The Relationship between External Reserve and Trade: Evidence from Nigeria.

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Abstract: *The study is an attempt to examine the relationship between external reserve and trade in Nigeria. It covers the period between 1981 and 2017. The study employed ARDL Bound test method of econometric technique to test for both long run and short run relationship while granger causality test was used to test for the causal relationship. Base on the regression estimate, exchange rate, oil export and non-oil export had positive impact on external reserve while oil import and non-oil import had negative effect on external reserve, also, the granger causality test revealed that exchange rate, non-oil export, oil export and oil import has uni-directional causal relationship with the causal running from each variable to external reserve while there is bi-directional relationship between non-oil import and external reserve. The above result clearly reflects the presence situation in Nigeria where both oil and non-oil export increases the external reserve while oil and non-oil import deplete it. This finding also revealed that the volume of external reserve affects non-oil export.*
This study recommend that more effort should be put into the non-oil export that is relatively stable for the country to have a huge and stable external reserve, also government should ensure that all refinery are working and to the full capacity in addition more refinery should be built so that the country would import little or no oil by this the country external reserve would be preserve and use for more productive purpose, furthermore, products that can be produce locally should be discourage from been imported and importation of luxury goods should be restricted, finally, government should take caution not to be tempted to squander the reserve when it rises.
Keywords:Self-insurance Theory, Mercantilist Model, external reserve, ARDL
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I.   Introduction

The issue of external reserve has been a topic of discuss among both the researchers and policy makers since the time countriesbegins to trade among themselves and it has been identified by researchers as an indicator of the financial strength of an economy Nneka(2012),Elhiraika and Ndikumana (2007). Prior to 1939external reserves were only held in gold. Unfortunately, Second World War erupted in 1939 and this destroyed the world economy, immediately the war ended in 1945 Bretton Wood Institutions were established to rebuild the world economy. With the establishment of Bretton wood system, gold standard was abolished and US dollar was pegged to gold. Thereby making, US dollar, appearing as good as gold, became the fiat and most significant reserves currency Kashif, Sridharan and thiyagarajan (2017).However, in 1962 other currencies were allowed to serve as external reserve.

The recent trend of accumulation of external reserve was as a result of the Asian financial crises of the 1990's. This marks the beginning of the era of financial globalization(Krušković & Maričić2015).The crises instigated the Asian countries to increase their external reserves as a result of precautionary demand, reflecting the desire for self-insurance against sudden restrictions in their ability to borrow funds from other countries (Allen and Hong, 2011). It is also noted that the bulk of the foreign exchange reserves accumulation in Asian can be attributed to an optimal insurance model that serves as a steady source of liquidity to mitigate the impact of a sudden stop in capital flows (Islam, 2009). Mendoza (2004), stated two motives of holding reserves as transactionary and precautionary while Aizenman and Lee (2005) added the third which is mercantilist motive.

External reserves accumulation has much benefit among which are: Enhances foreign debt service and international trade activities, serves as self-insurance against external shocks,serves as a tool for maintaining low exchange rates, promotes trade and international competitiveness, shows the creditworthy in the eyes of

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other countries, creditors and donors payments, supports monetary policy operations, enhances transaction needs, fosteres confidence in the government policy framework and its capacity to meet external obligations Elhiraika and Ndikumana (2007), Kashif, Sridharan, and thiyagarajan. (2017), Aizenman and Lee (2005), World Bank (2019), Drummond, Mrema, Roudet, and Saito (2009), Nugee (2000), Soludo (2005).

Despite the enormous benefitthat is attributed to external reserve as noted above, few researchers had investigated the relationship between external reserve and trade rather researchers like Prakash (2016),Olokoyo, Osabuohien and Salami (2009), Akaninyene (2016), Fukuda and kon (2007), Osuji and Ebiringa, (2012), focused on the impact of external reserve and macroeconomic variables. While some other researchers focused on the impact of selected variables on external reserve, for example researchers like Krušković & Maričić (2015), Kashif, et al (2017), Nwafor (2017), Aluko (2007), Obaseki (2007),Samih & Wael (2017),Akinwunmi and Adekoya (2016), Fapetu and Oloyede (2014),Awoderu, Ochalibe, and Obekpa (2017) investigated the impact of GDP on external reserve whileresearchers like (Gokhale and Ramana (2013), and Adhikari (2018) examined the relationship between exchange rate and external reserve. So, there is need to investigate the relationship between external reserves and trade.

II.   Literature review

External reserve can also be called foreign reserve or international reserve and it is defined according to IMF as consisting of official public sector foreign assets that are readily available to, and controlled by the monetary authorities, for direct financing of payment imbalances, and directly regulating the magnitude of such imbalances, through intervention in the exchange markets to affect the currency exchange rate and/or for other purpose (IMF, 2007). The mandate of managing the reserve is bestowed on the central bank of each country. The components of foreign reserves include monetary gold, reserve position at the International Monetary Fund (IMF), holding of special drawing right (SDRs) and foreign exchange which are convertible currencies of other countries (CBN, 2007). The major currencies that Nigeria hold as reserves are US dollar, pound sterling, Euro and yen.

Prior to 1959 when Central Bank of Nigeria (CBN) was established the Nigeria external reserve was been manage by West Africa Currency Board. Consequent upon the establishment of CBN, the apex takes charge of the responsibility of managing the reserve in accordance with the Act establishing it. And the reserves were kept only in gold and pound sterling in compliance with CBN Act 1959.

In 1961, Nigeria joined international Monetary Fund IMF and this widen the monetary options available to the country. Consequently, in 1962 CBN Act 1959 was amended to allow the apex bank maintain the external reserve not only in gold and pound sterling.

Osabuohien and Egwakhe (2008), investigated the relationship between external reserves and the Nigerian economy from 1994 to 2005. The study showed that there is a positive insignificant relationship between reserve and export that is export was not promoted satisfactorily by the nation's reserve holdings.

Akaninyene (2016),conducted a study on foreign reserves accumulation and macroeconomic environment: the Nigerian experience between 2004 and 2014. The ordinary least square (OLS) econometric model was employed in the analysis of the data. The result showed that GDP and exchange rate had positive impact on external reserve while trade, external debt, unemployment and inflation had no impact on external reserve.

Kevin, Roland, and Sashana, (2013), investigated the Macroeconomic effects of foreign exchange reserves on 13 countries between 1980 and 2012 using balanced panel. The study showed that foreign exchange reserves had a negative influence on consumption and debt maturity while exports and economic growth had positive impact on

Olokoyo et al (2009),examined the relationship between foreign reserves and some macroeconomic variables in Nigeria from 1970 to2007. Analyzing secondary data from CBN statistical bulletins (1970–2007), the econometric results obtained from cointegration test, vector error correction (VEC) within the framework of autoregressive distributed lags (ARDL) was used in the study. The results showed that there is a long-run relationship between foreign reserves and selected macroeconomic variables. The study further revealed that GDP and trade openness had positive impacts on foreign reserves, thereby supporting the self-insurance theoretical base of foreign reserves. Whereas the level of foreign capital inflow and inflation had a negative impact on foreign reserves.

Fang and Lili (2011),investigated correlation between the foreign exchange reserves and the exchange rate in China. The study used monthly data between 1994 and 2011. The study used Johansen estimation technique to analyses the date. The study revealed that total of import and export trade and GDP had a positive relationship with external reserves.

III. Theoretical review

3.1 Mercantilist Model

The Mercantilist model states that countries accumulate external reserve in order to manage effectively the exchange rate in order to trade and international competitiveness. Also this allows African countries to borrow abroad, attract foreign capital and promote domestic private investment as a result of strengthened external position and reduced vulnerability to external shocksElhiraika and Ndikumana (2007).On this model, Yeyati (2008) also noted that one reason for the recent surge in the stock of foreign reserves in developing countries is to prevent real exchange rate appreciation as a result of capital inflows, either due to the 'mercantilist' objective of preserving competitiveness or to avoid a potential overvaluation that may eventually create downside risks.

3.2 Self-insurance Theory

This theory was postulated by Wijnbergen (1990). The theory explains that countries hold reserve which would serve as shock absolver in order to deal with the unforeseen shocks in the international financial system.It examined the cash/debt buy-backs in the context of missing terms of trade contingent instruments in international capital markets coupled with differences in risk aversion between commercial creditors and developing countries' borrowers. The author argued that the price of debt in secondary markets does not adequately reflect the insurance value of reserves to debtors. In the 'bad state' (i.e. a debt default) the debt buy-back is of little use as no debt can be serviced. Hence, the Self-insurance Theory demonstrates how foreign reserves ensure that policymakers have some additional options during the bad periodsAwoderu et al (2017).

IV. Method

This research work would specify its model from theoretical framework of mercantilist theory as explained above. Drawing from the theory, this study seek to investigate the relationship between external reserve and trade in Nigeria and thus specify the linear model below:

Extres = f(trade) (1)

Because Nigeria is a mono-economy that relied mostly on oil export has its major source of revenue therefore, trade would mainly be divided into oil and non-oil. To effectively determine the relationship between trade and external reserve trade would be sub-divided into non-oil export and import then oil export and import

Simplifying equation 1 and introducing exchange rate as explanatory variable equation 2 is derived.

EXTRVES = f (OEXPT, NOEXPT, OMIMPT, NOIMPT, EXR)t (2)

$EXTREVS = \beta_0 + \beta_1 EXPT + \beta_2 NONEXPT + \beta_3 IMPT + \beta_4 NONIMPT + \beta_5 EXR + \mu_t$ (3)

Where the following notation has been used:

EXTRVES = External reserves

OEXPT = oil export

NOEXPT = non oil export

OIMPT = oil import

NOIMPT = non oil import

EXR = exchange rate

μ_t = error term.

The econometrics form of equation 3 is displayed below in equation 4:

$(EXTRVES)_t = \beta_0 + \beta_1(OEXPT)_t + \beta_2(NOEXPT)_t + \beta_3(OIMPT)_t + \beta_4(NOIMPT)_t + \beta_5(EXR)_t + \mu_t$ (4)

Equation (4) needs to be transform for all the variables to have same appropriate coefficient because EXR was in rate while other variables were in billions. Therefore the variables would be log. However, EXR cannot be log because variable on rates or index cannot be log so the model would be log-linear model

$In(EXTRVES)_t = \beta_0 + In\beta_1(OEXPT)_t + In\beta_2(NOEXPT)_t + In\beta_3(OIMPT)_t + In\beta_4(NOIMPT)_t + \beta_5(EXR)_t + \mu_t$ (5)

Where In represents natural log.

4.1 Data and Source

The study employs annual data covering the period 1981-2017. Data were collated from World Bank Data Base and Central Bank of Nigeria (CBN) statistical Bulletins.

V. Result And Discussion

5.1 Descriptive Analysis

The descriptive statistics on table 1, showed that the average values of the Exchange rate (EXR), external reserve (LEXTREV) and non-oil export (LNOEXPT) are 82.662, 22.653 and 17.097 respectively while the average values of non-oil import (LNOIMPT), oil export (LOEXPT) and oil import (LOIMPT) are 19.842, 20.376 and 18.131 respectively. Also, the standard deviation revealed that exchange rate (EXR) is the most volatile variable (80.336) while external reserve (LEXTREV) is the least volatile variable (1.480). The skewness statistics also showed that exchange rate is the only variable that is positively skewed while the remaining variables were negatively skewed. The Kurtosis statistics showed that all the variables are platykurtic, indicating that the distribution of the variables were flat relative to normal distribution. The Jarque-Bera statistic rejected the null hypothesis of normal distribution for the exchange rate external reserve, non-oil import and oil export, while the null hypothesis of normal distribution for non-oil export and oil import, were accepted at the same critical value (that is five percent).

Table 1: Descriptive Analysis

Variables	EXR	LEXTREV	LNOEXPT	LNOIMPT	LOEXPT	LOIMPT
Mean	82.662	22.653	17.097	19.842	20.376	18.131
Std. Dev.	80.336	1.480	2.783	2.529	2.663	3.285
Skewness	0.717	-0.176	-0.245	-0.409	-0.507	-0.739
Kurtosis	2.879	2.127	1.869	1.739	1.815	2.279
Jarque-Bera	3.196	1.365	2.342	3.480	3.749	4.167
Probability	0.202	0.505	0.0310	0.176	0.153	0.0124
Observations	37	37	37	37	37	37

5.2 Unit Root Test

The unit root test was conducted using the Augmented Dickey Fuller (ADF) test and the is result presented on table 2. The unit root test showed that all the variables were integrated of order one I(1) except oil import. Oil import was integrated of order zero I(0) series. The mix in the order of co-integration indicates the need for co-integration test via the use of ARDL bound co-integration technique.

Table 2: Unit root test

Augmented Dickey-Fuller (ADF) Test			
Variables	Level	After Differencing	Status
EXR	2.248944	-3.297764**	I(1)
LEXTREV	-1.637704	-8.23955*	I(1)
LNOIEXPT	-0.935653	-7.036883*	I(1)
LNOIMPT	-0.966003	-7.253259*	I(1)
LOEXPT	-1.185583	-6.182056**	I(1)
LOIMPRT	-3.072218	-	I(0)

Source: Authors' Computation using E-views 10, 2019.
Note: * and ** denote 1% and 5% critical values respectively.

5.3 ARDL Bound Co-integration Test

The result presented in table 3 below showed that the value of the F-statistics for the estimating model is 11.975 which is higher than the upper bound critical value at 5%, showing. The thumb rule is that when the value of F-statistic is higher than the value of both the lower and upper bound then there is co-integration among the variables in the model. Therefore, there is co-integration among the variables in this model.Thus the study presented can proceed to analyze both the long run and short run ARDL regression estimate.

Table 3: ARDL Bound Co-integration Table

Estimated Model	F-Statistics	
	11.975	
Critical Values	Lower Bound	Upper Bound
1%	3.06	4.15
5%	2.39	3.38

Source: Authors' computation using e-views 10, 2019.

Table 4: ARDL Long run Table

Variables	Coefficient	Std. Error	t-Statistic	Prob.*
C	23.967	3.620	6.621	0.000
EXR	0.009	0.004	2.477	0.029
LOG(NOEXPT)	0.376	0.180	2.087	0.059
LOG(NOIMPT)	-3.554	0.492	-7.221	0.000
LOG(OEXPT)	2.302	0.432	5.331	0.002
LOG(OIMPT)	0.848	0.416	2.041	0.064

Source: Authors' computation using e-views 10, 2019.

The co integration equation is:
EXTREV = 23.967 + 0.009EXR + 0.376LOG(NOEXPT) − 3.554LOG(NOIMPT) + 2.302LOG(OEXPT) + 0.848LOG(OIMPT)

The above result revealed that exchange rate, non-oil import and oil export had significant effect on external reserve at 5% significant level while non-oil export and oil import hadsignificant effect on external reserve at 10% significant level. In summary, the result showed that exchange rate, non-oil export, oil import and oil export had positive impact on external reserve while non-oil import had negative impact on external reserve.

5.4 ARDLECM

Having established that co- integration exist among the variables as revealed by ARDL Bound test, ARDLECM is considered more appropriate because according to Engle-Granger Theorem ARDLECM is considered more appropriate when co- integration exist among variables due to its encompassing power over other forms of dynamic specifications. The Error Correction Model captures the short run dynamics of the system and its coefficient measures the speed of adjustment to obtain equilibrium in the event of shock to the system. The below table shows the result of the short run dynamics of equation.

Table 5: ARDLECM TABLE

Variables	Coefficient	Std. Error	t-Statistic	Prob.*
DEXR	0.019	0.004	4.059	0.002
DLOG(NOEXPT)	0.949	0.263	-3.614	0.004
DLOG(NOIMPT)	-1.725	0.314	-5.489	0.001
DLOG(OEXPT)	0.731	0.262	2.794	0.016
DLOG(OIMPT)	-0.339	0.151	-2.243	0.045
CointEq(-1)*	-0.562	0.139	-11.214	0.000
R-squared	0.928	Mean dependent var		0.097
Adjusted R-squared	0.873	S.D. dependent var		0.914
S.E. of regression	0.326	Akaike info criterion		0.898
Sum squared resid	1.910	Schwarz criterion		1.578
Log likelihood	0.186	Hannan-Quinn criter.		1.127
Durbin-Watson stat	2.151			

Short-Run (Dynamic) ARDL Model analysis

The Table 5 above shows the short run (dynamics) results. The optimal lag combination for the models is obtained via Schwartz Information criterion (SIC).

From the result the ECM term is well defined, because it is negative and statistically significant. The coefficient is -0.562which indicates that 56.2 percent of the previous year's disequilibrium in external reserve is been corrected by exchange rate, non-oil export, non-oil import, oil export and oil import. This also showed the speed at which the model converges to equilibrium. The magnitude of this coefficient implies that nearly 56.2 percent of any disequilibrium in external reserve is corrected by exchange rate, non-oil export, non-oil import, oil export and oil import within one period (one year). The implication is that the present value of external reserve will adjust to changes in exchange rate, non-oil export, non-oil import, oil export and oil import.

The results also showed that exchange rate had positive significant impact on external reserve in Nigeria. This implies that as exchange rate increases the volume of external reserve would increase.

In the same vein, the result revealed that non-oil export had positive significant impact on external reserve in Nigeria. This implies that as the country export more non-oil goods and services the volume of external reserve would increase. This conform to the apriori expectation.

Furthermore, the result showed that oil export had positive significant impact external reserve in Nigeria at 5% significant level. This implies that as the country export more of oil the volume of external reserve would increase. This conform to the apriori expectation.

Conversely, the result showed that both oil import and non-oil import had negativesignificant impact on external reserve in Nigeria at 5% significant level. This implies that as the country import goods and services the external reserve is been depleted. This conform to the apriori expectation.

5.5 Test for causal relationship

Granger causality test is use to investigate causal relationship between two variables in a time series. The null hypothesis is rejected if the probability value is more than 5% otherwise do not reject the null hypothesis if the probability value is less than 5%. Unidirectional causality will occur between two variables if either of the null hypothesis is rejected. Bidirectional causality exists if both null hypotheses are rejected and no causality exists if neither of the null hypothesis is rejected.

Table 6: Pairwise Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
EXR does not Granger Cause LOG(EXTREV)	35	3.605	0.039
LOG(EXTREV) does not Granger Cause EXR		0.594	0.558
LOG(NOIEXPT) does not Granger Cause LOG(EXTREV)	35	6.969	0.003
LOG(EXTREV) does not Granger Cause LOG(NOIEXPT)		1.026	0.371
LOG(NOIMPT) does not Granger Cause LOG(EXTREV)	35	6.275	0.005
LOG(EXTREV)does not Granger Cause LOG(NOIMPT)		2.847	0.074
LOG(OEXPT) does not Granger Cause LOG(EXTREV)	35	8.241	0.001
LOG(EXTREV) does not Granger Cause LOG(OEXPT)		1.664	0.206
LOG(OIMPT) does not Granger Cause LOG(EXTREV)	35	6.103	0.006
LOG(EXTREV) does not Granger Cause LOG(OIMPT)		0.923	0.408

The Pairwise causality test in table 6 suggests the following:
(i) There is a uni-directional causality from EXR to EXTREV significant at 5%level, i.e exchange rate affects external reserve.
(ii) There is a uni-directional causality from NOIEXPT to EXTREV significant at 5%level, i.e non-oil export affects external reserve.
(iii) There is a bi-directional causality between NOIMPT and EXTREV significant at 10%level, i.e non-oil import affects external reserve also, external reserve affects non-oil import
(iv) There is a uni-directional causality from OEXPT to EXTREV significant at 5%level, i.e oil export affects external reserve.
(v) There is a uni-directional causality from OIMPT to EXTREV significant at 5%level, oil import affects external reserve.

VI.   Conclusion

This study examined the relationship between external reserve and trade in Nigeria and the implication of this for national development. The study covered the period of 1981 to 2017. Base on the regression estimate, exchange rate, oil export and non-oil export had positive and significant impact on external reserve while oil import and non-oil import had negative on external reserve. Also, the granger causality test revealed exchange rate, non-oil export, oil export and oil import has uni-directional causal relationship with external reserve running from each variable to reserve while there is bi-directional relationship between non-oil import and external reserve. The above result clearly reflects the presence situation in Nigeria where both oil and non-oil export increases the external reserve while oil and non-oil import deplete it. This finding also revealed that the volume of external reserve affects non-oil export.

Since both oil and non-oil export positively contribute to external reserve and oil export is highly volatile so when oil export fluctuate it would have adverse effect on external reserve therefore this study recommend that more effort should be put into the non-oil export that is relatively stable for the country to have a huge and stable external reserve. Also, since oil export had negative impact on external reserve, all hand must be on desk to ensure that all refinery are working and to the full capacity in addition more should refinery be built so that the country would import little or no oil by this the country external reserve would be preserve and use for more productive purpose. Furthermore, since non-oil import negatively affect external reserve, products that can be produce locally should be discourage from been imported and importation of luxury goods should be restricted. Finally, as revealed in the study a huge external reserves attract non-oil import so the government should take caution not to be tempted to squander the reserve when it rises.

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