Is Real Exchange Rate Misalignment a Leading Indicator of Currency Crises in Nigeria?

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Is Real Exchange Rate Misalignment a Leading Indicator of Currency Crises in Nigeria?[1]

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This paper constructs an early warning system (EWS) for currency crises in Nigeria based on selected key macroeconomic indicators. It estimates the probabilities of currency crises as a logistic function of the included variables within the framework of a logit model. Particularly, the extent to which real exchange rate misalignment (RERMIS) could be used as a leading indicator of currency crisis is investigated by including its lag in the model. Our findings show that the likelihood of currency crisis increases when the real exchange rate is misaligned; the exchange rate is volatile; oil price declines; debt/GDP ratio increases; and the current account balance to GDP ratio declines. Based on the size, sign and statistical significance of its coefficient in the currency crisis model, the study confirms that RERMIS represents a useful leading indicator of currency crisis in the country. Besides, its inclusion improves overall model performance substantially. The paper therefore recommends regular assessments of the value of the Naira exchange rate vis-à-vis its equilibrium level with a view to implementing appropriate policy responses to arrest or avoid prolonged and substantial misalignments. Since all the variables enter the equation in their one period lags, the estimated model constitutes a reliable early warning system to policy makers on the possibility of impending currency crisis in the country.

JEL Classification: C32, C35, E58, F31, F41, O55

Keywords: Real exchange rate misalignment, exchange market pressure, currency crises, logit model

1.0 Introduction

Following the collapse of the Bretton Woods system of fixed exchange rates in March 1973, the frequency and costs of currency crises have increased substantially. This unfortunate collapse led many developed countries to adopt the flexible exchange rate system while some developing ones responded by

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sustaining their fixed exchange rate parities. Eventually, a number of these developing countries abolished the fixed exchange rate system and embraced intermittent adjustments by implementing regimes such as the crawling pegs or the managed float. Consequently, exchange rate setting in those countries became the role and concern of monetary authorities rather than that of the market forces. Over the years, the strategy has been that of avoiding current account problems and currency crises via exchange rate policies.

In Nigeria, for instance, exchange rate policies are implemented by the Central Bank of Nigeria (CBN) and consistently targeted at avoiding substantial misalignments as well as achieving a realistic Naira exchange rate that is capable of addressing the basic problems of the country's external sector. The policies implemented over the years have ranged from a fixed exchange rate regime prior to 1986 to various forms of floating exchange rate system, following the liberalization of the foreign exchange market in 1986. The Second-tier Foreign Exchange Market (SFEM) was introduced in September, 2006 as a market-driven mechanism for foreingn exchange allocation. Currently, foreign exchange transactions in the country are guided by the Retail Dutch Auction System (rDAS). This replaced the Wholesale Dutch Auction System (wDAS), which was introduced on the 20th of February, 2006.

Historically, many currencies of the world have suffered crashes. These include the Bretton Woods system collapse of 1971-73, the British pound crisis of 1976, the European Exchange Rate Mechanism (EERM) mayhem of 1992-93, the Mexican peso crisis of 1994-95 and the Russian rubble crisis of 1998, amongst others. In fact, Hutchison and Noy (2002) noted that more than 51 currency crises episodes occurred in emerging-market economies between 1976 and 2001. The pervasive socio-economic costs of these crises have been widely documented in countries of diverse economic structures and monetary policy frameworks. For instance, Hutchison and Noy (2002) found a 5-8 per cent currency-crises-caused output reduction in emerging market economies while Bordo *et al*. (2001) estimated currency crisis cost amounting to 5-10 per cent of global GDP. There is also evidence that currency crises can result to banking crises (i.e. the twin crises), especially when the banking sector holds substantial unhedged foreign liabilities during periods of sharp exchange rate depreciation (Glick and Hutchison, 2001). In this regards, the balance sheets of banks are negatively affected as the domestic currency value of their foreign liabilities become bloated. These historical perspective as well as the experiences of the

2008-09 financial crisis underscores the pervasiveness as well as the spread of currency crises via contagion and the need for early warning systems.

To the knowledge of this study, no empirical work has been done to model currency crises in Nigeria, especially following the 2008/09 global financial crisis during which the Central Bank was believed to have substantially intervened in the foreign exchange market in order to avoid large changes in the Naira exchange rate. This paper seeks to bridge this gap using quarterly data for the period 1990:Q1 - 2011:Q2. A major innovation of this study is the disentanglement of the impacts of exchange rate volatility and real exchange rate misalignment on the probability of currency crisis in the country.

The paper is structured into six sections. Following the introduction is section two, which presents some stylized facts on exchange rate management in Nigeria. Section three reviews related empirical literature, with particular focus on conceptual definitions and measurement methods. The study methodology is discussed in section four while results are presented in section five. The final section concludes the paper with some recommendations.

2.0 Stylized Facts on Exchange Rate Policy in Nigeria

This section presents some stylized facts on the various exchange rate policies that have been implemented in Nigeria since 1960, which are summarized in Table 1. These exchange rate policies were intended to evolve a realistic and sustainable exchange rate for the naira. During 1960 – 1967, a one to one fixed parity was maintained between Naira and the British pound during 1960 and 1967 while another fixed parity was maintained with the American dollar between 1967 and 1974. The fixed parity system was later replaced with an independent exchange rate management policy that pegged the Naira to either the U.S. dollar or the British pound sterling; depending on which currency was stronger in the foreign exchange market. Late in 1976, the naira exchange rate was pegged to a basket of seven currencies of Nigeria's major trading partner countries. In line with the doctrines of the Structural Adjustment Programme (SAP), the government allowed the exchange rate to be determined by market forces[3]. Thus, the Second-tier Foreign Exchange Market (SFEM) was introduced in September 1986 as a market-driven mechanism for foreign exchange allocation.

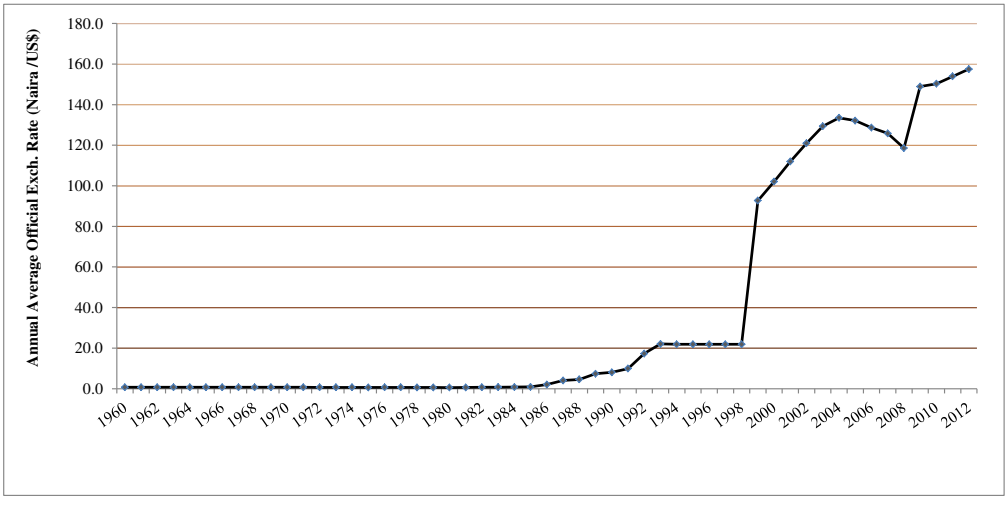
[3] Nigeria's exchange rate regime since SAP could be strictly referred to as a managed float system.

Table 1: Exchange Rate Regimes/Policies in Nigeria, 1960 – 2013

Exchange Rate Regime/Method of Exchange Rate Determination	Date	Average Exchange Rate
Fixed (Pegged to British pound sterling/US Dollars)	1960 - 1972	0.7085
Managed float	1973 - 1978	0.6354
Basket of currencies approach	1978	0.8938
Dual exchange rate system (Introduction of Second Tier FEM)	September 1986	2.0206
Dutch Auction System (DAS) of bidding	April 1987	4.0179
Single enlarged Foreign Exhange Market with various pricing methods	July 1987	4.2723
Creation of Interbank Foreign Exchange Market (IFEM)	January 1989	12.9377
Pegged exchange rate system	1994	21.8861
Autonomous Foreign Exchange Market (AFEM)	1995	21.8861
Reintroduction of IFEM	October 1999	108.0000
Retail Dutch Auction System (rDAS) of foreign exchange management	July 2002	130.8500
Wholesale Dutch Auction System (wDAS)	February 2006 - October, 2013	141.7600
Retail Dutch Auction System (rDAS) of foreign exchange management	October 2 - 31, 2013	157.4166

In July 1987, the first and the second tier markets were merged into an enlarged foreign exchange market while the exchange rate was determined via various pricing methods such as marginal, weighted average, and Dutch Auction System. The average annual official exchange rate, which was about N2.0 per US dollar in 1986 depreciated rapidly to about N4.3 per US$ during 1987.

Chart 1: Time Series Plot of Average Official Naira/Dollar Exchange Rate, 1960 – 2011



In a policy reversal, the naira exchange rate was again pegged in 1994. During this period, the naira exchange rate was pegged at N21.89/US$. However, an Autonomous Foreign Exchange Market (AFEM) was introduced in 1995 in an

attempt to liberalize the market. Whereas the fixed exchange rate of N21.9 per dollar was applied to official transactions, the market determined AFEM rates were used for other transactions. This policy encouraged round tripping and other sharp practices which led the monetary authority to abolish the fixed exchange rate system at the official segment of the market in 1999.

In order to further deepen the market, an Inter-bank Foreign Exchange Market (IFEM) was introduced in 1999. The system allowed oil companies, hotels and authorized dealers to buy and sell foreign exchange thereby relieving the CBN as the principal supplier of foreign exchange to the market. Daily trading sessions were conducted and the CBN only intervened either as a buyer or a seller, depending on its perception of the market. However, contrary to the expectations of the new policy, the demand for foreign exchange consistently outstripped its supply as the CBN remained the principal supplier of foreign exchange at the IFEM.

The Retail Dutch Auction System was reintroduced in July 2002 with the aims of narrowing the parallel market premium, evolving a realistic exchange rate for the naira and conserving the foreign exchange reserves. Under this system, the CBN supplies foreign exchange to the market and the ruling rates are determined through the quotations submitted by the authorized dealers. Foreign exchange is first sold to the highest bidder and subsequently down the line in descending order until the amount offered for sale by the CBN is exhausted. From it average of N108.00/US$ during the IFEM period, the naira exchange rate depreciated to an average of N130.85/US$ during the rDAS regime, implying a depreciation of about 17.5 per cent.

In order to further liberalize the foreign exchange market and reduce the dependence of authorized dealers on CBN for foreign exchange, the Wholesale Dutch Auction System (WDAS) was introduced on the 20th of February, 2006. The arrangement provided a window to authorized dealers to bid for foreign exchange on their own account as against the practice in RDAS where they were expected to bid on behalf of their customers. This led to an appreciation of the exchange rate from its average level of N132.15/US$ in 2005 to N128.65/US$, N125.83/US$ and N118.57/US$ in 2006, 2007 and 2008, respectively (Chart 1). However, the impacts of the global financial crisis manifested in the rate as there were depreciation pressures on the naira causing the exchange rate to move from N117.97/US$ at the end of 2007 to about

N149.58/US$ at the end of 2009. The RDAS was reintroduced on October 2, 2013 as a new framework for exchange rate allocation in the economy.

3.0 Literature Review

3.1 Real Exchange Rate Misalignment

The exchange rate is an important concept in economics and it connotes the prices at which currencies trade for each other. Its importance stems from the fact that it links the general price level within the economy with prices in the rest of the world while also affecting other prices within the system. To central banks, exchange rate is a key variable as it could be used as a target, an instrument or simply an anchor, depending on the monetary policy framework being operated in the economy Thus, exchange rate is at the core of any serious economic stabilization programme.

The Real Exchange Rate (RER) refers to inflation adjusted nominal exchange rate and it is often used as a measure of an economy's competitiveness. However, beyond the RER is a the Equilibrium Real Exchange Rate (ERER), which is an "ideal" real exchange rate that prevails in the absence of price rigidities, frictions and other short run factors in an economy. A deviation of the RER from its equilibrium values is often regarded as real exchange rate misalignment[4] (Razin and Collins, 1997). The effects of real exchange rate misalignments can be damaging on an economy. For instance, RER overvaluation discourages export production by rendering exports more expensive and less competitive. It makes imports cheaper thereby increasing demand for them. The increase in import demand increases the tendency for external borrowing and balance of payments disequilibrium[5], which may eventually lead to currency crisis. Furthermore, overvaluation discourages domestic production as producers are confronted with unfavorable competition from foreign imports.

In view of these implications, the concept of real exchange rate misalignment has become a recurrent topic in both international, monetary as well as growth economics and the literature is replete with its varying influences on macroeconomic performance. In Nigeria, studies that have been conducted to investigate the extent and negative consequences of Naira real exchange rate misalignment include Soludo and Adenikinju (1997), Obaseki (1998), Agu

[4] This could manifest in form of overvaluation or undervaluation
[5] Obadan (1994) supported this view.

(2002) and Aliyu (2011). These studies found varying levels of real exchange rate misalignment. It is important to highlight that Soludo and Adenikinju (1997) found that exchange rate misalignment affected the country's manufacturing investment negatively. Also, Agu (2002) found that real exchange rate misalignment and its volatility affected trade in Nigeria negatively during 1970 and 1998. The findings are similar for both country-specific and cross-country studies conducted in other countries. Table 2 provides a summary of some selected studies on real exchange rate misalignments that were reviewed.

Most of the studies reviewed applied time series analysis (i.e. cointegration and error correction mechanism) to estimate the equilibrium real exchange rate while a few others used the Purchasing Power Parity (PPP) and Ordinary Least Squares (OLS) approaches. The variables included in the real exchange rate models include degree of openness of the economy, terms of trade, government expenditure, productivity differential, capital flows, interest rate differential and gross domestic product, amongst others. The literature is replete with empirical evidence supporting the fact that different currencies have suffered varying levels of misalignment, depending on the estimation technique as well as the exchange rate regime and other macroeconomic developments prevailing in the economy being investigated. For instance, the Ivorian currency was found to be misaligned by 34.0 per cent during 1987 – 1993 (Baffes et al, 1997). In Nigeria, studies by Obaseki (1998), Agu (2002), Ononugbo (2005) found Naira real exchange rate misalignment levels of 4.7 per cent (during 1995 – 1998), 1.4 per cent (during 1970 – 1998) and 9.5 per cent (in 2003), respectively.

Table 2: Review of Literature on Real Exchange Rate Misalignment

Authour	Sample	Estimation Methodology for ERER	Variables Used	Major Findings
Baffes, Elbadawi and O'Connell (1997)	Cote d'Ivoire and Burkina Faso, 1980 - 1993	Cointegration & error correction model	Degree of openness, Share of investment in GDP TOT, Resource balance to GDP ratio	Ivorian currency was overvalued by 34 per cent during the period 1987-1993 while Burkina Faso's currency was undervalued by 14%
Montiel (1997)	Thailand, Indonesia, Malaysia, Philippines & Singapore (1960-1994	Cointegration & error correction model	External rate of inflation, Openness of the economy, Ratio of government consumption to GDP, TOT	No significant and persistent misalignments during ate 1980s and early 1990s in the economies.
Razin and Collins (1997)	Group of 93 countries 1975 - 1993	Panel Regression	Labor productivity, Annual money growth in excess of output growth, TOT, Annual long-term capital inflows as a share of GDP, Annual resource balance also as a share of GDP	Misalignments were most pronounced in Sub-Saharan Africa, South & Central Asia and Europe.
Obaseki (1998)	Nigeria, 1980 - 1998	PPP		Naira was overvalued by about 4.7 per cent during 1995 – 1998
Goldfajn and Gupta (1999)	80 countries, 1980 - 1998	Hodrick-Prescott filtered exchange rate series	Terms of trade (TOT), Openness of the economy, Government size, International interest rate	Monetary tightening reverses currency undervaluation Exchange rate misalignment causes currency crisis
Rahman and Basher (2000)	Bangladesh 1980 - 1999	Cointegration & error correction model	TOT, Degree of openness, Resource balance, Debt, Government consumption, Investment share, Foreign price level	The country's RER was considerably overvalued until the late 1980s.
Rajan et al. (2000)	Thailand 1988-1999	Cointegration & error correction model	TOT, Openness of the economy, Government size, International interest rate, Productivity	Significant misalignment (overvaluation) of the Thai baht against the Japanese yen
Chand (2001)	Australia 1981 - 2000	Cointegration & error correction model	TOT, Degree of openness, Import price, Export price, Resource gap (CAB) to GDP ratio	Exchange rate was 7 per cent below its equilibrium value as at December 2000
Lahcen (2001)	Algeria, Morocco, Egypt, Tunisia and Turkey 1970 - 1997	Cointegration & error correction model	Commercial policy (degree of openness), TOT, Net capital flows, Total government consumption	Significant overvaluation during the late 1990s
Nilsson (2002)	Sweden 1982 - 2000	Cointegration & error correction model	Net foreign debt as a share of GDP, Real interest rate differential, TOT, Real effective price ratio of tradables to non-tradables	Krona was severely overvalued in late 1992, when the fixed exchange rate regime was abandoned
Agu (2002)	Nigeria 1970 - 1998	Autoregressive Distributed Lag	Foreign direct investment, TOT, lag of real exchange rate, Recurrent expenditure, Output, Degree of openness	RER misalignment was irregular but persistent, Naira was overvalued by 1.4 per cent between 1970 and 1998
Aguirre and Calderon (2005)	Group of 60 Countries	Panel and Time series Cointegration	Net foreign assets to GDP ratio, Productivity, TOT, Government consumption to GDP ratio	Higher real exchange rate misalignment was found for developing countries compared to industrial countries
Ononugbo (2005)	Nigeria, 1970 - 2003	PPP		Naira was overvalued by 9.48 per cent in 2003.
Aliyu (2011).	Nigeria 1986 - 2006	Cointegration & error correction model	Net foreign assets,TOT, Index of crude oil price volatility, Government fiscal spending, Degree of openess, Index of monetary policy performance, Index of productivity	Deviations from the equilibrium path are eliminated within one to two years, Naira was undervalued between 2003Q3 and 2004Q4 and overvalued during 2005Q1 and 2006Q4
Suleiman and Muhammad (2011)	Nigeria 1980 - 2010	Cointegration & error correction model	Real oil price, Productivity differentials	Oil price conferred positive impact on the exchange rate while productivity differential conferred negative effect
Nwude (2012)	Nigeria 1960 - 2011	OLS	GDP, Balance of payments, Reserves, Consumer price index, Deposit rate, Lending rate	No statistically significant relationship between the dependent variable and the RHS variables

3.2 Measurement of Currency Crises

The first step in the measurement of currency crisis relates to crisis definition. A narrow definition includes successful attack on the currency that results in a substantial depreciation of the exchange rate. Based on this definition, studies such as Frankel and Rose (1996) define currency crisis as a nominal depreciation of 25 per cent or greater, which is at least 10 per cent greater than the depreciation in the preceding year. Raising the threshold a little, Leaven and Fabian (2008) define a currency crisis as a nominal depreciation of the currency of at least 30 per cent that is also at least 10 per cent increase in the rate of depreciation compared to the year before.

In a broader sense, currency crisis is defined as a speculative attack on a country's currency that can result in a sharp depreciation or the need for the government to intervene in the market by selling foreign exchange reserves. This definition includes episodes of unsuccessful attacks as captured by large changes in the index of Exchange Market Pressure (EMP), defined as a weighted average of exchange rate changes and reserve losses. The weights attached to the exchange rate and reserves component of the currency pressure index are inversely related to the variance of changes of each component over the sample. The intuition behind the EMP is that if there is an attack on the currency, either the exchange rate would depreciate or the central bank would sell foreign currency to support the exchange rate.

Changes in the EMP above some threshold are deemed to represent crisis, defined as zeros and ones binary variable (one for crisis periods and zero for tranquil periods). For instance, Eichengreen, Rose and Wyplosz (1995) used a threshold of one and a half standard deviation above the mean EMP, Glick and Hutchison (2005) used a 2 standard deviation threshold, while Kaminsky and Reinhart (1999) used a three standard deviation cutoff.

3.3 Currency Crises Prediction

In the literature, two popular methodologies have been extensively used in the construction of early warning systems for currency crisis; namely, signaling approach (which is non-parametric approach) and the probit/logit model (which is a parametric approach to the anticipation of a currency crisis). The signaling approach was introduced by Kaminsky *et al.* (1998), and further developed by Edison (2003). Kaminsky *et al.* (1998) monitored the evolution of several indicators with a view to assessing their relevance, individually in predicting currency crisis. Thus, if any of the macro-financial variables of a specific country tends to exceed a given threshold during the period preceding a crisis; it is interpreted as a warning signal indicating that a currency crisis in that specific country may take place soon. In this approach,

the researcher adjusts the threshold in order to maintain a balance between type I errors (i.e. that the model fails to predict crises when they actually take place) and type II errors (i.e. that the model predicts crises which do not occur) and considers a variable a good leading indicator if it gives a correct signal of the crisis occurrence.

Table 3: Review of Literature on Empirical Models of Currency Crises

Authour	Sample	Estimation Technique	Variables Used
Frankel and Rose (1996)	100 developing countries 1971 -1992	Probit model and Event study	Output growth, Growth in domestic credit, Foreign interest rate, Foreign direct investment to debt ratio, Government budget as a fraction of GDP, Ratio of reserves to imports, Current account as percentage of GDP, Real exchange rate misalignment, debt to GDP ratio,
Kaminsky, Lizondo and Reinhart (1998)	15 developing countries and 5 industrial countries 1970 - 1995	Non-parametric Signals approach	Exports, Real exchange misalignment, Broad money to international reserves ratio, Output, Equity prices
Berg and Pattillo (1999)	20 countries 1970 - 1995	Probit model	Current account deficit as a share of GDP, Real exchange rate misalignment, Growth rate of the ratio of M2 to reserves, Reserves growth, Export growth, M2/reserves
Berg and Pattillo (1999)	20 countries 1970 - 1995	Signals approach	Ratio of current account to GDP, M2/reserves, Real exchange rate, Exports growth, growth in external reserves, Domestic credit/GDP growth rate, TOT growth rate, Real interest rate, Import growth rate, Industrial production growth rate, M2 multiplier growth rate
Goldstein, Kaminsky and Reinhart (2000)	25 emerging economies 1970 - 1995	Non-parametric signals approach	Exports, Real exchange misalignment, Broad money to international reserves ratio, Output, Equity prices, Banking crisis
Kamin, Schindler, and Samuel (2001)	26 emerging market countries, 1980 - 1999	Probit model	Current account deficit, Real exchange rate misalignment, Fiscal deficit, debt service burden, Terms of trade (TOT) shocks, US Treasury bill rates
Kumar, Moorthy, and Perraudin (2003)	32 emerging economies 1985M1 - 1999M10	Logit model	Interest rate differential, Changes in foreign reserves, Regional contagion, deviation of real GDP from trend
Bussiere and Fratzscher (2002)	32 open emerging economies 1993 - 2001	Multinomial logit model	Real exchange rate overvaluation, current account deficit, short term debt as a proportion of reserves, the growth rate of real GDP, a lending boom indicator, and financial interdependence
Youngblood (2003)	Ghana 1987M1 - 2002M8	Signals Approach	Real exchange rate, TOT, Interest rate parity, Domestic credit/M2, Real interest rate, M2/reserves, Public sector credit growth, Public sector credit/domestic credit, International reserves Domestic credit growth, M2 multiplier, Inflation
Mariano et. al. (2004)	Turkey 1994 - 2001	Markov switching model	Real exchange rate, foreign exchange reserves, domestic credit/deposit ratio
Cepni and Kose (2006)	Turkey 1985Q2 - 2004Q2	Logit & Probit models	Real exchange rate, Current account balance to GDP ratio Industrial production index, Foreign direct investment to GDP ratio, M2 to international reserves ratio, Terms of trade, Credit Growth
Holtemoller and Mallick (2009)	Group of 69 countries 1970 - 2006	Logit model	Currency regime dummy, Primary current account balance to GDP ratio, Output growth, Real exchange rate misalignment, Squared real exchange rate misalignment
Masunda (2012)	Zimbabwe 1980 - 2006	Logit and Probit	GDP growth, Real exchange rate misalignment, External debt, Political stability, Money supply growth
Megersa and Cassimon (2013)	Ethiopia 1970 - 2008	Signals Approach	Excess M1 balances, Real exchange rate misalignment, Interest rate differential, Domestic real interest rate, Lending to deposit rate ratio, M2 multiplier, Domestic credit/GDP ratio, Bank deposits, Exports, TOT

On the other hand, the approach of probit/logit models estimates probability of a currency crisis as a function of selected factors. Within this framework, the currency crisis indicator is modeled as a binary response based on relevant input variables and model predictions are interpreted as the probability of a crisis (Singh, 2003). This approach which has the advantage of capturing the nonlinear nature of the relationship between economic fundamentals and the currency crisis binary variable has been used by Eichengreen et al. (1995, 1996) and Frankel and Rose (1996). In more recent studies, Bussière and Fratzscher (2002), Berg and Pattillo (1999), Komulainen and Lukkarila (2003) as well as Kumar et al. (2003) have also investigated the predictability of emerging markets currency crises using probit/logit models.

The right hand side variables often used in logit/probit models of currency crisis include money or domestic credit growth, the fiscal deficit, current account balance, real exchange rate misalignment, trade/financial openness, and output gap; as well as variables that gauge a country's vulnerability to attacks, such as measures of the adequacy of international reserves relative to possible short-run liabilities of foreign and domestic origin, foreign financing needs, and the overall soundness of the financial sector. Other variables include indicators of market expectations or investors' risk appetite, such as interest rate differentials, and exposure to contagion from crises in other countries. Table 3 provides a summary of selected studies on currency crisis, with particular focus on real exchange rate misalignment as a crucial leading indicator.

4.0 Methodology and Data

4.1 Model of Equilibrium Real Exchange Rate and its Misalignment

The study adopted the behavioral equilibrium exchange rate approach to estimate Naira equilibrium value. This approach was enunciated by MacDonald (1997) and has been used by authors such as Aliyu (2011), Omotosho and Wambai (2012), and Ali et al. (2015) to model equilibrium real exchange rate misalignment in Nigeria. We made use of nine economic variables to capture both transitory and structural movements in naira real exchange rate. These include total government expenditure (TGE), productivity (PRO), nominal exchange rate (NER), interest rate differential between Nigeria and the United States of America (IRD), capital inflow (FDI), degree of openness (DOO), oil price (OIL), reserves to GDP ratio (RES) and total inward remittance (REM). These variables are selected based on their theoretical, empirical and situational relevance. The functional form of the Naira equilibrium real exchange

rate model as well as the expected signs of the regressors (in parenthesis) is specified as

$$\boldsymbol{LRER} = \boldsymbol{f}(\boldsymbol{LTGE_t, LPRO_t, LNER_t, IRD_t, LFDI_t, LDOO_t, LOIL_t, LRES_t, LREM_t, \varepsilon_t}) \quad (1)$$

$$(-) \quad (-) \quad (+) \quad (-) \quad (-) \quad (\pm) \quad (-) \quad (-) \quad (-)$$

where LTGE is log of total government expenditure, LPRO is log of productivity differential, LNER is log of nominal exchange rate, IRD is as earlier defined, LFDI is log of capital inflow (proxied by the sum of foreign direct and portfolio investments), LDOO is the log of degree of openness, LOIL is log of oil price, LRES is the log of reserves to GDP ratio, LREM is log of inward remittance, and ε_t is the random error. In order to estimate equation (1)[6], the theory of cointegration and error correction model is applied. Firstly, we conduct stationarity test in order to ascertain their correct order of integration of the variables and avoid the spurious regression problem. In this regard, the ADF unit root test is employed. In the second step, the Engle & Granger (1987) residual based cointegration approach is used to test for cointegration amongst the variables included in equation (1). This is to ensure that the linear combinations of the variables in equation (1) exhibit stable properties in the long run. The third step involves estimating the Naira RER error correction model, which is of the form:

$$\Delta LRER_t = \alpha_0 + \sum_{i=0}^{s} \beta_i \, \Delta X_{t-i} + \sum_{j=1}^{q} \gamma_j \, \Delta Y_{t-j} + \rho \varepsilon_{t-1} + \mu_t \qquad (2)$$

where Δ denotes the first difference operator, $\mathcal{E}_t$ is the estimated residual from equation (1), s and q are the number of lag lengths, $LRER_t$ is the dependent variable while X_t is the vector of exogenous variables listed in equation (1). If the system is stable, the coefficient ρ will be negative and statistically significant. Moreover, the value of ρ measures the speed of adjustment of the dependent variable to the value implied by the long run equilibrium relationship. The fourth stage involves the computation of the equilibrium real exchange rate based on sustainable values[7] of the exogenous variables. In the final stage, the percentage difference between the estimated equilibrium real exchange rates (e*) and the observed real exchange rate (e) is calculated in a time series perspective and regarded as the extent of misalignment. Thus, if:

[6] See Aliyu (2011) a for detailed discussion on the use of this methodology for obtaining naira real exchange rate equilibrium

[7] The Hodrick Prescott filter is used to derive sustainable values of the fundamentals.

$$e^* - e > 0, \quad the\ RER\ is\ overvalued \tag{3}$$

$$e^* - e < 0, \quad the\ RER\ is\ undervalued \tag{4}$$

$$e^* - e = 0, \quad the\ RER\ suffers\ no\ misalignment \tag{5}$$

4.2 Measurement of Currency Crisis

In this paper, the broader definition of currency crises is employed as it provides a more comprehensive perspective than the narrow definition by capturing both successful and unsuccessful attacks on the currency. Thus, we adopt the definition based on the concept of 'exchange market pressure' developed by Girton and Roper (1977). This way of defining crises has an advantage over the alternative definitions of currency crisis, which rely only on extreme currency movements, because both 'successful' and 'unsuccessful' speculative attacks can be considered[8]. Thus, the exchange market pressure in a country *'i'* at time 't' can be measured as:

$$\boldsymbol{EMP_{i,t} = \left[\alpha\%\Delta e_{i,t} - \beta\%\Delta r_{i,t}\right]} \tag{6}$$

where $e_{i,t}$ denotes the price of a U.S. Dollar in country *i*'s currency at time *'t'*; $r_{i,t}$ denotes the foreign reserves (excluding gold) of country *'i'* at time *'t'* and α and β are the weights that equalize the variances of these two components. The first term, $\alpha\%\Delta e_{i,t}$ measures the percentage change of the Naira to dollar exchange rate while the second term, $\beta\%\Delta r_{i,t,}$ measures the percentage change in the level of external reserves. A positive value of the exchange market pressure index indicates depreciation pressure on the naira, while a negative value of the index implies appreciation pressure. In the literature, the currency crisis indicator is constructed as a dummy variable that assumes the values of 1 and 0 as follows:

$$\begin{aligned} \boldsymbol{Crisis_t = 1, if\ EMP_t > EMP_\mu + 2.0 EMP_\sigma} \\ \boldsymbol{Crisis_t = 0, if\ EMP_t < EMP_\mu + 2.0 EMP_\sigma} \end{aligned} \tag{7}$$

where EMP_μ and EMP_σ are the sample mean and the standard deviation of the computed exchange market pressure index. The classification of each time series observation under crisis (crisis=1) and tranquil (crisis=0) periods depends on whether or not the index exceeds an arbitrarily chosen threshold. In the literature, the values of threshold used have ranged between 1.5 to 3 standard deviations above the mean of the EMP. We decided to use a threshold of 2.0 for this study, similar to the works of Glick and Hutchison (2001, 2005) and Glick, *et. al.* (2006).

[8] The 'successful' speculative attack means occasions where the currency in consideration depreciates/appreciates strongly. The 'unsuccessful' speculative attacks means occasions, where the central bank has been able to defend the currency (i.e. the currency has not been devalued/revalued) by intervening in the foreign exchange markets

4.3 Model of Currency Crisis

Having constructed a currency crisis dummy as outlined above, we estimate a binomial logistic regression that models the probability of a crisis as a function of carefully selected explanatory variables as follows:

$$P_t = \frac{1}{1 + e^{-(\beta_1 + \beta_2 x_1 + \cdots + \beta_k x_k + \mu_t)}} \qquad (8)$$

Where P_t is the probability that there is currency crisis (i.e. $Crisis_t = 1$). The probability of currency crisis is related to a set of explanatory variables $x_1, x_2, \ldots, x_k$. β_1 is the constant term while $\beta_2, \beta_3, \ldots, \beta_k$ are the coefficients of the explanatory variables. The included input variables are: government expenditure as a ratio of Gross Domestic Product (Government Size), Output Gap, high inflation dummy, Ratio of broad money to external reserves (M2/Reserves), debt/GDP ratio, oil price growth, current account balance/GDP ratio (CAB/GDP), foreign private investment gap (FPIGap), exports growth, real exchange rate, real exchange rate volatility, and real exchange rate misalignment. Data on real exchange rate misalignment was based on computed deviations of the actual real exchange rate from its long run equilibrium path described in section 4.1. Also, data on exchange rate volatility was obtained from variance series derived based on an estimated Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model of the naira-dollar real exchange rate.

The choice of the independent variables was based on theoretical models of currency crisis, which aim to capture both domestic and external conditions of the economy. In addition, all used variables have been found to be related to currency crises in the empirical literature reviewed in section 3. For instance, the simple monetary model of exchange rate determination, predicts that money growth in excess of the anchor currency's money growth will cause higher inflation that creates pressure for depreciation of the home currency. If the home country successively resists depreciation for a time, the ultimate fall in the exchange rate may occur as a large discrete movement in the form of a currency crisis. Also, higher foreign reserve holdings imply greater ability to respond to speculative depreciation attacks. The ratio of M2 to reserves captures the extent to which the liabilities of the banking system are backed by international reserves. In the event of a currency crisis, bank depositors may rush to convert their domestic currency assets into foreign currency, so that this ratio captures the ability of the central bank to meet those demands and stabilize the currency. It is also documented in literature that relatively large exchange rate misalignment is associated with increased likelihood of a currency crisis because of the negative effects on competitiveness (Frankel and Rose, 1996 and Berg and Pattillo, 1999).

4.4 Data

This study used data spanning 1990Q1 to 2011Q2 sourced from the Central Bank of Nigeria (CBN) Annual Statistical Bulletin CBN data base (http://statistics.cbn.gov.ng/cbn-onlinestats). The choice of the estimation period is based on data availability and the need to capture the behavior of the macroeconomic fundamentals just after the occurrence of the 2008/09 global financial crisis.

5.0 Results

5.1 Descriptive Statistics

The descriptive statistics for the included variables in the crisis model is presented in Table 4. The average real exchange rate misalignment during the estimation period is 0.03, with an average undervaluation of -0.39 per cent during the tranquil periods (dep=0) and average overvaluation of 3.17 per cent during the crisis periods (dep=1). Also, higher exchange rate volatility is discernible in crisis periods compared to the tranquil periods. During the tranquil periods, the average growth rate in oil price is 10.49 per cent while the crisis periods are associated with an average decline in oil prices (-1.82%). Crisis periods are more associated with high inflation episodes (i.e. inflation in excess of 40 per cent) than tranquil periods. While the average real exchange rate is about the same during the tranquil (167.61) and crises periods (167.70), its standard deviation is higher during the crises period (67.13) compared to the tranquil period (61.69).

Table 4: Categorical Descriptive Statistics for Explanatory Variables in Crisis Model

	Mean			Standard Deviation		
Variable	Dep=0	Dep=1	All	Dep=0	Dep=1	All
Real Exchange Rate Misalignment	-0.39	3.17	0.03	4.49	5.06	4.67
Government Size	0.16	0.17	0.16	0.05	0.04	0.05
Output Gap	23216.94	-85623.18	10412.22	240341.70	224368.30	239844.70
M2 to Reserves Ratio	2.47	1.63	2.37	2.30	0.78	2.19
High Inflation Dummy	0.15	0.50	0.19	0.36	0.53	0.39
Debt Service to GDP Ratio	0.36	0.49	0.37	0.43	0.41	0.43
Oil Price Growth	10.49	-1.82	9.04	36.24	29.80	35.61
Exchange Rate Volatility	22.62	27.08	23.14	39.24	51.81	40.58
Current Account Balance	0.22	0.12	0.20	0.11	0.09	0.12
Real exchange Rate	167.61	167.70	167.62	61.69	67.13	61.93
Foreign Portfolio Investment Gap	-576.00	7662.19	393.19	24143.15	16902.62	23478.49
Exports Growth	6.89	12.11	7.51	15.95	39.33	19.82
Observations	75	10	85	75	10	85

5.2 Test for Stationarity on the Real Exchange Rate Model Variables

The results of the ADF unit root test conducted on the variables used for the real exchange rate model are summarized in Table 5. At the 5 per cent significance level, all the variables were found to be non-stationary at levels. However, after differencing them once, the null hypothesis of non-stationarity in the individual series was rejected, implying that the variables are integrated of order one. It was also noted that the purchasing power parity hypothesis does not hold for the RER as the series failed to exhibit mean reversion. The implication of this is that Naira long run equilibrium RER may not be explained by the PPP theory. Thus, the use of an alternative model, based on relevant economic fundamentals as employed in this study is justified.

Table 5: Results of Augmented Dickey-Fuller Unit Root Test

Variables	Levels		First Difference	
	ADF^{c}	ADF^{ct}	ADF^{c}	ADF^{ct}
LRER	-1.6360	-1.6291	-8.3461	-8.2950
LDOO	-2.5895	-2.5650	-6.9789	-6.9095
IRD	-2.5768	-2.5691	-7.1059	-7.0686
LFDI	-2.2808	-2.7018	-3.7889	-4.1824
LNER	-1.6542	-1.6495	-8.6774	-8.7530
LPRO	-1.8352	-2.5440	-3.4979	-3.7740
LTGE	-2.6465	-3.0122	-8.8090	-8.7561
LOIL	0.1303	-2.5691	-8.3823	-8.6250
LRES	-1.9757	-2.3900	-16.8210	-16.7180
LREM	-1.5858	-2.1554	-7.6946	-7.7033

ADF^{c} represents unit root test with constant while ADF^{ct} represents unit root test with constant and trend

**MacKinnon (1996) critical values with constant are -3.5113 (1%), -2.8968 (5%) and -2.5856 (10%)*

**MacKinnon (1996) critical values with constant and trend are -4.0710 (1%), -3.4642 (5%) and -3.1586 (10%)*

5.3 Test for Cointegration

The presence of cointegration amongst the I(1) variables used for the real exchange rate model was investigated using the Engle & Granger residual test for cointegration and the results are presented in Table 6. The results show that the linear combination of the variables in the real exchange rate model is stationary, implying the presence of cointegration. The results of the maximum eigenvalue unrestricted cointegration rank test of Johansen (1995) presented in Table 7 also confirmed the presence of one cointegrating vector.

Table 6: Result of Unit Root Test on the Residuals of the Static Model[9]

[9] The results of the long run model from which the residuals were obtained are not included in this paper in order to conserve space.

Null Hypothesis: RESID01 has a unit root Lag Length: 0 (Automatic - based on SIC, maxlag=11)			
		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.0293	0.0001
Test critical values:	1% level	-3.5093	
	5% level	-2.8959	
	10% level	-2.5852	

*MacKinnon (1996) one-sided p-values.

Table 7: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.6683	48.5587	46.2314	0.0277
At most 1	0.5517	35.2979	40.0776	0.1568
At most 2	0.4874	29.4076	33.8769	0.1558
At most 3	0.3189	16.9003	27.5843	0.5885
At most 4	0.2675	13.6941	21.1316	0.3907
At most 5	0.1485	7.0717	14.2646	0.4807
At most 6	0.0304	1.3571	3.8415	0.2440

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

** denotes rejection of the hypothesis at the 0.05 level*

***MacKinnon-Haug-Michelis (1999) p-values*

5.4 Equilibrium Real Exchange Rate Model

The results of the error correction model for the real exchange rate (equation 2) are presented in Table 9. The short run parameters as well as the adjustment speed of the model are reported. Based on the obtained adjusted R^2, about 93.9 per cent of variations in the real exchange rate is explained by the right hand side variables of the model. In terms of model diagnostics, the tests for parameter stability, non-normality, autocorrelation and heteroscedasticity in the residuals of the error correction model show that the model is adequate and can be used for the purpose of generating Naira equilibrium real exchange rate (Table 8).

At the 5 per cent level of significance, capital inflows, interest rate differential, nominal exchange rate, productivity and ratio of external reserves to GDP were found

to be the significant fundamentals driving movements in the real exchange rate of the Naira.

Table 8: Model Diagnostics Results for the RER Error Correction Model

Test	F-statistic	P Value
Jarque-Bera (Normality)	2.2689	0.3216
Breusch-Godfrey (Serial Correlation LM Test)	0.5045	0.6060
White Test (Heteroskedasticity)	0.6875	0.8589
Ramsey RESET Test (Stability)	1.7458	0.1501

Most of the included variables possess the expected signs. For instance, an appreciation of the real exchange rate is associated with increasing inflow of foreign direct investment, improving productivity and increasing ratio of reserves to GDP. At 0.98, the coefficient of DLNER (nominal exchange rate), which captures the short run impact of nominal depreciation/appreciation on the real exchange rate is positive and high. This implies that about 98.0 per cent of a nominal depreciation/appreciation passes through to the real exchange rate. The error correction coefficient, which is -0.1471, is relatively low but statistically significant, implying that about 14.7 per cent of deviation in the real exchange rate from its equilibrium path is corrected within the next quarter. This low level of adjustment many not be unconnected with the fixed exchange rate regime of the 1990s.

Table 9: Results of the Error Correction Model for the Naira Real Exchange Rate

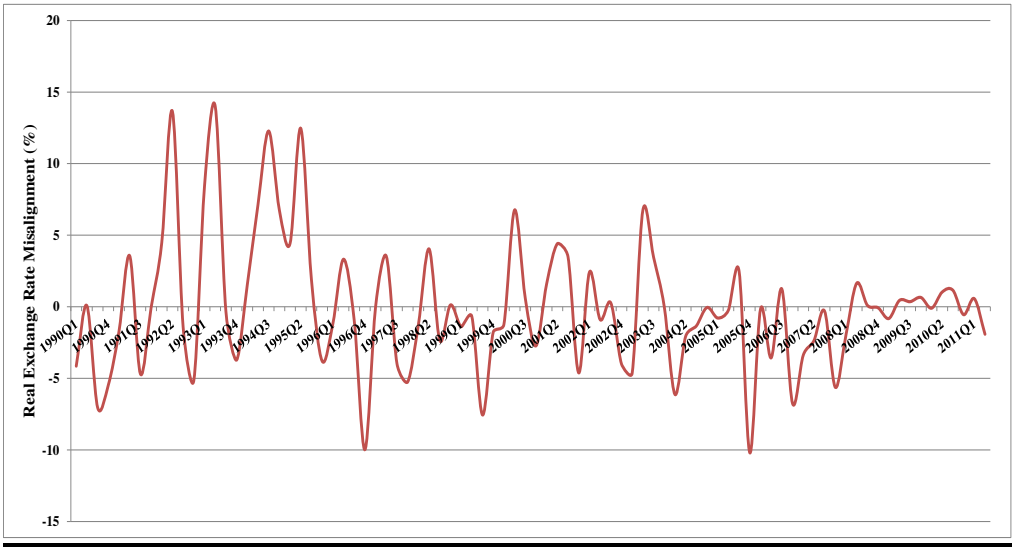
Dependent Variable: D(LRER)
Method: Least Squares
Included observations: 83 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.0127	0.0061	-2.0967	0.0395
DLRER(-1)	0.4399	0.0995	4.4221	0.0000
DLFDI	-0.0751	0.0302	-2.4863	0.0152
DIRD	0.0983	0.0477	2.0605	0.0430
DLNER	0.9836	0.0290	33.9292	0.0000
DLPRO(-1)	-0.0967	0.0431	-2.2428	0.0280
DLRES(-1)	-0.0280	0.0107	-2.6161	0.0108
DLRES(-2)	-0.0236	0.0102	-2.3126	0.0236
DLRER(-2)	0.0826	0.0303	2.7217	0.0081
RESID01(-1)	-0.1471	0.0633	-2.3239	0.0230
R-squared	0.9463	Mean dependent var		-0.0037
Adjusted R-squared	0.9388	S.D. dependent var		0.1651
S.E. of regression	0.0408	Akaike info criterion		-3.4350
Durbin-Watson stat	1.8648	Durbin-Watson stat		1.8504

5.5 Real Exchange Rate Misalignment

The estimated naira RER misalignment is presented in Chart 2. Overall, the observed RER was overvalued by an average of 0.03 per cent during the study period, with 49 cases of undervaluation and 37 cases of overvaluation. Analysis of estimated RER misalignment levels in a time series context shows that periods of significant misalignments (i.e. overvaluation or undervaluation) are associated with identifiable government policy shifts and shocks emanating from both the domestic and global economies. The periods of control (i.e. pegged exchange rate system and AFEM, 1992 - 1996) are notably periods of overvaluation. The introduction of the rDAS in Q3 2002 led to a correction to equilibrium, after which the naira RER became undervalued in Q1 2003. Following the introduction of wDAS in Q1 2006, the naira real exchange rate oscillated closely around its long run equilibrium path, except for the distortions of 2008 and 2009 that emanated from the impact of the 2008/09 global financial crisis. The crisis mounted serious depreciation pressures on the naira RER leading to an undervaluation of about 9.82 per cent at the peak of the crisis impact in Q1 2009. The extent to which this estimated levels of misalignment constitutes a reliable leading indicator of currency crisis in Nigeria is investigated in this paper.

Chart 2: Estimates of Real Exchange Rate Misalignment, 1990 – 2011



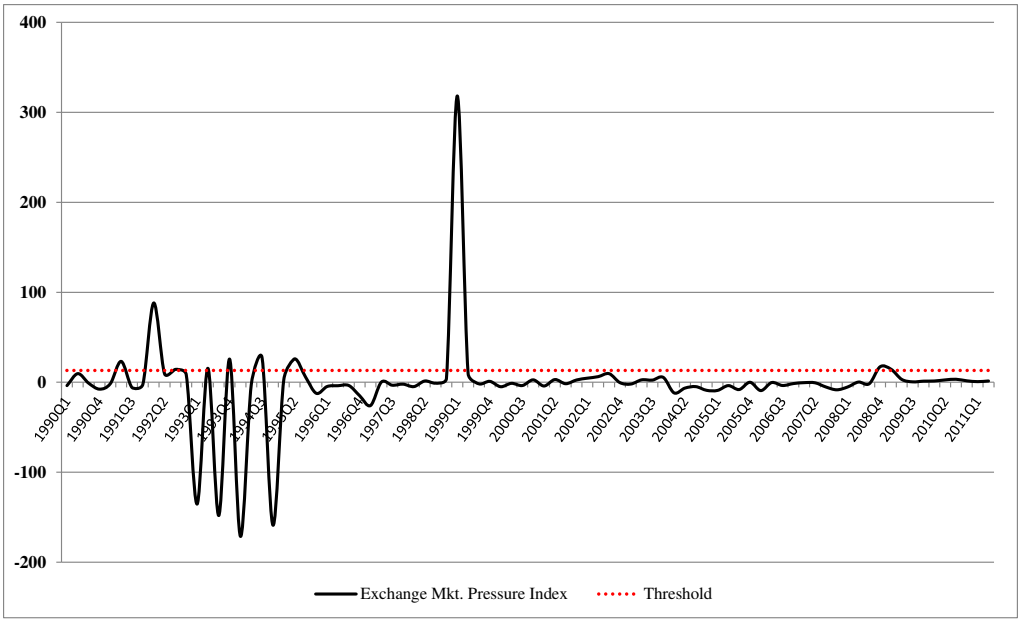
Source: Author's computation

5.6 Exchange Market Pressure and Currency Crisis Indicator

The computed exchange market pressure index is presented in Chart 3. The red dotted line represents the 2.0 standard deviation threshold adopted by the study. Any observation of the EMP in excess of the threshold is regarded as a period of currency crisis. Thus, ten cases of currency crisis were identified during the estimation period,

notable amongst which are 1999 (the year in which the AFEM was abolished and replaced with the IFEM) and 2009 (the year the foreign exchange market faced shocks emanating from the 2008/2009 global financial crisis). These periods were associated with substantial depreciation in the exchange rate.

Chart 3: Exchange Market Pressure Index, 1990Q1 – 2011Q2



Source: Author's computation

5.6 Currency Crisis Model

Table 10 presents the results of three variants of equation (8) fitted to investigate the determinants of currency crisis in Nigeria. Model 1 excludes the exchange rate indicators while model 2 includes both the real exchange rate and its volatility. In Model 3 real exchange rate misalignment was added to the variables included in Model 2. With or without the inclusion of the exchange rate indicators in the logit model, the signs of the other coefficients remained the same, implying some level of consistency and robustness of the estimates. The inclusion of real exchange rate, its volatility and misalignment significantly improved model performance as the deviance statistics (a measure of lack of model fit) reduced significantly from 26.3 (Model 1) to 10.83 (Model 3). At 0.82, the McFadden R-Squared for model 3 is the highest thus making it our preferred model.

Most of the coefficients of the preferred models are correctly signed and in line with theoretical expectations. The 12 variables included in the model are significant at the 1 per cent level, confirming their relevance in predicting currency crises in Nigeria. Since the variables enter the model in their one period lags, we confirm that

government size, output gap, ratio of M2/external reserves, high inflation, debt to GDP ratio, oil price growth, FPIGap, exports growth as well as exchange rate indicators, such as real exchange rate, exchange rate volatility and real exchange rate misalignment are leading indicators of currency crisis in the country.

Table 10: Results of the Logit Models of Currency Crises in Nigeria

Variable	Model 1	Model 2	Model 3	Marginal Effect (Model 3)
Government Size (-1)	0.0255*	0.0390*	0.1061*	0.1061
Output Gap (-1)	-0.0000*	-0.0000*	-0.0000*	-0.0001
M2/Reserves (-1)	-0.0066*	-0.0182*	-0.0350*	-0.0350
High Inflation Dummy (-1)	0.0345*	0.0785*	0.1021*	0.1021
Debt/GDP Ratio (-1)	0.0367***	0.0737*	0.1128*	0.1128
Oil Price Growth (-1)	-0.0002 (ns)	-0.0008*	-0.0016*	-0.0016
CAB/GDP (-1)	-0.2762*	-0.4970*	-0.4844*	-0.4844
FPIGap (-1)	0.0001*	0.0003*	0.0002*	0.0002
Exports Growth (-1)	0.0266 (ns)	0.0857*	0.1161*	0.1162
Real Exchange Rate (-1)		0.0006*	0.0010*	0.0010
Exchange Rate Volatility (-1)		0.0010*	0.0018*	0.0018
Real Exchange Rate Misalignment (-1)			0.5984*	0.5983
McFadden R-Squared	0.5737	0.7287	0.8241	
Deviance	26.2515	16.7036	10.8345	
LR Statistic	35.3243	44.8722	50.7413	
Prob (LR Statistic)	0.0000	0.0000	0.0000	

**** Significant at 1%, ** Significant at 5%, *** Significant at 10%, ns=not significant***

Note: The dependent variable is based on Girton and Roper (1997) currency crisis dummy

The significant factors increasing the probability of currency crises in Nigeria are real exchange rate misalignment, the prevailing exchange rate regime (proxied by real exchange rate movement), exchange rate volatility, exports growth, FPI gap, debt/GDP ratio, high inflation dummy and government size. However, increase in money supply/external reserves ratio (a measure of reserves adequacy), oil price growth and improved current account balance/GDP ratio reduce the probability of currency crisis. In terms of magnitude, the coefficient of real exchange rate misalignment is large (0.5984) underscoring its overarching influence on the likelihood of currency crisis incidence in the country. This finding is in line with the works of Frankel and Rose (1996) and Berg and Pattillo (1999), which found the values of 0.08 and 0.15, respectively for the coefficient of the exchange rate misalignment variable in their currency crises models.

In terms of marginal effects (Table 10), real exchange rate misalignment seems to be the most impactful variable in the determination of currency crises in Nigeria as its marginal effect stood at 0.5983. This is followed by current account balance as a ratio of GDP (0.4844) and exports growth (0.1162). The results also seem to suggest that real exchange rate misalignments matter more in the prediction of currency crises

than exchange rate volatility (with a marginal effect of 0.0018). The fact that the included explanatory variables enter the model in their one period lags imply that the model could be used as an early warning system for currency crises in Nigeria.

6.0 Conclusion

The paper examined the predictability of currency crisis in Nigeria based on the logit model and relevant macroeconomic fundamentals. Particularly, the question of whether real exchange rate misalignment could be a useful leading indicator of currency crisis in Nigeria was examined. The currency crisis definition adopted in this study is that of Girton and Roper (1977). Thus, the probability of currency crises in Nigeria was estimated as a logistic function of relevant macroeconomic fundamentals derived from the currency crises theories. Based on the author's literature review, this paper seemed to be one of the first applications of the logit model to currency crisis modeling in the country.

Model results showed that the included macroeconomic variables have statistically significant impact on the probability of currency crises in the country. In order to explore the possibility of using the model as a reliable early warning system of currency crisis as well as to answer the question posed by the study, the right hand side variables of the model were included in their one period lags. In terms of marginal effects, real exchange rate misalignment was found to have the most impact on the probability of currency crisis (0.60), followed by current account balance as a ratio of GDP (0.48). However, while an increase in real exchange rate misalignment increases the probability of currency crisis, an improvement in the current account balance produces an opposite effect.

The inclusion of real exchange rate indicators, namely: real exchange rate, exchange rate volatility and real exchange rate misalignment improved model performance significantly. In terms of their marginal effects, real exchange rate misalignment (0.60) seems to be a more crucial predictor of currency crisis in the country than exchange rate volatility (0.002). Therefore, while exchange rate stability continues to be a major consideration in exchange rate policy making in Nigeria, the need to also continue to realign the value of the real exchange rate in line with the dictates of economic fundamentals should be of policy imperative.

In conclusion, since real exchange rate misalignment enter the logit model significantly in its one period lag, the answer to the question posed in the title of the paper is 'yes'. In other words, real exchange rate misalignment is a leading indicator of currency crises in Nigeria. Therefore, we recommend a continuous and credible assessment of the naira real exchange rate relative to its long run equilibrium value with a view to ensuring that episodes of substantial and prolonged misalignments are

avoided. When such assessments reveal a widening real exchange rate misalignment, the need for urgent policy shift becomes paramount, if currency crisis is to be prevented. This paper recommends the continued use of market-based exchange rate determination arrangements that is capable of arresting misalignments and volatility in the Naira exchange rate as an effective strategy for reducing the probability of currency crisis in the country.

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