Interactive Effects of Exchange Rate Volatility and Foreign Capital Inflows on Economic Growth in Nigeria

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Abstract - **Various literature have attested to the vital roles of foreign capital inflow in bridging the savings-investment gaps in the developing countries in other to bring about the so much desired development. The impediment of exchange rate volatility (EXRV) on sourcing for this much desired foreign capital is also notable. However it was observed in literature that the negative effect of EXRV could be mitigated by the level of financial development prevalent in the country. This study investigates the interaction of financial development with exchange rate volatility on one hand and of financial development with capital inflows on the other hand. The result of our GMM estimation indicates significant positive effect of FDI, FD, interaction of FDI with FD and interaction of EXRV with FD on GDP. However, remittance, lag of EXRV and interaction of remittance with FD has significant negative impact on GDP. This study posits that government in its efforts to diversify the economy for future growth should promote infrastructure and adequate financial development that will attract FDI to agric and agro allied industries and diversify remittances from consumption into investment.**

Keywords: *Exchange rate volatility, foreign capital inflow, interactive effects, financial development, financial liberalisation, savings-investment gap*

I. INTRODUCTION

Nigeria is the most populous country in Sub-Saharan Africa which is highly endowed with both human and natural resources that make her a toast of both foreign and local investors. During colonial era and immediate post colonial era in the 1950s and 1960s its economy was largely dependent on agricultural products. However, with the large scale discovery of oil in the early 1970s the country gradually reduced its agricultural production until the economy became monoculturally dependent on oil revenue a situation that have been prevalent in the last few decades. However the dwindling oil revenue arising from the fall in international oil prices of recent is putting a lot of pressure on the Nigerian economy. In particular the downturn being currently faced by Nigerian economy needs an urgent economic policy to remedy. It is on this note that the current administration in Nigeria is thinking along policy shift from overdependence on oil to agriculture, solid mineral and agro allied industries. The lean purse of the Nigerian government however did not encourage the development of the necessary infrastructures for economic development that could attract foreign investment to the nation [**1**].

Theoretical and empirical literature has applauded investment as a fundamental channel of accelerated economic growth [**2**]. Literature have identified foreign capital inflow as an important source of augmenting the savings - investment gap in most capital resource deficient economies like Nigeria [**3**] [**4**]. Thus, there is the quest to attract foreign fund across the globe to mitigate the effect of this shortfall. However, EXRV which is the risk associated with unexpected and unpredictable movement in the exchange rate has been further

proved in literature as impediment to foreign capital inflow. As a matter of fact neither low nor high exchange rate volatility is good for the economy. The Structural Adjustment Programme (SAP) introduced by Nigerian Government in 1986 to stabilise overvalued naira was however not successful.

Literature have extensively explained that the effect of exchange rate volatility as well as the foreign capital inflow on economic growth will be largely dependent on the level of capital development prevalent in the local economy [**5**]. This study in the light of this assertion focus on the investigation of interactive effect of exchange rate volatility and financial development on one hand and the interactive effect of foreign capital inflow and financial development on economic growth of Nigeria between 1970 and 2013 .

II. LITERATURE REVIEW

The review of literature focuses on theories on exchange rate volatility, theories on FDI, theories on workers remittance and some basic economic growth theories. It has been theorised that exchange rate volatility has direct negative impact on the economic growth however it is dependent on the level of financial development in the economy [**6**]. In other words low financial development in the presence of high exchange rate volatility will depressed the economy growth and vice versa. This was evidence in Chile between 1975 and 2000.

The most celebrated theory on FDI and Economic growth was OLI theory propounded by Dunning which explain motives behind FDI flow to another country. He identified three main conditions considered by firms for making investment abroad as firm specific ownership advantage, Location advantage and Internalisation incentives (OLI). The firm specific advantage includes competitive advantage such as proprietary, technology, managerial and marketing advantages which the foreign company has over local firms. Location advantage specify the advantage the host country has in form of raw material supply, high labour supply at low cost, abundance of natural resources and wide market. Dunning emphasised the significant role of the government in regards to monetary and fiscal policies and its ability to attract FDI flow [**7**]. Argarwal criticized this OLI theory as being eclectic, static and not paying particular attention to political and sociological element [**8**].

Another macroeconomic theory of capital inflow is the International Monetary theory (IMA) widely publicized by Emerson who believed that stability in exchange rate that accompany monetary union should improve trade and investment in the economy even as they noted that exchange rate volatility could be detrimental to FDI [**9**]. For example, Morsink and Molle in their empirical work adopted IMA approach and discovered exchange rate volatility as a restricting factor to FDI flows between two countries [**10**].

The rate of return theory on FDI on the other hand postulates that FDI flows is a function of international differences in rates of returns on capital relative to the required rate of return. They argued that capital will naturally flow from countries with low rate of returns to countries with higher rate of returns. The Portfolio theory by Tobin and Markowitz theorised that investors besides maximizing profit also endeavour to minimize their risk by way of spreading their investment in various countries [**11**] [**12**].

Theory on foreign capital inflow was further extended to workers remittance. In advancing motives for workers remittance Kaasschieter in his pure altruism theory anchored his argument on migrants concern for the welfare of their family and associate in his or her home country [**13**]. The second theory of workers remittance is the implicit family agreement theory propounded by Lucas and Stark, where family agreed to sponsor the migrant abroad in expectation of remittance of both principal and interest when gainfully employed [**14**]. The third theory is the portfolio management decision in which the migrant consider macroeconomic factors such as interest rate, exchange rate, inflation rate and economic policies prevalent in both home and foreign countries before taking decision on remitting fund home for investment purpose. Only the portfolio management decision theory that has element of investment drives which have the ability to grow the economy while others are consumption driven.

One of the topical issues in economics for all time has been that of economic growth The earlier classical economics theories pioneered by Adam Smith, recognised the mechanism that influence economic growth as productive investment as well as capital accumulation [**15**]. Classical economists concentrated on physical capital and economic growth while no reference was made to financial capital. The first Economist to recognise the place of financial capital in growth theory was Keynes in his simple macroeconomic open economic model of national income where he theorised that foreign capital flow (E-M) is required to bridge the saving-Investment gap in the domestic economy [**16**]. In advancing growth model, neoclassical economists led by Solow postulate the role of steady state where investment is equal to depreciation as a sine qua non for economic growth. However, as capital grows over time, diminishing returns sets in to make depreciation higher than investment thereby impeding economic growth. To guarantee economic growth therefore savings rate need to be increased so as to ensure the steady state. Solow therefore advocated the flow of foreign capital in order to improve savings required for growth in the domestic economy [**17**].

A. Review of Empirical Literature

There are conflicting views in literature concerning the effect of exchange rate volatility on capital inflow. Some studies observe a positive effect [**18**] [**19**] [**20**]. While some others noted a negative effect [**21**]. Literature has also shown that conflicting results of the effect of exchange rate volatility on FDI flow to the host country could be largely dependent on

the technique of estimation applied. For instance, while Osinubi and Amaghionyeodiwe used OLS and Error Correction model (ECM) estimation techniques discovered a significant positive relationship between EXRV and FDI, Udoh and Eghwakhide using GARCH model observed a negative effect of EXRV on FDI [**22**] [**23**]. We observed that most literature on the effect of capital inflow proxy by FDI noted positive relationship both internationally and locally [**24**] [**25**] [**26**] [**27**] [**28**] [**29**] [**30**]. The only exemption to this discussion was that of Oyinlola who arrived at the negative effect of FDI on economic growth using the two-gap model [**24**].

Literature also advanced the importance of financial development (FD) in reducing the negative impact of EXRV on economic growth. Aghion et al. interacted FD with EXRV and observed a significant positive impact on GDP whose result is better than the one obtained with FD and EXRV separately [**31**]. Lee in his study of the effect of FDI on economic growth in Vietnam anchored the positive effect of FDI on economic growth to the spillover effect that FDI has on technological transfer to the host country [**32**].

Most of the studies that used remittance to proxy foreign capital inflow in their study of the impact of foreign capital inflow on economic growth both internationally and in the local Nigerian context found a positive relationship between remittance and economic growth [**33**] [**34**] [**35**] [**36**].

III. METHOD

A. Model Specification

This study adopts a model developed by Borensztein, De Grezorio and Lee [**37**]. The model starts from general production function given by Solow which is explicitly given as:

Y = f (K, L, A) ---------- (1)

Where Y = GDP

K = Capital input, L = Labour input

A = the level of technological knowledge.

Decomposing capital to physical capital (K) and financial capital (FDI and REM.) as presented by Balassa [**38**], then we have:

Y = f (K, FDI, REM, L, A) ---------- (2)

If we denote financial liberalization as FL, then:

Y = f (K, FDI, REM., L, FL) ---------- (3)

Financial development as represented by FD could be introduced into the model because of its importance: Y =f (K, FDI, REM, L, FL, FD) ---------- (4)

If we proxy FD by money supply(M_2) and introduce other variables of interest (EXRV) into the model then

Y = f (K, FDI, REM, L, FL, M_2, EXRV) ---------- (5)

From the implicit model above, we therefore proceed to build our explicit model thus:

$Y= \propto_0 + \propto_1 K + \propto_2 FDI. + \propto_3 REM + \propto_4 L + \propto_5 FL + \propto_6 M_2 + \propto_7 EXRV + \cup$ --------- (6)

To examine the interactive effect of financial development and EXRV as well as interactive effect of financial development and capital flow we extend equation 6 to obtain:

$Y= \propto_0 + \propto_1 K + \propto_2 FDI + \propto_3 REM + \propto_4 L + \propto_5 FL + \propto_6 M_2 + \propto_7 EXRV + \propto_8 (FDI * M_2) + \propto_9 (REM * M_2) + \propto_{10} (EXRV * M_2)$ ---------- (7)

We expect the coefficient of the variables to have the following signs: $\propto_0 > 0$, $\propto_1 > 0$, $\propto_2 > 0$, $\propto_3 > 0$, $\propto_4 > 0$, $\propto_5 > 0$, $\propto_6 > 0$, $\propto_7 < 0$. $\propto_8 > 0$, $\propto_9 > 0$, $\propto_{10} > 0$,

B. Estimation Techniques

We adopt the Generalised Method of Moments (GMM) estimators which provide consistent estimators when lagged of dependent variables are used to overcome the inconsistency inherent in OLS estimation technique. This is necessary in order to overcome the problem of endogeneity that is inherent in the long run growth determinants [**39**]. This method is widely used by other studies because of its consistency [**40**] [**41**].

In applying this method, the explanatory variables are instrumentalized with their suitable lags so that the instruments are not correlated with the error term.

Therefore this study adopted GMM. Taking the first-difference transformation of equation 7 to observe the interactive effect as stipulated below:

$\Delta Y_t = \propto_1 \Delta Y_{t-1} + \propto_2 \Delta K + \propto_3 \Delta FDI + \propto_4 \Delta REM + \propto_5 \Delta L + \propto_6 \Delta FL + \propto_7 \Delta M_2 + \propto_8 \Delta EXRV + \propto_9 \Delta(FDI * M_2) + \propto_{10} \Delta(REM * M_2) + \propto_{11} \Delta(EXRV * M_2) + \Delta \cup_t$ ---------- (8)

C. Estimation of Exchange Rate Volatility

We adopt the Standard Deviation of the first difference of logarithms of the exchange rate in estimating Exchange Rate Volatility. Here the change in exchange rate is computed over one month using end of month data. The standard deviation is calculated over a one year period as an indicator of short run volatility as well as over a forty three years period to capture long run variability.

D. Sources of Data

Data on Various variables to be used in the study such as Exchange rate, GDP, FDI and money supply, were sourced from volumes of the Central Banks of Nigeria (CBN) Statistical Bulletin. On the other hand, data on Workers' remittances, Capital and labour were sourced from the World

Development Indicator (WDI). Exchange rate volatility was computed by the author by applying standard deviation on the exchange rate data collected from CBN Statistical Bulletin.

IV. DATA ANALYSIS AND RESULTS

We present the table of our results of GMM estimation techniques below. The R-Squared of 0.989923 shows that the variation in dependent variable (GDP) was 98.99 percent jointly explained by all the explanatory variables. The Adjusted R^2 of 0.985086 shows that the model has high goodness of fit as the explanatory power of this model is approximately 98 percent of the total variation in GDP. The validity of the instrument in the estimation was justified by the Prob. J- Statistics of 0.996631 which is closer to 1.0. Also the standard error of all the variables which lies between 0 and 1 indicates that the coefficients of the estimator are reliable.

Dependent Variable: LY
Method: Generalized Method of Moments
Sample (adjusted): 1975 2012
Included observations: 38 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	89.06894	6.773421	13.14977	0.0000
LY(-1)	0.059938	0.043837	1.367291	0.1837
LK	0.056590	0.006807	8.312968	0.0000
LL	-5.113565	0.384071	-13.31411	0.0000
LFDII	0.031636	0.037048	0.853906	0.4013
LREM	-0.016072	0.038236	-0.420325	0.6778
LFL	-0.206870	0.011042	-18.73555	0.0000
LFD	0.907283	0.047884	18.94732	0.0000
EXTV	0.001599	0.028248	0.056592	0.9553
EXTV(-1)	-0.026617	0.002073	-12.83790	0.0000
LFDII*LFD	0.004502	0.004169	1.079774	0.2906
LREM*LFD	-0.004485	0.003478	-1.289339	0.2091
EXTV*LFD	0.000205	0.002151	0.095277	0.9249

R-squared	0.989923	Mean dependent var	12.36462
Adjusted R-squared	0.985086	S.D. dependent var	1.011974
S.E. of regression	0.123586	Sum squared resid	0.381840
Durbin-Watson stat	1.444900	J-statistic	10.00801
Instrument rank	38	Prob(J-statistic)	0.996631

We now examine the effect of each of the explanatory variables on the growth of the Nigerian economy. The coefficient of FDI which is 0.031636 shows that there was positive and very significant effect of FDI on GDP as demonstrated in the probability of 0.4013 In other words a percentage change in FDI lead to 0.032 percentage change in GDP.

Remittance on the other hand had insignificant negative effect on the Nigerian economy as evidenced in its negative coefficient of 0.016072 and probability of 0.6778.This shows that a one percent change in remittance will lead to 0.016 percentage change in GDP. This result was contrary to empirical evidence in previous literatures on Nigeria which produced positive relationship between remittance and economic growth [**36**] [**42**] [**43**]. The negative effect of remittance on economic growth in Nigeria could be justified by the fact that most of the fund that come to Nigeria via remittance were consumed rather than invested. This is in line with findings in literature [**44**] [**45**]. Effort should therefore be geared towards encouraging remittance flow towards investment that could lead to both human and physical capital accumulation.

EXRV shows an interesting position. Here there is positive but insignificant effect of EXRV on GDP as evidence in its positive coefficient of 0.001599 and probability of 0.9553 which is contrary to the theory that specified that EXRV has a negative effect on GDP. But a study by Aghion, Howit and Mayer opined that the extent of financial development will dictate the impact of EXRV on economic growth [**6**]. For instance a lower degree of financial development with high EXRV will aggravate the divergence of the economy growth rate while a country with well developed financial system will neutralize the negative effect of EXRV. The various reforms implemented by Nigeria's government overtime might have explained the positive effect of EXRV on GDP in Nigeria.

Financial liberalisation was found to have negative but highly significant effect on economic growth. This shows that a percentage increase in financial liberalisation will lead to retardation in economic growth by 0.21 percent. On the other hand financial development was found to have positive significant effect on the economic growth in Nigeria as evidenced in the positive coefficient of 0.907283 and probability of 0.0000, This means that for every percentage change in financial development there is 0.907 percentage increase in economic growth. The interaction of FDI with FD shows a positive and significant effect on GDP as demonstrated in the positive coefficient of 0.004502 and probability of 0.2906.This shows that this interactive effect shows that the percentage change in the interactive effect will lead to 0. 0045 percent change in the economy and this is higher than the growth of 0.032 percent in economic growth when FDI alone is considered. Also the interaction of EXRV with FD also shows significant positive effect on economic growth as demonstrated by the coefficient of 0.000205 and probability of 0.9249. However the interaction of remittance with FD shows a significant negative effect on the economic growth as demonstrated in the negative coefficient of

0.004485 and probability of 0.2091. Even though the result still shows negative impact but there was a reduction in the negative effect when interaction takes place (0.004485) than when remittance alone is considered (0.016072)

The result of the general Method of Moment (GMM) regression analysis show R^2 to be 0.989923, implying that all the explanatory variables jointly explain the variation in the GDP by 98.99 percent . This was buttressed further by Adjusted R^2 of 0.985086 which imply that the model has high goodness of fit. The FDI was discovered to have significant positive effect on GDP. We also noted that workers remittance have a significant negative effect on GDP

EXRV has positive but insignificant effect on economic growth contrary to negative effect posited by theory but which could be justified by the level of financial development prevalent in Nigeria in line with the findings of another study [**6**]. Financial development has a positive and very significant effect on economic growth in Nigeria. On the other hand financial liberalisation has a negative but significant effect on economic growth in Nigeria. The interactive effect of FD with FDI as well as EXRV show an improvement in economic growth. Even though interactive effect of Remittance and FD shows a negative effect on economic growth, there was an improvement over a situation of remittance alone.

V. CONCLUDING REMARKS

The study shows that FDI has a positive and significant effect on economic growth in Nigeria. On the other hand remittance has a negative effect on the economic growth in Nigeria as it affects consumption and not investment which is capable of improving economic growth. Also EXRV has positive but insignificant relationship with economic growth in Nigeria contrary to basic theory on EXRV. The interactive effect of FD and capital inflow as well as EXRV shows a promising future for Nigerian economy.

This study therefore admonishes government to provide enabling infrastructural and financial development that will not only encourage greater financial inclusion in rural area but also attract the inflow of FDI to agric sector, solid mineral sector and agro allied industry if their intension to diversify Nigerian economy from its dependence on oil should succeed. This will help to bridge financial, technological and managerial gap that exist in the domestic Nigerian economy presently. Also financial development will also reduce drastically the negative effect of EXRV on economic growth. Policy that will diversify more of remittance which is on the increase to the nation now from consumption to investment in agric and agro allied industries should be put in place. In this way the remittance will have direct impact on economic growth in Nigeria. Finally government through monetary and fiscal policy should place stricter control on the activities of the bureau de change so as to curtail the overbearing influence of the mafia in the sector.

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