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TIME SERIES ANALYSIS OF EFFECT OF EXTERNAL RESERVES ON MACROECONOMIC INDICATOR: EVIDENCE FROM NIGERIA

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Abstract: *This study used systematic time series econometrics approach to analyse the effect of external reserve (ER) on macroeconomic indicator proxy by real gross domestic product (RGDP) during the period 1981-2019. The study made use of secondary data from Central Bank Nigeria (CBN) Statistical Bulletin and adopted Ordinary Least Square (OLS) technique of analysis. The result of the finding revealed that economically, independent variable did not conform to a priori expectation. Statistically, both individual and overall results revealed that external reserve has statistical significant effect on real gross domestic product in Nigeria. Therefore, the researchers recommend that government should not wholly depend on crude oil exportation for foreign earnings rather they should diversify the economic base of the country like industrialization and improvement in agricultural sector. These will boost the foreign earnings as exportation of domestic goods is encouraged. More so, there should be a statutory check on mismanagement of foreign refunds by government officials.*

Keywords: ER, RGDP, OLS, CBN

INTRODUCTION

The accumulation of external reserves has been attributed to its enormous importance to an economy. External reserves contribute to the GDP of a country thereby creating jobs and enhancing the well-being of its citizens (Charles, 2012). In addition, external reserves are employed by monetary authorities of countries to curb exchange rate fluctuations (Fang and Lili, 2011). It boosts the confidence of foreign investors, which in turn boosts foreign direct investment (FDI) into the country.

Adequate external reserves enhance the value of a country's currency thereby encouraging traders to embark on imports and exports transactions as they find it profitable to do so, thus boosting the economy (Romero, 2005). Also, the monetary authorities use external reserves as a store of value to build up additional wealth which can be consumed in the future. This is done by segregating the external reserves into a wealth tranche and liquidity tranche for speculative purposes. The wealth tranche includes long term securities such as bonds and equities, which are controlled alongside a special benchmark that lays emphasis on return maximization (CBN, 2015).

Tule (2015) opines that use of external reserves provide monetary authorities means of controlling the money supply in an economy and also to strike equilibrium for foreign exchange demand and supply through policy intervention that is, offering to trade foreign currency to money deposit banks (MDB) in the foreign exchange markets. When money deposit banks buy foreign exchange from monetary authorities, the monetary authorities' level of external reserves drops by that amount of sale (CBN, 2015) and vice versa. External reserves serve as a boost for a nation's international raking and credit worthiness by enhancing regular servicing of external debt thus avoiding additional penalties (Charles, 2012). Moreover, a country's external reserve is a vital factor in a country's risk models that are employed by the international financial institutions and credit rating agencies. External reserves serves as a cover for the "Rainy Day", particularly when nations experience a fall in revenue. A sound reserves level readily provides cushion against such back drop in revenue and facilitates the recovery of such economies (CBN, 2015).

Foreign reserves provide an economy with a buffer against external shocks. When a country's external trade position is suddenly thrown into disequilibrium, adequate external reserves position usually helps an economy to absorb and quickly adjust to such shocks without resorting to any costly financing options (Tule, 2015).

Excluding the introduction, the rests of this study includes empirical literature; materials and method; result and discussion as well as conclusion.

EMPIRICAL LITERATURE

Nwosa (2017) examined relationship between external reserves and economic growth in Nigeria from 1981 to 2014 using the Ordinary least squares econometric method of analysis. The result of the study showed that external reserves had positive and significant influence on the economic growth in Nigeria.

Ifurueze (2014) using time series data from 1970-2009 examined the relationship between external reserves and economic growth in Nigeria. The result showed that there is a significant relationship between level of economic growth and external reserves accumulation.

Umeora (2013) investigated the relationship between foreign exchange reserves accumulation, exchange rate, inflation and Gross Domestic Product in Nigeria. The results of the tests showed that exchange rate and GDP have positive and significant relationship with foreign exchange reserves accumulation.

Charles (2012) conducted a research on the casualty effect of macroeconomic variables on Nigeria's external reserves. The results show that there exists a long run relationship between external reserves and the selected macroeconomic variables. The trade openness and level of GDP were found to have a positive relationship with external reserves.

Benigno and Fornaro (2012) analysed the relationship among reserve accumulation, growth and financial crisis. Their result created a positive link between reserve accumulation, current account surpluses and growth.

Osuji and Ebiringa (2012) examined analysis of effect of external reserves management on macroeconomic stability of Nigeria from 1981 – 2010. Secondary data were sourced and analyzed using multiple regressions, granger casualty test, VAR model and unit test. The study revealed a direct relationship between external reserves and explanatory variables and external reserves were observed to be inversely related to macroeconomic instability.

Gong (2012) examines a growth perspective of foreign reserves accumulation and finds that foreign reserves accumulation is a consequence of a growth strategy induced by strong capital investment in a financially constrained economy. Gong further employed Granger causality test and found that the growth of foreign reserves causes a growth of gross fixed capital formation.

Alasan and Shaib (2011) examined the management of external reserves and economic development in Nigeria between the periods 1980 to 2008. The result of the study

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revealed a significant relationship in the management of external reserves and economic development in Nigeria.

Usman and Ibrahim (2010) specified a simple long run external reserves demand equation for the period 1986-2006. Using an error correction model, they found that demand for external reserves in Nigeria is driven mainly by current account variability, real exchange rate and opportunity cost of holding reserves. Two of these variables (current account variability and real exchange rate) have positive and statistically significant coefficients, while the opportunity cost of holding reserves has a negative coefficient. However, GDP was found to be insignificant.

Olokoyo, Osabuohien and Salami (2009) examined the interactive influence of foreign reserve on some macroeconomic variables in Nigeria over the period 1970 to 2007. The study concluded that accumulation of large foreign reserves is not very productive in Nigeria due to its inability to induce some of the macroeconomic variables.

Osabuohien and Egwakhe (2008) made an attempt to evaluate the role of external reserve in the Nigerian economy. Their model was structured to determine the relationships between external reserves and three covariates; namely, gross domestic product (GDP), exports and imports. It was assumed that external reserves were held with a view to making the economy more attractive to foreign investment, which would, in turn, improve the economic performance of the nation. Their results however showed that large foreign reserves cannot propel economic growth in Nigeria.

MATERIALS AND METHOD

In this study, a systematic time series econometrics approach is used to analyse the effect of external reserve on macroeconomic indicator proxy by real gross domestic product (RGDP) during the period 1981-2019. For the purpose of arriving at a dependable and unbiased analysis, the researchers employed a secondary data obtained from Central Bank Nigeria (CBN) Statistical Bulletin and adopted Ordinary Least Square (OLS) technique of analysis.

The model for the study is specified as:

RGDP = F (ER) ..... (1)

Thus, the functional form of the model is stated below:

RGDP = F (ER) + e_t .....(2)

Hence, the mathematical form of the model is thus:

RGDP = b_0+ b_1(ER) + e_t .....(3)

Where:

RGDP = Gross Domestic Product

ER = External Reserve

b_1 = Estimator

b_0 = Constant

e_t = error term

The a priori expectation in the model above is that ER is expected to be positively effect RGDP. This implies that an increase in ER will, all things being equal, lead to an increase in RGDP. Hence, $b_1 > 0$.

RESULTS AND DISCUSSION

This part covers the regression result, evaluation of estimate and discussion.

i. Regression Result

Table 1. Regression result of the model

Dependent Variable		RGDP		
Independent Variable	Coefficient	Standard Error	t-Statistic	Probability
C	1480.965	247.6648	5.979714	0.0000
ER	-0.080326	0.003422	-0.095196	0.9247

Other test statistic:

Variable	Values
R-squared	0.640252
Adjusted R-squared	0.527519
F-statistic and Prob (F-statistic	0.009062(0.924687)
Durbin-Watson sta	1.710856

Information Criteria:

Variable	Values
Akaike info criterion	17.52358
Schwarz criterion	17.60977
Hannan-Quinn criterion	17.55425

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Source: Authors' Computation, 2021.

Economically, the model result in table 1 above shows that a unit increase in ER will decrease RGDP by approximately 0.1 unit. On the other hand, individual statistical test shows that ER has negative significant effect on RGDP.

ii. Evaluation of Estimate.

In this study, the estimated result is evaluated based on economic criteria (a priori expectation) and statistical criteria.

A. Economic Criteria (a priori expectation)

Table 2: Model a priori expectation

Independent Variable	Expected sign.	Obtained result	Remark
ER	+	-0.080326	Did not conform to a priori

Source: Authors' Computation, 2021.

Economically, table 2 above shows that the independent variable did not conform to a priori expectation. This means that external reserve which should contribute to increase in real gross domestic product (RGDP) in Nigeria as an oil endowed nation is contributing to decline in RGDP of Nigeria.

B. Statistical Criteria (First order test)

This stage includes; t-statistic, F-statistic, coefficient of determination (R^2) and adjusted coefficient of determination (R^{-2}).

Table 3: Model t-test statistic

Independent variable	T-computed	Probability
ER	-0.095196	0.0000

Source: Authors' Computation, 2021.

Statistically, the t-test in the table above which measures individual statistical relationship between the dependent and independent variables shows that ER has negative statistical effect on RGDP in Nigeria within this study period.

Table 4: Model F-test statistic

Independent variable	F-computed	Probability
ER	0.009062	0.924687

Source: Authors' Computation, 2021.

In the table 4 above, the F-test which measures overall statistical relationship between the dependent and independent variables shows that ER has significant statistical effect on RGDP in Nigeria within this study period.

Coefficient of determination (R^2)

From the estimated result, the coefficient of determination (R^2) in the model is 0.640252, which means that 64% of change in the dependent variable RGDP is explained by ER.

Adjusted coefficient of determination (R^{-2})

The result from (R^{-2}) indicates that the independent variable in this study is not perfectly but relatively related RGDP. Evidence to that effect in the model is the value of estimated R^{-2} which is 0.527519. By implication, there is about 52% non-collinearity between ER and RGDP.

iii. Discussion

The economic finding of this study revealed that ER has contributed to decline in RGDP in Nigeria within the study period. Statistically, individual test shows that ER has negative statistical effect on RGDP in Nigeria. The overall statistical result revealed that ER has significant statistical effect on RGDP in Nigeria. By implication it means that economically the increase in ER is expected to increase RGDP. But from the result obtained in this study, external reserve has contributed negatively to real gross domestic product in Nigeria within the study period. This means that export of crude oil being the major source of revenue to Nigeria is affected by the oil price fluctuations in the international market which also affects the exchange rate, hence, a decline in RGDP in Nigeria. More so, mismanagement of Paris Club refund and other foreign refunds by government officials negatively affects the RGDP.

Despite the difference in study approach, the finding of this study agrees with the finding of Osuji and Ebiringa (2012) who observed that external reserve is inversely related to RGDP in Nigeria.

CONCLUSION

The objective of this study is to analyse the effect of external reserve on macroeconomic indicator proxy by real gross domestic product (RGDP) in Nigeria from 1981 to 2019. The study adopted the Ordinary Least Square method of analysis and the estimate was evaluated based on economic and statistical criteria. It was discovered that the relationship between the independent variable and the dependent variable did not conform to a priori expectation. Individual and overall statistics revealed that external reserve has statistical significant effect on RGDP in Nigeria. Hence, the economic and statistical results of this study nullified a priori expectation in Nigerian contest which stated that external reserve ought to increase RGDP in Nigeria, rather, it has contributed to its decline over time. Therefore, in order to increase RGDP in Nigeria, the researchers recommend that government should not wholly depend on crude oil exportation for foreign earnings rather they should diversify the economic base of the country like industrialization and improvement in agricultural sector. These will encourage exportation of domestic goods and boost the foreign earnings. There should also be a statutory check on mismanagement of foreign refunds by government officials.

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APPENDIX 1

ESTIMATED RESULT

Dependent Variable: D(RGDP,1)
Method: Least Squares
Date: 07/22/21 Time: 13:52
Sample (adjusted): 1982 2019
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXTR,1)	-0.080326	0.003422	-0.095196	0.9247
C	1480.965	247.6648	5.979714	0.0000

R-squared	0.640252	Mean dependent var	1477.101
Adjusted R-squared	0.527519	S.D. dependent var	1485.759
S.E. of regression	1506.064	Akaike info criterion	17.52358
Sum squared resid	81656251	Schwarz criterion	17.60977
Log likelihood	-330.9481	Hannan-Quinn criter.	17.55425
F-statistic	0.009062	Durbin-Watson stat	1.710856
Prob(F-statistic)	0.924687		

Source: Authors' Computation, 2021.