

Impact of External Reserve Holdings on Selected Macroeconomic Indicators in Nigeria

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The paper examines the impact of change in external reserve positions of Nigeria in recent time on foreign direct investment, exchange rate and current account balance. Using a combination of Ordinary Least Square (OLS) and Vector Error Correction (VEC) method, it was observed that change in external reserves in the country influences Foreign Direct Investment (FDI), exchange rates and current account balance of the country. However, the results show that the reserve holding by the country can not be justified by the opportunity cost of such reserve holding. Therefore, strategies with a broader economic development policy focus and framework should be put in place for maximizing the gains from external reserves induced by oil export revenues by utilizing more of the resources to boost domestic investment.

Introduction

In the past few years, external reserves accumulation has mainly been associated with emerging Asian economies following the Asian financial crisis of the 90's. Today, it has become a global phenomenon traversing oil exporting nations and other non renewable resource dependent economies.

In Nigeria, the period beginning from the later end of 1999 marked a turning point from a hitherto culture of fiscal indiscipline characterized by frivolous spending to a new dawn of prudent consumption and saving. This is evident from an unprecedented accumulation in the level of reserves from USD 4.98 billion in May 1999 to USD 59.37 billion as at March 28, 2007 (CBN, 2007). These robust domestic economic performances according to Magnus (2007) were occasioned by macroeconomic fundamentals like internal reforms, complemented by favorable external economic conditions like the persistent and unprecedented rise in crude oil prices joined with drastic decline in external obligations like debt service. Also, other sources of rising external reserve in Nigeria include, continuous growth of FDI and portfolio investment, banks' on-lending activities to foreign financial institutions, political development of the nation (Soludo, 2007).

The recent growth of external reserve is not a phenomenon that has been unique to Nigeria; most of the South East Asian as well as Latin American

economies have also been indulging in this kind of behaviour. For instance, Adam and Leonce (2007) noted that global official foreign exchange reserves rose from USD 1.2 trillion in January 1995 to USD 5.04 trillion in December 2006 and the share of developing countries in world reserves increased from 50 to 72 percent over the same period.

These developments according to Magnus (2007) consequently underscored the critical role of foreign exchange reserve in the balance sheets of central bank and monetary policy operations, generating renewed and ranging controversies among scholars and analysts in the process (see also Williams, 2005). Mostly the bone of contention has been on issues like the adequacy of reserves, the alternatives uses to which these reserves should be put, the costs and benefits of holding excess reserves, etc.

Common to every economic phenomenon, these developments have earned the praises of many as it equally drew severe criticisms from others who question the rationale for building reserves in the face of crippling domestic economic activities and high incidence of poverty in the country.

However, this paper intends to provide empirical evidence on the implications of holding reserves on foreign direct investment, exchange rate and current account balance in the country. The results we believe will contribute to the literature on the desirability or otherwise of holding reserves by countries such as

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Nigeria.

The rest of the paper is structured as follows; Section 2 presents the literature and the theoretical framework; section 3 deals with research methodology; section 4 present and analyze the results while in section 5 we conclude.

Literature/Theoretical Framework

External reserves according to IMF (1993) “consist 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 purposes”.

The Central Bank of Nigeria (CBN) Act 1991 vests the custody and management of the country’s external reserves in the CBN. The Act provides that the CBN shall at all times maintain a reserve of external assets consisting of gold, balance at any bank outside Nigeria where the currency is freely convertible; treasury bills; securities of or guarantees by a government of any country outside Nigeria, securities of or guarantees by international financial institutions of which Nigeria is a member; Nigeria’s gold tranche at the international monetary fund and allocation of Special Drawing Rights made to Nigeria by the International Monetary Fund.

Though the management of foreign exchange reserves of a country is the exclusive responsibility of the central bank, the quantum of reserves to be held at any point in time depends on several exogenous factors, depending on its development objective and the prevailing economic management challenges.

Economic literature suggests that reserves are held both for transaction and precautionary motives (Mendoza, 2004). In principle therefore, countries hold reserves in order to meet unexpected and temporary fluctuations in international payments. In this context, the optimal size of reserves depends on the balance between the macroeconomic adjustment costs that result if reserves are exhausted and the opportunity cost of holding reserves (Heller, 1996). According to Gosselin and Parent (2005) there is a relatively stable long run reserve

demand function that depends on five categories of explanatory variables; economic size, current account vulnerability, capital account vulnerability, exchange rate flexibility, and the opportunity cost. Reserve holding is expected to increase with economic size and the volume of international transactions. Thus, in view of the nature of commodity-base production and oil export in Nigeria, both the level and growth rate of output are expected to influence reserve accumulation. Increased current and capital accounts vulnerability should motivate central banks to hold more reserves, while exchange rate flexibility reduces demand for reserves. Economic theory predicts that the higher the opportunity cost of holding reserves the lower would be the demand for reserves.

The months of import cover is the most frequently used criteria for determining the vulnerability of countries. It measures the country’s level of trade exposure to the outside world and signifying the ability of country to country to continue to finance its imports, for a certain period of time, usually three months, should there be an unexpected fall in its exports or reserves. The benchmark of import cover has been met several times by Nigerian government. As stated in Magnus (2007:41), the reserve holdings of Nigeria since 1995 exceeded the IMF required threshold of three months and the West African Monetary Zone (WAMZ) convergence criteria of six months. For instance, according to his analysis, the months of import cover for Nigeria, stayed around the average of 3.4 months between 1977 and 1995. Between 1996 and 2006, months of imports cover rose to an average of 12.3. The excess which can be of great disadvantage to the domestic economy.

In their own contribution, Burkee and Lane (2001) opine that, apart from trade openness, financial depth and external indebtedness also influence the demand for international reserves. Aizenman and Marion (2004) point out that the size of international transactions; their volatility, exchange rate arrangement and political stability are some of the key determinant of international reserve holdings in most East Asia. Focusing on Korea, Aizenman et al (2003) find evidence of a structural break in the pattern of reserve holding post- Asian crisis after which financial openness and external indebtedness have become significant and a strong

predictor of reserve holdings, while trade openness loses some significance after the crisis.

Methodology

In order to investigate the implication of external reserves on foreign direct investment, current account balance and exchange rates, the paper first examines various determinants of external reserves in the country by taking a lead from the model of Gosselin and parent (2005). Thus, simple long run reserve demand equation is specified as follows:

External Reserve Demand Equation

$$RES_t = \alpha_0 + \alpha_1 RGDP_t + \alpha_2 KAV_t + \alpha_3 CUV_t + \alpha_4 REXH_t + \alpha_5 OC_t + E_{1t} \dots \dots \dots 1$$

Where;

RES = the nominal external reserves over time t,

RGDP = the real Gross Domestic period over time t (indicating market size of the economy),

KAV = the capital account vulnerability over time t,

CUV = current account variability over time t, and

OC = the opportunity cost of holding reserves over time t.

REXH = Real exchange rate over time t

Accordingly, capital account vulnerability is measured by short-term external debt/total debt ratio, current account volatility is measured by trade openness/variability ratio and opportunity cost (OC) is the difference between the real return for reserves and the real return to domestic investments.

In order to show the equilibrium path of the above model to its long-run solution, we estimate a Vector Error Correction (VEC) version of the model in the form of equation 2 after conducting unit roots and co integration tests on the series used.

$$\Delta RES_t = \alpha_0 + \alpha_1 \Delta Z_{it} - \phi ECM_{t-1} + E_{2t} \dots \dots \dots 2$$

Where;

ECM = Error Correction Mechanism.

Δ = change

Z_{it} = vector of all variables as defined before.

Apart from investigating the determinants of

external reserve holdings of Nigeria, as stated earlier, the study also investigate the linkages between movements in external reserves (change in reserves) and specified economic variables namely; Foreign Direct Investment (FDI), Current account balance(CAB) and real exchange rate(REXH). To drive home our points, we modified the model used by Adam and Leonce (2007) for some African countries by introducing in the model variables such as; openness of the economy (OPN) and Niger Delta dummy (Nd).

Foreign Direct Investment Equation

In order to confirm the effect of external reserves on Foreign Direct Investment (FDI) in the country the model is stated as follows:

$$\Delta RFDI_{it} = \alpha_0 + \alpha_1 \Delta RES_t + \alpha_2 \Delta OPN_t + \alpha_3 \Delta REXH_t + \alpha_4 N_d + \alpha_5 Ecm_{t-1} + E_{3t} \dots \dots 3$$

Where,

RFDI = Real foreign Direct Investment

RES = External reserve

OPN = Openness of the economy (total trade/GDP ratio)

REXH = Real exchange rate

N_d = Niger Delta Crisis dummy (Assume the value 0 from 1999 to 2006 and 1 otherwise)

Δ = Change

Exchange Rate Equation

According to Adam and Leonce (2007) adequate stock of foreign exchanges allows monetary authorities to intervene in the market to protect the exchange rate. However, excessive inflows of reserves can cause the currency to appreciate while high volatility of reserves can cause instability in the exchange rate. Thus, they specified an exchange rate equation with the domestic and foreign price and interest rate differentials as the two key explanatory variables besides foreign exchange reserves. The equation is as follows:

$$\Delta EXH_t = \sigma_0 + \sigma_1 (i - i^*)_{t-1} + \sigma_2 (p-p^*)_{t-1} + \sigma_3 \Delta RES_t + U_{4t} \dots \dots \dots 4$$

Where,

i = nominal domestic interest rate

i^* = nominal foreign interest rate (USA rate treasury bill)
 p = Domestic inflation rate
 p^* = Foreign inflation rate (USA) price index rate).
 Other variables as defined earlier.

Current Account Balance Equation

The current account balance equation as stated in most economic literature (Israd, 2007; Williamson, 2008 etc) is adopted and specified as follows:

$$\Delta CAB_t = \eta_0 + \eta_1 \Delta NEP_t + \eta_2 \Delta RES_t + \eta_3 \Delta REXH_t + \eta_4 ECM_t + E_{5t} \dots \dots \dots 5$$

Where;

CAB = Current account balance over time t

NEP = Net export over time t

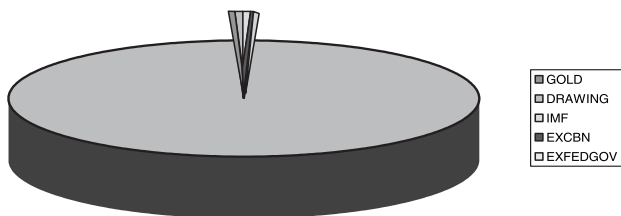
Other variables are as defined ealier.

Data Source and Measurement

All data were obtained from Central Bank of Nigeria (CBN) Statistical bulletin (various issue) and Bureau of Statistics (various issue). The USA data was obtained from US Bureau Economic Analysis. The data covered the period between 1986 and 2006. The estimations were carried out using E views 3.1.

Analysis and Discussion of Results

The study started the discussion of results by showing the composition of Nigeria’s external reserve. The composition is made up of gold, special

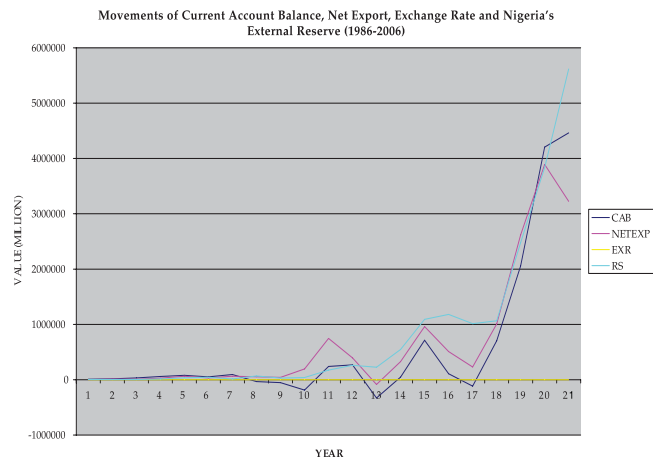


drawing rights, reserve position with the IMF, the CBN foreign exchange and the federal government foreign exchange.

In most of the period under analysis, the greater percentage(98%) of Nigeria’s external reserve has been inform of CBN foreign exchange, this is followed by gold reserve(the values of which ranges from 0.0003% to 0.52%). The special drawing rights, the reserve position with IMF and the

foreign exchange with federal government hovered around 0.0002% and 0.4%. Thus, the composition as indicated in the figure above confirm the CBN as the sole monetary authority saddled with the responsibility of controlling the external reserve position of the country.

The next figure shows the trends of movement in Nigeria’s foreign exchange reserve with co-movements of some selected macroeconomic



variables. These are; Current account balance, Net export and exchange rate.

Nigeria’s total external reserves position which stood at a modest USD 2.84 Million in 1986 rose to a significant USD42.30 billion in 2006 and USD 63.1 billion as at November 2008. This represents 49.17 percent increase from 2006 to 2008. Within these years, external reserve position varies from time to time, while some major economic indicators also respond from period to period. For instance, with the level of external reserves at USD 4.5 billion in 1991, exchange rate stood at 49.91/ dollar, current account balance stood at N51.9 billion and the value of net export stood at N32.4 billion. External reserve shows an upward moment over time, while in the year 1993,1994,1995,1998 and 2002 current account position indicates a deficit balance. However, a negative net export position was only recorded in 1998. Our subsequent analysis shows using empirical methodologies the various associations between the indicators chosen and change in external reserve position.

As a preliminary step in testing for co-integration and the use of error correction methodology, the study employs Augmented Dikey Fuller Unit root

test (ADL) to confirm the stationary or otherwise of the series (variables) used. The results of these tests are shown in table 1, where all the series are found to be integrated order of one.

The next tables (2a, 2b, and 2c) show the Johansen co integration tests for equation 2, 3 and 5 respectively. These tests indicate one co-integration equation at 5 percent of significance in each case. The tests further justified the use of vector error correction model for each of this equation and partially guaranteed long run equilibrium for the specified problems.

Equation 1 was estimated using ordinary least square method (table 3) and dynamics specification of the same equation (equation 2) was estimated using vector error correction (VEC) methods (Table 4). The two methods show similar results as the demand for external reserves in Nigeria has been driven mainly by current account variability, real exchange rate and opportunity cost of holding reserve (measured by the difference between the real return on reserves and the real return on domestic investment). 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 and statistically significant. This suggests that external reserve accumulation in Nigeria has not been induced by returns because the result obtained indicated that as the opportunity cost of reserve is falling, Nigeria's external reserve is increasing. The coefficient of ECM that measures the speed of adjustment to equilibrium indicated a speed that is slightly above average (0.59%).

In the equation on the determinants of Foreign Direct Investment in Nigeria (equation 3), external reserves came out positive and significant along side some other variables, such as, openness of the economy and real exchange rate, we introduced a dummy variable (Niger Delta) to cover the major crisis that has be delved certain part of the country over the years. The variable (Niger Delta dummy) coefficient came out negative but not statistically significant. When the variable was removed, the performance of foreign direct investment improved from 2 percent to about 12 percent, judging from the elasticities of the coefficient (see table 5).

On the estimates of exchange rate equation, change in external reserves was found influential to relative

stability of the rates in recent time. The coefficient indicates a 10 percent increase in external reserve to a 24 percent appreciation of Naira against US dollar. Apart from this variable, price differentials ($p-p^*$) also prove significant in influencing exchange rate in Nigeria (table 6).

The result of the regression on the impact of external reserve on current account balance is shown in table 7. The relationship is positive according to the result. For instance, a 10% increase in external reserve position leads to 49% favorable changes in the current account balance position (others things being equal). Other variable that influences the current account balance position in the period under review is the net export. A 10% changes in net export improve the current account balance position by 63%. All statistics applied (t-sta, R-squared and F-sta) to confirm the reliability of our estimates support the results.

Conclusion

The paper has investigated the possible influence of a continuous external reserves accumulation on foreign direct investment, current account balance and exchange rate in Nigeria. However, the empirical evidence shows that the growth in external reserve of this country is not influenced by the opportunity cost of reserves but by other determinants such as, exchange rate stability and current account variability.

Also, some other important inferences that can be drawn from the work are that; change in external reserve has been having a positive influence on the growth of Foreign Direct Investment, exchange rate fluctuations and current account balance position in the country within the period under review.

In all, these results suggest that Nigerian government need to reconsider her reserve management strategies as the results show that reserves holding by this country can not be justified by its opportunity cost, which is the difference between the real return for reserves and the real return to domestic investment. The implication of this type of result is that, the monetary authorities should come out with a broader monetary policy strategy that will ensure a better portfolio balance arrangement between the amount earmark for external reserve pot and the fund to boost domestic

investment. This study believes that the two events are complimentary.

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APPENDIX

Table 1: Augmented Dickey Fuller (ADF) Unit Root Test.

Variable	ADF STA			
	Level	1st Diff	Lag length	Decision
RGDP	0.1059	-3.0638**	2	I (1)
REXH	-1.3731	-3.2454**	2	I (1)
RFDI	-1.1853	-5.5265*	2	I (1)
OPN	-0.6362	-3.0649**	2	I (1)
CAB	0.5609	-3.4463**	2	I (1)
RC	-1.5756	-4.2421*	2	I (1)
KAV	-1.5756	-3.4216**	2	I (1)
CUV	-2.2659	-4.2421*	2	I (1)
RS	-1.0479	-3.966*	2	I (1)
NEP	-1.6599	-4.2976*	2	I (1)

(x), (xx) and (xxx) indicate significant at 1%, 5% and 10% respectively.

I(1) indicate that the variables are integrated of order one

Table 2: Johansen Co-integration test (Equation 2)
Assumption: Linear deterministic trend in the data

Eigen value	LR	5% critical value	1% critical value	Hyp. No of (CEs)
0.7203	65.56	50.72	71.78	None*
0.5507	29.91	38.81	40.67	At most 1
0.3206	12.84	21.94	30.72	At most 2
0.2014	7.61	16.61	19.72	At most 3
0.019	1.32	4.66	7.36	At most 4

* (**) denotes rejection of the hypothesis at 5% (1%) significance level.
 L.R. test indicates 1 co integrating equation at 5% level of significance.

Table 2b: Johansen Co-integration test (Equation 3)
Assumption: Linear deterministic trend in the data

Eigen value	LR	5% critical value	1% critical value	Hyp. No of (CEs)
0.8403	74.84	68.52	76.07	None*
0.6507	39.98	47.21	54.46	At most 1
0.4607	19.99	29.68	35.65	At most 2
0.3092	8.26	15.41	20.04	At most 3
0.0629	1.23	3.76	6.65	At most 4

* (**) denotes rejection of the hypothesis at 5% (1%) significance level.
 L.R. test indicates 1 co integrating equation at 5% level of significance.

Table 2c: Johansen Co-integration test (Equation 5)
Assumption: Linear deterministic trend in the data

Eigen value	LR	5% critical value	1% critical value	Hyp. No of (CEs)
0.7825	53.46	47.21	54.46	None*
0.5583	24.47	29.68	35.65	At most 1
0.3681	9.29	15.41	20.04	At most 2
0.0296	0.57	3.76	6.63	At most 3

* (**) denotes rejection of the hypothesis at 5% (1%) significance level.
 L.R. test indicates 1 co integrating equation at 5% level of significance.

Table 3: OLS Estimates of Equation 1
Variable Coefficient t-value

Constant	-2.78	-1.63***	R2 = 0.77
RGDP	20.55	1.15	Adj - R2 = 0.70
KAV	-4.24	-0.21	DW = 1.88
CUV	3.28	1.63***	F-Sta = 10.19
REXH	5.09	2.02**	
RC	-3.36	-1.67***	

* (**) denotes significance at 5% and 10% level respectively.

Table 4: Error Correction Model Estimates (Equation 2)**Dependent variable: Δ RES**

Variable	Coefficient	t-value	
Constant	3.58	1.36	R2 = 0.65
Δ (RGDP)	7.54	0.34	Adj - R2 = 0.56
Δ (KAV)	-1.22	-0.61	F-Sta = 18.61
Δ (CUV)	1.36	2.64**	
Δ (REXH)	2.04	-2.78**	
Δ (RC)	-3.14	-1.76***	
ECM(-1)	-0.59	-4.64*	

*, ** and *** denotes significance at 1%, 5% and 10% respectively.

Table 5: Error correction model estimates (Equation 3)**Dependent variable: Δ RFDI**

Variable	Coefficient	t-value	
Constant	1.09	0.08	R2 = 0.81
Δ (RS)	0.12	2.93**	Adj - R2 = 0.75
Δ (OPN)	-0.64	-1.66***	F-Sta = 11.73
Δ (REXH)	-1.62	-3.29*	
Δ (RC)	-3.42	-0.78***	
ECM (-1)	-0.89	-5.23*	

*, ** and *** denotes significance at 1%, 5% and 10% respectively.

Table 6: OLS Estimates of Equation 4**Dependent variable: Δ REXH**

Variable	Coefficient	t-value	
Constant	0.82	2.20**	R2 = 0.68
i-i*	-0.01	-0.76	Adj - R2 = 0.67
P - p*	-0.02	-2.85**	Dw = 2.10
Δ RS	0.24	0.26	F-Sta = 19.64

*, ** denotes significance at 1% and 5% level.

Table 7: Error correction model estimates (Equation 5)**Dependent variable: Δ CAB**

Variable	Coefficient	t-value	
Constant	0.74	0.41	R2 = 0.91
Δ (RS)	0.49	4.81*	Adj - R2 = 0.88
Δ (REXH)	3.24	0.54	F-Sta = 37.20
Δ (NEP)	0.63	5.14*	
ECM (-1)	-0.65	-2.04**	

*and ** denotes significance at 1% and 5% respectively.