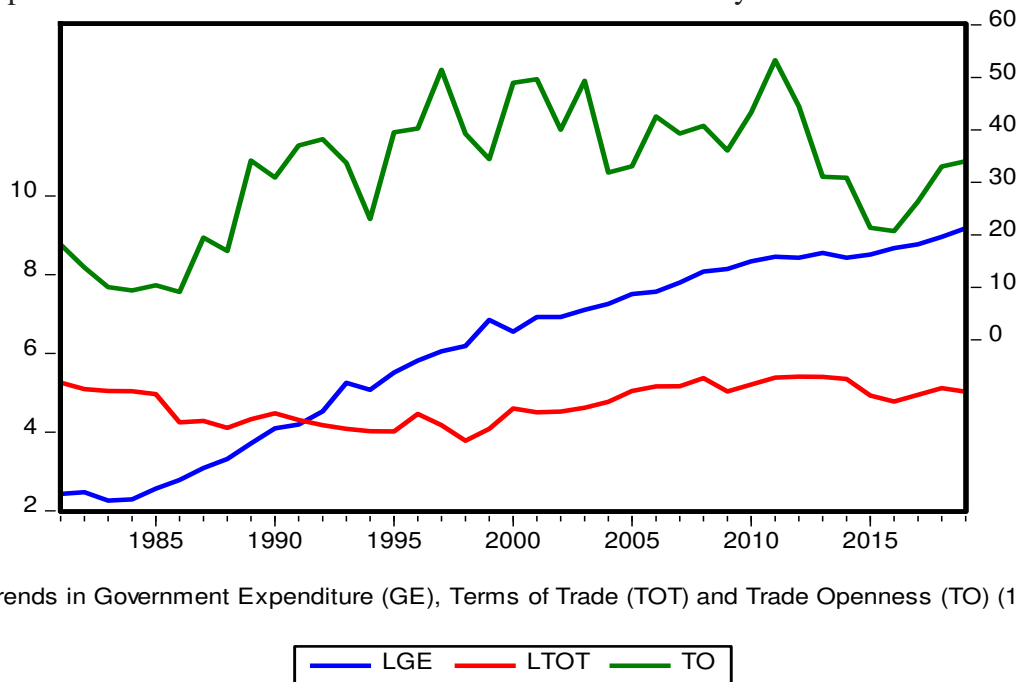


Fig. 1: Trends in Government Expenditure (GE), Terms of Trade (TOT) and Trade Openness (TO) (1981-2019)

In Figure (1), the trends and co-movement in the series is presented. It can be observed that all the series seem to be positively trending for the period under review, except for the irregularity in trade openness. Terms of trade seem to be somewhat flat for the period under review.

Table 1: Descriptive Statistics

	GE	INF	OILE	TO	TOT	OILP
Mean	2040.908	19.14646	2430.350	32.30051	125.6790	3.552364
Median	947.6900	12.55496	1230.850	34.02388	119.0035	3.361417
Maximum	9714.843	72.83550	8878.970	53.27796	224.6432	4.71519
Minimum	9.636500	5.388008	7.250000	9.135846	43.87755	2.549445
Std. Dev.	2544.412	17.06283	2723.421	12.40409	55.82771	0.664003
Jarque-Bera	11.03762	27.16262	4.756112	1.795334	2.805303	3.058931

Probability 0.004011 0.000001 0.092731 0.407519 0.245944 0.216651

Source: Researchers' computation (2021)

The correlation matrix in Table (2) show that the predictor variables do not suffer from multicollinearity problems as their correlation coefficient seem not to be severe (see Kim (2019)).

Table 2: Correlation Matrix of Variables

	<i>lge</i>	<i>inf</i>	<i>loile</i>	<i>to</i>	<i>ltot</i>	<i>loilp</i>
<i>lge</i>	1.000000					
<i>inf</i>	-0.292470	1.000000				
<i>loile</i>	0.983259	-0.280500	1.000000			
<i>to</i>	0.593501	-0.056458	0.670207	1.000000		
<i>ltot</i>	0.392817	-0.507561	0.410697	-0.025254	1.000000	
<i>loilp</i>	0.685195	-0.461740	0.698138	0.223406	0.918708	1.000000

Source: Researchers' computation (2021)

Note: Except for trade openness (*to*) and inflation (*inf*), the other variables are expressed in their natural logarithmic forms

In Table (3), we report the unit root tests. Two kinds of unit root tests are reported – the Augmented Dickey Fuller (ADF) and the Philip-Perron (PP) Tests. The tests result shows that the series under consideration are largely stationary at their first differences. That is, they seize to have unit root after first differencing. This still fits the condition for the use of ARDL by Pesaran & Shin (1999), where the framework can be used for uniformly integrated series or series of mixed order of integration (not higher than I(1))

Table 3: Unit Root Tests

	Augmented Dickey-Fuller (ADF)			PP Unit Root Test		
	LEVEL			LEVEL		
	Constant	Constant & Trend	None	Constant	Constant & Trend	None
<i>inf</i>	-2.915636*	-4.019832**	1.919931*	-2.784994*	-2.867527	-1.792519*
<i>lge</i>	-1.421197	-0.423101	0.562072	-1.081691	-0.937502	3.201785
<i>loile</i>	-1.442117	-0.824799	1.872091	-1.522267	-0.781897	1.848689
<i>loilp</i>	-1.024257	-2.334812	0.166226	-1.024257	-2.365179	0.185996
<i>ltot</i>	-1.691342	-2.507355	-0.320711	-1.700747	-2.464389	-0.323897
<i>to</i>	-2.308196	-2.366662	-0.498099	-2.220641	-2.287732	-0.247960
	FIRST DIFFERENCE			FIRST DIFFERENCE		
<i>inf</i>	-5.672638***	-5.606727***	-5.754334***	-9.669308***	-10.60546***	-10.05194***
<i>lge</i>	-1.993978	-7.708211*** ^c	-0.523556	-7.323788***	-7.589937***	-4.833678***
<i>loile</i>	-6.171975***	-5.372773***	-5.239155***	-6.171975***	-6.957459***	-5.287572***
<i>loilp</i>	-5.755245***	-5.725322***	-5.810317**	-5.745756***	-5.712388***	-5.803923***
<i>ltot</i>	-5.105019***	-5.205633***	-5.181387***	-5.732213***	-5.749143***	-5.825301***
<i>to</i>	-7.477690***	-4.656047***	-7.546726***	-8.038615***	-9.913599***	-7.932723***

Source: Researchers' computation (2021)

Note: *** and ** imply significance at 1% and 5% respectively. All variables are in their natural logarithm form

An important step in the ARDL modelling is the determination of cointegration in the variables of interest. That is, to determine if a long-run combination of the variables exist despite not being integrated at level. The result of the bounds testing approach to cointegration is reported in Table (4). From the result, it is observed that given that the value of the F-statistic is greater than the upper bound at the 5 percent level of significance, there exists cointegration among government expenditure, terms of trade, trade openness, inflation, oil export earnings and oil price in Nigeria.

Table 4. Bounds test for ARDL (4, 0, 3, 4, 3, 1)

Test Statistic	Value	Significance	I0 Bound	I1 Bound
F-statistic	3.859989	10%	2.26	3.35
k	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68

Source: Researchers' computation (2021)

Note: Lag selection was by Swartz Information Criterion (SIC)

4.2 Discussion of Results

Table (5) presents the result of the short-run and long-run analysis of the effect of terms of trade and trade openness on government spending in Nigeria. The short-run analysis shows that both terms of trade and trade openness exert negative effects on government openness, however, these effects are not statistically significant at the 5 percent threshold for this study. In the short-run, it is observed that inflation and oil export earnings exert negative and statistically significant effects on government expenditure. More specifically, for every 1 percent rise in inflation, government expenditure declines by about 0.001 percent; on the other hand, for every 1 percent rise in oil export earnings, government expenditure declines by about 0.01 percent. This implies that the effect on government size coming from oil export is more than that coming from inflation. Oil price also exerts a negative effect on government expenditure, but insignificantly.

In the long-run, terms of trade remains negatively related to government expenditure, but insignificantly while trade openness exerts a negative and statistically significant effect on government expenditure. In specific terms, for every 1 percent rise in trade openness in the long-run, government expenditure in Nigeria declines by about 0.06 percent; this long-run effect is not just larger than the short-run, but is also statistically significant. The effect of inflation in the long-run turned positive but insignificant; this result is in line with a similar study by Jibir & Aluthge (2019). It is observed that oil export earnings exerts a positive and statistically significant effect on government expenditure, in agreement with Jibir & Aluthge (2019). From the result, every 1 percent rise in oil export earnings results in about 1.2 percent increase in government expenditure. The effect of oil export remained negative and insignificant in the long-run. The short-run and long run significant effect of oil export earnings, particularly the long-run significant positive effect is supported by the findings of Awode & Akpa (2018).

The long-run effect of trade openness on government expenditure, in terms of sign is in disagreement with Rodrik (1998), but supports the findings of Benarroch & Pandy (2012). The negative relationship found between trade openness and government expenditure supports the efficiency hypothesis that says that increased trade openness makes governments reduce tax collection from domestic companies to help them remain

competitive with their foreign counterparts, thus reducing the size of the government. This may be true for Nigeria, where oil export earnings including borrowings play important roles in spending than international trade in general, besides, the country's contribution to international is still quite small.

The speed of adjustment to the long-run following a disruption in the short-run given by the ECT_{t-1} term is negative, less than one and statistically significant. The ECT_{t-1} coefficient shows that 38% of short-run distortions in the system will be recovered in the year, and it will take the system about two years and half to some to full recovery.

Table 5: ARDL Result for Short-run and Long-run coefficients

Variables	
Short-run results	Symmetric
Δlge_{t-1}	0.192344 (0.262869)
$\Delta ltot$	-0.268937 (0.360567)
Δlto	-0.002277 (0.0356)
Δinf	-0.000724 (0.003350)***
$\Delta loile$	-0.006681 (0.002212)***
$\Delta loilp$	-0.539383 (0.400587)
ECT_{t-1}	-0.381494 (0.079771)***
Long run results	
Constant	4.034159 (2.576260)
$ltot$	-0.704956 (0.936467)
to	-0.055152 (0.010463)***
inf	0.003601 (0.006758)
$Loile$	1.227484 (0.089039)***
$Loilp$	-0.058629 (0.660523)
F-stat	888.1575***
Adj R^2	0.9981
J-B stat.	0.955146
Breusch-Godfrey LM test	0.3249

Breusch-Pagan-Godfrey
Heteroscedasticity test

0.2916

Lag selection (SIC)

4,0,3,4,3,1

Source: Researchers' computation (2021)

Note: * and ** imply significance at 1% and 5% respectively. All variables are in their natural logarithm form.**

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