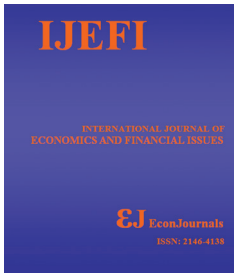

International Journal of Economics and Financial Issues

ISSN: 2146-4138

available at http: www.econjournals.com

International Journal of Economics and Financial Issues, 2015, 5(4), 884-888.

Causal Relationship among Foreign Reserves, Exchange Rate and Foreign Direct Investment: Evidence from Nigeria

Augustine C. Osigwe[1]*, Maria Chinecherem Uzonwanne[2]

[1]Department of Economics and Development Studies, Federal University, Ndufu-Alike, Ikwo, Nigeria, [2]Department of Economics, Nnamdi Azikiwe University, Awka, Nigeria. *Email: onyi2amaka@yahoo.com

ABSTRACT

This study scrutinized the Granger causality of foreign reserves, exchange rate (EXR) and foreign direct investment (FDI) in Nigeria. The results of the augmented Dicky–Fuller and Philip–Perron unit root test for stationary of the variables showed that all the variables were non-stationary at levels, but become stationary after first differences. The Johansen co-integration test revealed long-run relationship among the variables. The results of the Granger causality test indicated unidirectional causality from EXR to foreign reserves. Consistently from lag one to lag two; unidirectional causality existed from FDI to foreign reserves. At lag three, bidirectional causality was discovered between foreign reserves and FDI. Evidence of unidirectional causality running from EXR to FDI in lags one and three, was revealed. No causality existed between the duos at lag two. Based on the findings it is recommended that the policy makers establish the optimum EXR level that positively promotes foreign reserves and FDI.

Keywords: Foreign Reserves, Exchange Rate, Foreign Direct Investment
JEL Classifications: C0, C32, F0

1. INTRODUCTION

The Central Bank of Nigeria (CBN) Act 1991 vests the custody and management of the country's foreign reserves in the CBN. Nigeria's foreign reserves are mainly from the proceeds of crude oil production and sales. This includes direct sales (Nigerian National Petroleum Corporation), petroleum profit tax (Oil Companies), royalties, penalty for gas flaring and rentals; and the reserve comprises of the federation, the federal government and the CBN portions. CBN (2015) noted that Nigeria has taken numerous policy initiatives and measures in the management of its foreign reserves. Although very little was achieved because the structure in place then could not support efficient reserves management, enduring lessons could be distilled from the nation's past experience. It continued to note with nostalgia that since the 1970s, Nigerian economy has persistently depended on oil as the main source of foreign exchange earnings with the attendant cycles of economic booms and bursts. However, one of the key challenges for Nigeria over the last 8 years, especially under a civilian administration was how to manage the phenomenal growth in foreign exchange reserves (FOREX) resulting from the sustained high international oil prices. According to CBN (2015), foreign reserves in Nigeria averaged 774483.82 million Naira from 2000 until 2015, reaching an all-time high of 4166778.95 million Naira in December of 2014 and a record low of 88,635 million Naira in March of 2000.

Exchange rate (EXR) price of a nation's currency in terms of another currency. It is also regarded as the value of one country's currency in terms of another currency. Thus, EXR has two components, namely; the domestic currency and a foreign currency, and can be quoted either directly or indirectly. In an indirect quotation, the price of a unit of domestic currency is expressed in terms of the foreign currency whereas in a direct quotation, the converse holds. EXRs are determined in the foreign exchange market, which is open to a wide range of different types of buyers and sellers where currency trading is continuous. A market-based EXR changes if the values of either of the two component currencies change. A currency will tend to become more valuable when demand for it is greater than the available supply and become less valuable each time demand is less than available supply. Goldberg and Charles (2015) observed that EXRs can influence both the total amount of foreign direct investment (FDI) that takes place and the allocation of this

investment spending across a range of countries. When a currency depreciates, meaning that its value declines relative to the value of another currency, this EXR movement has two potential implications for FDI. First, it reduces that country's wages and production costs relative to those of its foreign counterparts. All else equal, the country experiencing real currency depreciation has enhanced "locational advantage" or attractiveness as a location for receiving productive capacity investments. By this "relative wage" channel, the EXR depreciation improves the overall rate of return to foreigners contemplating an overseas investment project in this country.

The reasons behind FDI and Multinational Corporations were explained by neoclassical economics based on macro-economic principles. These principles were based on the classical theory of trade in which the motive behind trade was a result of the difference in the costs of production of goods between two countries, focusing on the low cost of production as a motive for a firm's foreign activity (Ietto-Gillies, 2012). Global FDI inflows rose by 11% in 2013, to US$1.46 trillion. FDI flows to developed countries remained at a historically low share of global total FDI flows (39%) for the 2nd consecutive year. They increased by 12% to US$576 billion, but only to 44% of their peak value in 2007. FDI to the European Union increased, while flows to the United States continued their decline. FDI flows to developing economies reached a new high of US$759 billion, accounting for 52% of global FDI inflows in 2013. At the regional level, flows to Latin America and the Caribbean, and Africa were up; developing Asia, with its flows at a level similar to 2012, remained the largest host region in the world (UNCTAD, 2014). Nigeria slumped from its number one position in 2012 to achieve $5.61 billion in FDI inflows in 2013, coming third behind Mozambique and South Africa (UNCTAD, 2013). Most scholars believe that FDI inflow has a direct impact on foreign exchange reserve, while others hold that FDI is mainly invested in the form of physical capital and technology, and therefore does not directly contribute to foreign exchanges reserve accumulation. Hence the need for this study.

A peep into the literature indicates that studies that have examined causality among foreign reserves EXR and FDI remains mixed as their method of analysis varied. Also, in the context of the dwindling revenue obtained from the main foreign exchange earner (crude oil) of Nigeria, it becomes apt to re-examine the form of causality that runs among the three variables. The remainder of this paper is structured as follows. Section 2 centers on literature review while Section 3 briefly describes the theoretical framework and methodology adopted in the study. Section 4 presents and discusses the empirical results while the study is concluded in Section 5.

2. REVIEW OF LITERATURE

Existing literature on relationship among foreign reserves, EXR and FDI stands on divergent strands as evidenced by empirical outcomes. For instance, Wenkai and Song (2009) decomposed the possible effects FDI could have on FOREX into direct effects and indirect effects and mainly estimated the real effect of FDI on the growth of FOREX. According to them the study helped to correctly understand the role of FDI in raising FOREX. Results from their empirical analysis revealed that FDI is an important factor that contributes to the growth of China's FOREX. They asserted that during the rapid growth of the reserves in recent years, and contrary to the "decreasing contribution" as stated in the nominal effects, FDI's real effect increased. This finding provides a basis to further analyze the possible causality that runs between FDI and FOREX and implications for policy makers.

Abdullateef and Waheed (2010) extended the study on the determinant of foreign reserves by investigating the impact of change in external reserve (EXTR) positions of Nigeria on domestic investment, inflation rate, and EXR from 1986 to 2006. Using the ordinary least square and vector error correction (VEC) estimation methods, they found that change in EXTRs in the country only influences FDI and EXRs, and no influence was found on domestic investment and inflation rates. The results further suggested that there is the need for broader reserve management strategies that will aim at maximizing the gains from oil export revenue by utilizing more of these resources to boost domestic investment.

Yasir et al. (2012) empirically investigated the relationship among the broad macro variables such as FOREX, FDI and nominal EXR in Pakistan by testing annual data set the period of 1980-2010. In order to investigate the stationarity of data at level or at first difference, they carried out augmented Dicky–Fuller (ADF) unit root test and concluded that EXR, FDI and FOREX are stationary at first difference. For the investigation of long-run relationship, Johnson co-integration test was applied and the results showed that long-run relationship exist among the variables. They then proceeded to VEC method to examine the short-run association of the variables. The obtained results suggested that nominal EXR have a significant positive impact on FOREX while FDI have insignificant impact on FOREX. Similarly, Osuji and Ebiringa (2012) focused on the long-run relationship between some selected macroeconomic variables and EXTR management factors in Nigeria. The result of their vector auto regression (VAR) model indicated that exchange (EXTR) is significant in the current year but tends to converge in the previous years. On the other hand, the value of the joint significance indicates that the current values of gross domestic product (GDP), capital goods (CPG), non-CPG and EXCR are most influencing factors that determine the current values of EXTR.

Irefin and Yaaba (2012) on the other hand, employed an autoregressive distributed lag approach to run a slightly modified econometrics "Buffer Stock Model" of Frenkel and Jovanovic (1981) to estimate the determinants of foreign reserves in Nigeria over the period of 1999-2011, with focus on income, monetary policy rate, imports and EXR. The results debunked the existence of buffer stock model for reserves accumulation and provided strong evidence in support of income as the major determinant of reserves holdings in Nigeria.

Using a time series data of between 1980 and 2010, Gokhale and Ramana (2013) establish a causal relationship between EXR and FOREX in the Indian context. They laid emphasis on understanding the impact of FOREX on the EXR. According to them, India has accumulated unprecedented FOREX and synchronously has been experiencing a large depreciation in its

Rupee *viz*., US dollar. This trend prompted their study undertook to establish some association between the two trends. Their employed unit root test, Johansson co-integration test and VAR in the analysis of their data. On the basis of empirical findings, they concluded that there is no long-and short-term association between EXR and FOREX in the Indian context.

Chowdhury et al. (2014) recently undertook an econometric analysis of the determinants of FOREX in Bangladesh, using the ADF unit root test to examine stationarity, Engle Granger residual based co-integration approach to show the co-integrating relationship among the variables, and some diagnostic tests for better modeling. The empirical results of their study confirmed the existence of strong relationship among FOREX, EXR, remittance, home interest rate, broad money, UPI of export and import, and per capita GDP. The study suggested that EXR, strong remittance related policies, quality items of exports and sustainable GDP can keep a substantial and feasible role to make up a healthy amount of FOREX for the host country like Bangladesh.

3. THEORETICAL FRAMEWORK AND METHODOLOGY

3.1. Theoretical Framework

The core objective of this paper is to examine the casual relationship among foreign reserve, EXR and FDI. In the light of this and leaning on the reviewed literature, the model of this study which is recursive in nature, mimics the empirical studies of Yasir et al. (2012) for Pakistan and Osuji and Ebiringa for Nigeria (2012) and Gokhale and Ramana (2013) for India.

3.2. Methodology

Two methods of unit root test (ADF and Philip–Perron [PP]) were adopted to test for the stationarity of the variables. The causality among the variables is traced with the Johansen co-integration technique and the Granger causality test (GCT). Long-run relationship (co-integration) between two variables indicates that causality runs in at least one direction. It is one of the major thrust of this study to determine not only the long-run relationship among the variables but also to determine the causal relationship (if any) among them. To this effect, the pairwise GCT was adopted. When a time series X Granger causes another time series Y, it follows that the pattern in X is approximately repeated in Y after some time lags. Alternatively expressed, a time series X is said to Granger cause a time series Y if and only if it can be clearly shown through series of *t*-tests and *F*-tests on the lagged values of X (with lagged values of Y inclusive) that all the lagged X values provide statistically significant information about the future values of Y. The null hypothesis underlying the GCT is that the variable under study (say X) does not Granger-cause the other (say Y). Originally, the GCT is based on estimating a pair of regression models in the following generic fashion:

$$Y_t = \sum_{i=1}^{n} \alpha_i Y_{t-1} + \sum_{j-1}^{n} \beta_i X_{t-j} + v_{1t} \quad (1)$$

$$X_t = \sum_{i=1}^{n} \delta_i Y_{t-1} + \sum_{j-1}^{n} \lambda_i X_{t-j} + v_{2t} \quad (2)$$

Where, it is assumed that v_{1t} and v_{2t} are uncorrelated. In the above specification, according to Granger (1969), X is said to Granger-cause Y if β_i is not equal to zero and Y will also Granger-cause X if λ_i is not equal to zero. If these two situations simultaneously exist, then there is bi-directional causality. The first two scenarios represent unidirectional causality and if none of them prevails, then it is concluded that there is independence between the two variables X and Y. This situation represents the simplest form of Granger causality specification which involves only two variables (X and Y), dealing with bilateral causality. However, in this study, the situation is more complex, involving three variables, thus, making it multivariable causality through the technique of VAR. Thus, the GCT is based on estimating the following VAR model:

$$lfres_t = \sum_{i=1}^{n} \alpha_i lfres_{t-i} + \sum_{j=1}^{n} \beta_j lexch_{t-j} + \sum_{k=1}^{n} \delta_k fdi_{t-k} + \xi_{1t} \quad (3)$$

$$lexch_t = \sum_{i=1}^{n} \gamma_i lfres_{t-i} + \sum_{j=1}^{n} \theta_j lexch_{t-j} + \sum_{k=1}^{n} \eta_k fdi_{t-k} + \xi_{2t} \quad (4)$$

$$lfdi_t = \sum_{i=1}^{n} \vartheta_i lfres_{t-i} + \sum_{j=1}^{n} \varsigma_j lexch_{t-j} + \sum_{k=1}^{n} \varpi_k fdi_{t-k} + \xi_{3t} \quad (5)$$

Where, it is assumed that ξ_{1t}, ξ_{2t} and ξ_{3t} are uncorrelated. The hypothesis of no causality between variables is rejected if the *F*-statistic for the restricted and unrestricted residual sum of squares is significant at the conventional 1% or 5% level of significance. Given that the interest of this study is in testing for causality, one need not present the estimated coefficients of the VAR model explicitly (Gujarati and Porter, 2009). Data for this study which ranged from 1970 to 2013 were sourced from WDI (2013).

4. EMPIRICAL RESULTS

The results of the ADF and PP unit root test for stationary of the variables are presented in Table 1. The results show that all our variables were non-stationary at levels, but become stationary after first differences. In other words, they are integrated of

Table 1: ADF and PP unit root results

Variable	ADF statistic	Order of integration	PP statistic	Order of integration
LRESV	−3.600987**	I (1)	−6.291427**	I (1)
LEXCH	−5.747095**	I (1)	−5.747095**	I (1)
LFDI	−12.11608**	I (1)	−12.11608**	I (1)

**(*) implies significant at 1% (5%) level of significance. ADF: Augmented Dicky-Fuller, PP: Philip-Perron

Table 2: Results of Johansen's co-integration test (intercept, no trend)

Hypothesized number of CE(s)	Eigen value	Trace statistic	5% critical value	*P*
None*	0.562364	44.51718	29.79707	0.0005
At most 1*	0.198414	9.809721	15.49471	0.0257
At most 2	0.012325	0.520863	3.84146	0.4705

*Denotes rejection of the hypothesis at the 0.05 level

Table 3: GCT results

Null hypothesis	Lag order	*F*-statistic (*P*)	Decision
EXCH does not Granger cause RESV	1	8.99949** (0.0046)	Reject
RESV does not Granger cause EXCH		0.16444 (0.6873)	Accept
EXCH does not Granger cause RESV	2	7.71877** (0.0016)	Reject
RESV does not Granger cause EXCH		0.57628 (0.5669)	Accept
EXCH does not Granger cause RESV	3	6.51409** (0.0013)	Reject
RESV does not Granger cause EXCH		0.96533 (0.4203)	Accept
FDI does not Granger cause RESV	1	16.7412** (0.0002)	Reject
RESV does not Granger cause FDI		0.12195 (0.7288)	Accept
FDI does not Granger cause RESV	2	8.67701** (0.0008)	Reject
RESV does not Granger cause FDI		0.02294 (0.2117)	Accept
FDI does not Granger cause RESV	3	7.12448** (0.0008)	Reject
RESV does not Granger cause FDI		3.27594* (0.0327)	Reject
FDI does not Granger cause EXCH	1	0.20955 (0.6496)	Accept
EXCH does not Granger cause FDI		15.7645** (0.0003)	Reject
FDI does not Granger cause EXCH	2	0.79345 (0.4598)	Accept
EXCH does not Granger cause FDI		1.49252 (0.2384)	Accept
FDI does not Granger cause EXCH	3	0.50195 (0.6835)	Accept
EXCH does not Granger cause FDI		6.51336** (0.0013)	Reject

**(*) denote rejection of the null hypothesis at 1%(5%) level; *P* values in parenthesis. GCT: Granger causality test. Source: Authors' Compilation using Eviews, FDI: Foreign direct investment

the same order, that is order one, I(1). Thus, null hypothesis of non-stationarity was rejected for all the variables. Given that the variables were I(1), we proceeded to test for co-integration using the Johansen co-integration test (Table 2).

Table 2 shows that the null hypothesis of no co-integration relationships was rejected against the alternative of two co-integrating relationships at the 5% level. This implies that there is long-run relationship among FRES, EXCH and FDI. Evidence of co-integration suggest causality, at least, in one direction. The error correction model results would then be required to ascertain the direction of causation and in detecting the differences between the long-run and short-run Granger causality.

4.1. GCT Results

The optimal lag length was three for AIC lag selection criteria and one for the Schwarz information criterion. It was noted that the Granger causality is sensitive to lags. Thus, the empirical findings are guided by the optimal lags. The results of the GCT indicate unidirectional causality runs consistently from EXR to foreign reserves from lag one to lag three. The results also showed that, consistently from lag one to lag two, unidirectional causality from FDI to foreign reserves. At lag three, we discovered bidirectional Granger causality between foreign reserves and FDI. Evidence of unidirectional causality running from EXR to FDI in lags one and three, was discovered. No causality existed between the duos at lag two (Table 3).

5. CONCLUSION

This study examined the Granger causality of foreign reserves, EXR and FDI. The results of the ADF and PP unit root test for stationary of the variables showed that all our variables were non-stationary at levels, but become stationary after first differences. The Johansen co-integration technique revealed that the null hypothesis of no co-integration relationships was rejected against the alternative of two co-integrating relationships at the 5% level implying that there is long-run relationship among foreign reserves, EXR and FDI. The results of the GCT indicated that unidirectional causality runs from EXR to foreign reserves from lag one to lag three. Unidirectional causality from FDI to foreign reserves was found from lag one to lag two. At lag three, we discovered bidirectional Granger causality between foreign reserves and FDI. Evidence of unidirectional causality running from EXR to FDI in lags one and three, was discovered. No causality existed between the duos at lag two.

REFERENCES

Abdullateef, U., Waheed, I. (2010), External reserve holdings in Nigeria: Implications for investment, inflation and exchange rate. Journal of Economics and International Finance, 2(9), 183-189.

CBN. (2015), Reserve Management. Abuja: Central Bank of Nigeria. Available from: http://www.cenbank.org/Intops/ReserveMgmt.asp. [Last retrieved on 15 Aug 08].

Chowdhury, M.N.M., Uddin, M.J., Islam, M.S. (2014), An econometric analysis of the determinants of Foreign exchange reserves in Bangladesh. Journal of World Economic Research, 3(6), 72-82.

Frenkel, J., and Jovanovic, B., (1981), Optimal international reserves: A stochastic framework", Economic Journal, 91, 507-514.

Gokhale, M.S., Ramana, J.V. (2013), Causality between exchange rate and foreign exchange reserves in the Indian context. Global Journal of Management and Business Research Finance, 13(7), 449-456.

Granger, C.W. (1969), Investigating causal relations by econometric models and cross-spectral methods. Econometrica Journal of the Econometric Society, 37(3), 424-438.

Goldberg, L., Charles, K. (2005), Foreign direct investment, exchange rate variability and demand uncertainty. International Economic Review, 36(4), 855-873.

Gujarati, D.N., Porter, D.C. (2009), Basic Econometrics. 5th ed. New York: McGraw-Hill.

Ietto-Gillies, G. (2012), Transactional Corporations and International

Production: Concepts, Theories and Effects. 2nd ed. Cheltenham, UK: Edward Elgar.

Irefin, D., Yaaba, B.N. (2012), Determinants of Foreign reserves in Nigeria: An autoregressive distributed lag approach. CBN Journal of Applied Statistics, 2(2), 63-81.

Osuji, C.C., Ebiringa, O.T. (2012), Analysis of effect of external reserves management on macroeconomic stability of Nigeria. International Journal of Business Management and Economic Research, 3(6), 646-654.

UNCTAD. (2013), World Investment Report. Geneva, Switzerland: United Nations Conference on Trade and Development.

UNCTAD. (2014), Global Investment Trends Monitor. Geneva, Switzerland: United Nations Conference on Trade and Development.

WDI. (2013), World Bank Database. Washington, DC: World Development Indicator.

Wenkai, S., Song, M. (2009), FDI's real impact on foreign exchange reserves: Evidence from China. China Economist 1, 1-12.

Yasir, M., Shehzad, F., Ahmed, K., Sehrish, S., Saleem, F. (2012), Relationship among exchange rate, FDI and foreign exchange reserves: An empirical investigation in case of Pakistan. Interdisciplinary Journal of Contemporary Research in Business, 4(5), 225-232.