INTEREST RATE AND EXTERNAL RESERVES OF NIGERIA: A COINTEGRATION APPROACH

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Abstract: **The study sought to evaluate the effect of interest rate on external reserves of Nigeria. This study which originates from the master's thesis of the author is based on a cointegration approach. The analysis was based on time series data spanning from 1981 to 2014. The findings of the study show that real interest rate is significant in determining external reserves. Therefore, the Government of Nigeria should employ measures that will ensure moderate inflation that is price stability. Strenthening of monetary policies should be the focus of the Central Bank as it plays a major role in the accumilation of external reserves.**

Keywords: **Interest Rate, External Reserves, Interest Rate Parity Theory, Liquidity Preference Theory.**

1. INTRODUCTION

In Africa, commodity price such as international oil price hikes have allowed external reserves accumulation among exporting countries, while on the other hand draining the external reserves among importing countries. However, the recent fall in international oil price has led to the depletion of reserves for oil exporting countries. Evidently, Egypt devalued its national currency three times in 2015 as a result of the dwindling reserves. Egypt's reserves depleted by 10 percent in September, 2015, which is the highest since January, 2012 (Namatalla, 2015). Similarly, Libya spent more than 25 percent of its external reserves in 2014 to offset the sharp decrease in oil revenues and keep the country running. This sharp decrease in oil revenue is attributed to the fall in international oil price. Libya's reserves totaled US$76.6 billion at the end of 2014, a decrease from the US$105.9 billion in the previous year (Bloomberg, 2015). The rationale for holding reserves varies from one country to another; however, the most common reason for holding reserves is to back monetary policy (Sajal, 2012).

Nigeria like other developing countries relies on external reserves for import cover, and also for exchange rate stability (Central Bank of Nigeria, 2015). Total external reserves for Nigeria was used in this study. Total external reserves constitute monetary gold holdings, Special Drawing Rights, holdings of foreign exchange, and external reserves of IMF member countries, under the management of Central Banks, which are expressed in US dollars (World Bank, 2014). 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).

Interest rate being a short term monetary policy tool is used by the monetary authority of a country to influence the level of foreign reserves of a nation (Bird & Rajan, 2003). Higher interest rates increase the value of a given economy's currency. An interest rate above the average world rate will attract foreign capital into the domestic market, and as this continuous, the value of the country's currency increases. Conversely, lower interest rates tend to be unattractive for

foreign investment and it also decreases the value of a country's currency. Interest rate decisions in Nigeria are taken and reported by the Central Bank (CBN, 2015). Real interest rate was utilized in this study which refers to nominal interest rate less the rate of expected inflation.

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-Anyaogu, 2012). In addition, external reserves are employed by monetary authorities of countries to curb exchange rate fluctuations (Fang & Lili, 2011). It boosts the confidence of foreign investors, which in turn boosts foreign direct investment (FDI) into the country.

The external reserves of Nigeria have been on a fluctuating trend and notably a decreasing trend from the year 2012. In 2014, the external reserves declined to US$37.50 billion and this decline has been continuous (Central Bank of Nigeria, 2014). The Central Bank of Nigeria uses the external reserves to meet the country's transactionary needs. Equally, the regulator uses the external reserves for precautionary purposes in order to provide a framework necessary to absorb unexpected fiscal shocks in terms of trade and capital outflows (Gong, 2012). The current study sought to examine the effect of interest rate on external reserves of Nigeria.

2. THEORETICAL REVIEW

2.1 Interest Rate Parity Theory

The Interest Rate Parity Theory was developed by Keynes (1936). The Interest Rate Parity comprises of the relationship between interest rate and exchange rate of two countries (Amano & Norden, 2003). It assumes that the exchange rate between two countries is affected by their interest rate differentials. The Interest Rate Parity relates interest rate of one country to the exchange rate value of her trading partner (Fadli, Abu, Nurul, Nurmadihah, Zuraida, Norazidah & Kamaruzaman, 2011). This means that, interest rate charged in a country reflects the exchange rate value of that country's currency and that of her trading partner(s) (Keynes, 1936).

The devaluation of the home currency can be attributed to the low demand of such currency as a result of low interest rate. The reverse is the case when interest rates are high, as this attracts foreign investors thereby leading to high demand of such currency and subsequently leading to an appreciation in the exchange value of such currency (Bergen, 2010). Thus, the appreciation of the exchange value of a country's currency enhances its external reserves accumulation (CBN, 2015).

2.2 Liquidity Preference Theory

Liquidity Preference Theory was propounded by Keynes (1936). The theory is based on the notion that interest rate is the reward for partying with liquidity. Liquidity preference theory is key to success in acquisition of goods and services. Every individual in the world desires to hold money with him for various reasons which sum up his demand for money to hold. Therefore, the sum total of all individual demands for money constitutes the total demand for money in the economy (Mankiw, 2005).

Liquidity Preference Theory attributes the motives for holding liquidity to transactionary motive, which includes business motive, day to day financing of activities and business transactions. Precautionary motive, which attributes the demand for money to cover for the rainy days, and to meet unforeseen emergencies. Lastly, speculative motive which attributes the demand for money to take advantage of the uncertainty of the future due to fluctuations in rate of interest in the market. Some money is set aside to speculate on these probable changes in order to earn some profit (Frank & Bernanke, 2012).

2.3 Empirical Review

Chowdhury, Uddin and Islam (2014) conducted an econometric analysis of the determinants of external reserves with the use of annual data for the period 1972 to 2011. The study attempted to identify the key determinants of external reserves in Bangladesh using unit root test and ADF test to examine the stationary, Engle Granger residual based cointegration approach to show the co integrating variables among variables and diagnostic tests for better modeling. The empirical results suggest that there exist a significant relationship among external reserves, exchange rate, remittance, interest rate and broad money. However, the study was not focused on Nigeria.

Irefin and Yaaba (2012) conducted a study using an Autoregressive Distributed Lag (ARDL) approach to estimate the determinants of external reserves in Nigeria with focus on income, exchange rate, imports and monetary policy rate within the period 1999 to 2011. The empirical results from the study show that there exists a long run relationship among the determinants of reserves in Nigeria. The lag of interest rate is negatively related to reserves, although not significant. They opined that their empirical result is consistent with most empirical studies on the determinants of external reserves, although, a negative relationship provides evidence in support of opportunity cost of reserves holding in Nigeria. They opined that a decline in interest rate in the preceding period will compel the deposit money banks to borrow more funds from the CBN, thereby restraining the CBN from building more external reserves.

3. METHODOLOGY

The study made use of causal research design. In causal research designs, the researcher attempts to ascertain if the independent variable(s) causes a change in the dependent variable in a research. Thus, causal research design was adopted for the study as the study sought to determine the effect of macroeconomic factors on external reserves and the moderating effect of balance of trade on the relationship between macroeconomic factors and external reserves in Nigeria. The analysis was based on time series data spanning from 1981 to 2014.

4. RESEARCH FINDINGS AND DISCUSSIONS

4.1 Descriptive Statistics

Descriptive statistics are employed in a research study to describe the basic features of data in a research (Wooldridge, 2003). Thus, the researcher employed descriptive statistics to provide summary of the study data. Table 1 provides a summary of the descriptive statistics.

Table 1: Summary of Descriptive Statistics

	LEXTRES	INT
Mean	22.65	-0.7
Standard Deviation	1.379	16.87
Minimum	20.65	-43.6
Maximum	24.7	25.3
No. of Observations	34	34

Source: Author's Computation

LEXTRES: Log of external reserves, INT: Real interest rate (%),

Descriptive statistics show that interest rate had a large standard deviation between 1981 and 2014. The results show that the dispersion - measured using standard deviation - of change in real interest rate was significantly high. The mean of interest rate was -0.7 percent with standard deviation of 16.87 percent. This implies that interest rate was highly volatile. Large variations in interest rate may signify instability in monetary and foreign exchange environment in Nigeria which in turn impacts on external reserves. External reserves had mean and standard deviation of 22.65 and 1.38, thus, indicating high level of fluctuations within the study period.

4.2 Diagnostic Test

The study carried out various diagnostic tests which include test for serial correlation using Breusch Godfrey Serial correlation LM test, test for Heteroscedasticity using Breusch Pagan Godfrey test, test for stationarity using the Augmented Dickey-Fuller tests, model specification test using the Ramsey-Reset test, test for multicollinearity using the Variance Inflation Factor (VIF) test and test for cointegration using the ARDL bounds test (Pesaran and Shins' bounds testing approach). Diagnostic tests were performed to ensure that a good model is chosen as it checks whether the stochastic properties of the model are met in order to avoid conventional econometrics problems.

4.3 Inferential Analysis

To determine the effect of interest rate on external reserves, time series regression analysis was employed. The study adopted the ARDL model which has the advantage of incorporating the lagged values of predictors therefore capturing the dynamics of the study. Therefore, the ARDL approach can comfortably be applied irrespective of the research variables being integrated of order one I(I) or order zero I(0) (Pesaran, Shin & Smith, 2001; Greene, 2008). Co integration test shows that both long run and short run models are consistent and can be used for the analysis. The baseline ARDL model presented in Table 2 was used for the analysis.

Table 2: ARDL Cointegration and Long Run Form

Cointegration Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEXTRES(-1))	1.639850	0.467899	3.504709	0.0172
D(LEXTRES(-2))	0.976111	0.318397	3.065702	0.0279
D(LEXTRES(-3))	0.456947	0.257294	1.775972	0.1359
D(INT)	-0.013487	0.009463	-1.425207	0.2134
D(INT(-1))	0.038920	0.009755	3.989751	0.0104
D(INT(-2))	-0.001729	0.007261	-0.238126	0.8212
D(INT(-3))	0.013263	0.006312	2.101187	0.0896
CointEq(-1)	-3.095408	0.699097	-4.427720	0.0068

Cointeq = LEXTRES - (-0.0203*INT + 0.6808+ 20.7923)

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT	-0.020319	0.005644	-3.600005	0.0155
C	20.792291	0.090142	230.661118	0.0000

Source: Author's Computation

Firstly, the results of the co integrating test show that the error correction coefficient (CointEqn(-1)) is -3.095 with a p value of 0.0068 which is significant at 5 percent level. A significant negative error correction term implies that external reserves adjust towards long run equilibrium path due to changes in real interest rate. The first part of Table 2 presents the short run model results, which includes the dynamic regressors, while the second part presents the long run coefficients. The short run model shows that the coefficients of the lagged values of interest rates were largely insignificant. The long run model shows that real interest rate was significant in predicting external reserves of Nigeria.

4.4 Hypotheses Testing

The study sought to determine the effect real interest rate on external reserves of Nigeria. The null hypothesis stated that real interest rate has no significant effect on external reserves of Nigeria. The coefficient for real interest rate (-0.02) has probability value of 0.016. Therefore, the null hypothesis was rejected at 5 percent significance level. These results show that real interest rate is significant in determining external reserves in Nigeria. A unit increase in the coefficient of real interest rate decreases external reserves by approximately 2 percent. The findings of the study on the effect of interest rate on external reserves correspond with that of Irefin and Yaaba (2012) who showed that interest rate has a negative relationship with external reserves. However, these results contradict theoretical expectation as argued by the interest rate parity theory. This maybe the case if inflation in Nigeria rises faster than nominal interest rates such that the long run real interest rates are negative.

In addition, the data on real interest rate provides evidence that real interest rate for Nigeria from the study period 1981 to 2014 is characterized by some periods of negative real interest rates. As 15 out of the 34 number of observations on real interest rate are having relatively large negative values. Therefore, since real interest rate is nominal interest rate less inflation, a negative real interest rate in a particular period indicates that inflation rate is higher than nominal interest rate in such period.

5. CONCLUSION

The accumilation of external reserves is benefical to an economy in many folds. They are used by monetary authorities to stabilize monetary policies. External reserves are used in Nigeria to guard against terms of trade shocks and also, unforseen emergencies. Thus, supporting the liquidity preference theory of money which attributes the demand for money for transactionary, precautionary and speculative motives. The findings of the study show that real interest rate is significant in determining external reserves.

6. POLICY RECOMMENDATIONS

The study concludes that real interest rate has a significant effect on external reserves of Nigeria particular negative real interest rate that is, periods of high inflation. Therefore, the Government of Nigeria should employ measures that will ensure moderate inflation that is price stability. Also, strenthening of monetary policies should be the focus of the Central Bank as it plays a major role in the accumilation of external reserves.

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