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MACROECOMOMIC PERFORMANCE AND EXCHANGE RATE MISALIGNMENT IN NIGERIA (1970- 2012)

BY

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ABSTRACT

The study investigates macroeconomic performance and misalignment of real effective exchange rate in both the long run and short run in Nigeria from 1970 to 2012, using REER model . the estimation techniques used in the analysis included VAR estimation, ECM and co-integration. The REER is the dependent variable while the determinants of macroeconomic performance are the independent variables such as gross domestic product, gross fixed capital formation, money supply, net foreign assets, trade openness and terms of trade. The findings from the result showed that there is disequilibrium in short run but the variables have long run relationship. The economic implication arising from the result is that diseeuilibrium leads to unstable policies and offset changes in international competitiveness. Based on this findings the study suggested that there is need to formulate monetary policy that will stabilise the exchange rate as well as allow such policy to complete their gestation period before subjecting them to change, among others.
KEYWORDS: MACROECONOMIC PERFORMANCE, EXCHANGE RATE MISALIGNMENT

INTRODUCTION

The exchange rate is an essential macroeconomic variable in the context of international economics for policy formulations, and a key price variable which government take very active interest in. The exchange rate is one of the most important fundamentals in an economy that trades goods and services internationally. In the process of macroeconomic adjustment and performance, a stable real exchange rate plays a vital role as a price that measures the market value of common baskets of domestically and internationally produced goods. Razin and Collins (1999) considers the real exchange rate as misaligned when it deviates from the underlying level that would have prevailed in the absence of price rigidities, frictions and other short-run factors. "Equilibrium real exchange rate" is a notion used as a more structured definition of misalignment. According to Edwards (1989,), real exchange misalignment is a "sustained deviation of the actual real exchange from its long-run equilibrium level". When a country's exchange rate is misaligned, it causes instability in a country's economy and the macroeconomic indicators are affected. Misalignment of the real exchange can result to undervaluation or overvaluation. However, overvaluation has been frequently occurring in developing countries. In a developing economy like Nigeria, there is an overvalued RER when the value of the observed RER at current period is above the value of the equilibrium RER. Likewise, there is an undervalued RER if the value of the RER at current period is below the value of the

equilibrium RER. Hence, the demand for domestic goods falls and places a downward pressure on prices of goods in the tradable sector. Accordingly, a fall in the domestic prices of goods in the tradable sector which would affect domestic production is caused by an overvalued currency while an increase in the domestic prices of products in the tradable goods sector is caused by an undervalued currency.

According to traditional exchange rate theory, the equilibrium exchange rate affects a country's economic competitiveness; therefore it is always a major concern for all countries to realize whether the RER is misaligned with respect to its long-run equilibrium level. Exchange rate misalignment could result in reduced investments, devastating the business, and declining productivity, deterioration of commercial positions and loss of established markets in the long run (Stockman, 1978). There is a growing concern in Nigeria because Nigeria's exchange rate have undergone difference transformations from 1960 till date and a large and lingering misalignment of the exchange rate can create severe macroeconomic disequilibrium in the long-run. It has been recognized in previous studies that in order to boost economic growth, maintaining a relatively stable exchange rate is important. Changes in exchange rate induced uncertainty and risk in investment decision with destabilizing impact on the macroeconomic performance (Mahmood and Ali, 2011). The divergence between the policy prescriptions of government and macroeconomic performance has made a rethink on the appropriateness of policy interventions necessary because Nigeria in the recent past has adopted different policy to improve the economy (Bolarinwa, 2012) From the forgone, with attempts to improve the macroeconomic policy in Nigeria with the dynamic nature of exchange, the impact of exchange rate misalignment on macroeconomic performance remains an empirical question because stability in the economy would improve the conditions of the economy. So the question that arises is what impact has macroeconomic performance on exchange rate misalignment in Nigeria both in the short run and long run?

In an attempt to answer the question raised above, many researchers have centered their works on the determinants of exchange rate and economic growth (see Bakare and Oluokun (2011), Adarmola (2012), Akinbobola (2012), Oriavwote and Eshenake (2012)) but they did not look at the equilibrium exchange rate. Other researchers looked at exchange rate volatility and macroeconomic performance (Azeez, Kolapo and Ajayi (2012), Oyovwi (2012), Udoh et al (2012), Ajao and Igbekoyi (2013), Danmola (2013)) but did not take cognizance of the short run relationship. Those works examined just the unit-directional relationship and long run relationship. However, both the short run and long run misalignment on macroeconomic performance using bi-directional relationship spurred the researcher to undertake this study which has not been specifically addressed. Therefore study is organized into five sections. Section one, being the introductory. Section two presents brief review of relevant literature. Section three presents the methodology employed in conducting the study while section four presents the result and disussion. And finally the study is rounded-up in section five which discussed conclusion and recommendation.

LITERATURE REVIEW

Mishkin (2004), Purchasing Power Parity (PPP) is based on the Law of One Price which implies that, among two countries that produce a similar good with minimal transportation costs and barriers to trade, the exchange rate should be such that the cost of a non-differentiable good remains the same throughout the world irrespective of the country in which it is produced. The Mundell-Fleming model is the mainstay of open-economy macro-economic analysis for industrial countries whose trade consists largely of manufactured goods that are imperfect substitutes for what the rest of the world produces. In the single good model, the domestic good is taken to be an imperfect substitute for the good produced by the rest of the world. The real exchange rate is well defined in this context as the number of units of the foreign good that has to be given up for each unit of the domestically produced good. It is also applicable to the definition of terms of trade, which is the price of exports relative to that of imports but these two concepts cannot be distinguished in the context of this production structure. Moreover, trade policies which may result in large fluctuations of the terms of

trade are not regarded. Where multiple price and cost indexes arise in empirical literature, they are not explicitly defined as a result of the issues that plague the external RER. It is also uncertain which basket and weights of the domestic and foreign goods should be used empirically.

Chowdhury (2011) examined the changing aspects of the real exchange rate of Australia based on an inter-temporal general equilibrium model. He uses ARDL modeling for cointegration analysis. The results reveal that increases in the terms of trade, government expenditure and net foreign liabilities cause RER appreciation in the long run. Dubas (2009) explores on how exchange rate misalignment may impact economic growth and development. He employs panel dynamic OLS estimation to arrive at a measure of misalignment and BEER approach using cross-section of 102 countries and annual data spanning 32 years from 1971 to 2002. The determinants of the exchange rate are terms of trade, capital flows, excess credit productivity and government consumption. He finds that exchange rate misalignment has asymmetric effects. It affects both developed and developing countries differently in that developing countries are more sensitive to the growth effects of misalignment.

Yajie *et al* (2007) examines the equilibrium exchange rate for China applying the BEER model using the Johansen technique between 1980 and 2004. The variables used are the foreign exchange reserves, monetary policy, terms of trade and per capita output used as a proxy for technological advances. The study reveals that increases in terms of trade, technological advances and foreign exchange reserves leads to the exchange rate appreciation while monetary policy depreciates the exchange rate. All the variables conform to economic theory. Maeso-Fernandez *et al* (2006) analyze the relationship between exchange rates of transition countries and economic fundamentals during the transition decade of the 1990s. The study employed the BEER model with a two-step approach. The fundamentals used in the model are government spending, developments in real per capita income and openness. The results reveal that there is no evidence of misalignment for the Croatian Kuna. The study also reveals that an increase in real per capita income and government spending cause an appreciation of the real exchange rate, while depreciation of the RER is caused by an increase in openness which is in line with the *a priori* assumptions. Kemme and Roy (2005) estimates the long run equilibrium real exchange rate model using macroeconomic fundamentals to calculate the misalignment of real exchange rate for Poland and Russia from the 1990s. He applies Beveridge and Nelson (1981) decomposition of macro fundamentals and short run movements of the real exchange rate are estimated with ARIMA and GARCH error correction techniques. The openness reveals a negative coefficient which leads to a currency depreciation in the long-run.

In Developing Countries, Insah and Chiaraah (2013) used annual data covering the period 1980 to 2012 to investigate the determinants of real exchange rate volatility in Ghana. The methodology employed is a dynamic econometric technique based on the Autoregressive Distributed Lag (ADL) Model to account for psychological inertia among others. The findings from the study revealed that money supply; though exerting a negative influence on real exchange rate volatility was not statistically significant. Consistent with the empirical literature, government expenditure is a major determinant of real exchange rate volatility. There existed a positive relationship between them. This implies that an increase (decrease) in government expenditure will lead to an increase (decrease) in real exchange rate volatility.

Rochester (2013) estimates the fundamental equilibrium exchange rate of Jamaica. The study sets out to enhance the bank of Jamaica's portfolio of equilibrium exchange rate measures through the estimation of the fundamental equilibrium exchange rate for Jamaica. The FEER was estimated using the Autoregressive Distributed Lag (ARDL) approach. The study found that there were periods where Jamaica's REER was undervalued and periods where the RER was overvalued. The study also revealed that the depreciation observed since December 2011 has brought the REER in line with the equilibrium measure as at September 2013.

Musyoki, Pokhariyal and Pundo (2012) examine the impact of real exchange rate volatility on economic growth in Kenyan. The study employed the Generalized Autoregressive Condition of Heteroscedasticity (GARCH) and computation of the unconditional standard deviation of the changes to measure volatility and Generalized Method Moments (GMM) to assess the impact of the real exchange rate volatility on economic growth for the period January 1993 to December 2009. The study found that RER was very volatile for the entire study period. Chi-Wei (2012) provides

evidences on the relationship between Renminbi (RMB) exchange rate and macroeconomic variables in China, as well as guidelines for reform of RMB exchange rate regime, the long-run equilibrium relationship between RMB exchange rate and macroeconomic variables of China is examined by applying the non-parametric rank tests proposed by Breitung (2001).

Mahmood, Ehsanullah and Ahmed (2011) investigate whether uncertainty or fluctuations in exchange rate affect the macroeconomic variables in Pakistan. Four variables; GDP, FDI, growth rate and trade openness were included in the study. GARCH model has been applied in this study to calculate volatility of real exchange rate and ordinary least square regression technique has been used to investigate the relationship between dependent and independent variables. The findings confirm the impact of exchange rate volatility on macroeconomic variables in Pakistan. It concludes that exchange rate volatility positively affects GDP, growth rate and trade openness and it negatively affects the FDI.

Sidek (2011) examines the impact of exchange rate misalignment in Malaysia on exports at disaggregated level, using the conventional cointegration and vector error specification to establish and estimate long run relationships. The data is aggregated into 2 sub-categories – agriculture and manufacturing exports, analyses are performed on disaggregated exports at 2-digit SITC. The results suggest that the impact of misalignment is negative and significant being more effective in the manufacturing sector compared to the agriculture sector. Loria *et al* (2010) examines the determinants of the peso-USD nominal exchange rate in Mexico from 1994 to 2007. Using the Johansen method, the study reveals the validity of the short and long run versions of the monetary approach of exchange rate determination.

Korsu and Braima (2009) therefore investigate the determinants of the real exchange rate of Sierra Leone using annual data from 1970 to 2005. A model based real exchange rate misalignment index is constructed based on the inter-temporal optimizing framework of Edwards (1989). Unit root, co-integration tests and an error correction model of the actual real exchange rate model is applied in the context of Hendry's general to specific modelling while the equilibrium real exchange rate is estimated using the Johansen Maximum Likelihood procedure. The study reveals that capital accumulation, increase in output, increase in government expenditure and trade restrictions leads to appreciation of the equilibrium real exchange rate while an increase in capital inflow and improvement in terms of trade leads to depreciation

Dedi (2008) adopted the BEER approach which developed from the reduced form approach to estimate the equilibrium real exchange rate of rupiah (Indonesia currency). He examines the appropriate level that represents the sustainable equilibrium real exchange in the long term trend. He determines the misalignment for real exchange rate of rupiah for the post crisis era from 1999 to 2006 (quarterly). Using co-integrating regression, the results reveal that the relative of non-traded to traded goods and net foreign asset are statistically significant indicating that the Balassa-Samuelson effect exists in Indonesia. He revealed that four patterns occurred; an undervaluation in the period quarters 2000Q2 to 2002Q1, overvaluation from 2002Q2 to 2002Q1, undervaluation 2004Q2 to 2005Q3 and overvaluation from 2005Q4 to 2006Q4. His findings reveal that the policy in export sector, inflation sector and investment sector contributes in strengthening the real exchange rate.

Iossifov and Loukoianova (2007) applied the BEER model and Vector Error Correction Model to estimate the equilibrium RER for Ghana from 1983Q1 to 2006Q3. The determinants used to estimate the equilibrium exchange rate in Ghana include the real interest rate differential (both relative to trading partner countries), real GDP growth and real world prices of Ghana's main export commodities. The study reveals that increases in all the variables lead to appreciation of the exchange rate and is consistent with the *a priori* expectations. Fourteen percentage points of any misalignment between actual and equilibrium REER is corrected in each quarter and the REER in Ghana reverts back to equilibrium after a shock provided the shocks do not reoccur. The actual REER was close to its equilibrium value in 2006Q3, following the period from 1999 to 2000 when the actual REER was below its equilibrium value.

Iimi (2006) uses the behavioural equilibrium exchange rate (BEER) approach to analyze the behaviour of the real exchange rate to investigate the misalignment of exchange rate in Botswana with its economic fundamentals from 1985 to 2004. The study applies a reduced-form single equation model using a VECM. The fundamentals used are interest rate differential, terms of trade a proxy for the Balassa–Samuelson effect, fiscal risk premium which depends on government income and expenditure, and the net foreign assets (capital inflow). The study reveals that the pula in the late 1980s was undervalued but in recent years is overvalued by 5 to 10 percent, though the misalignment in the 1990s seems to have been very marginal and had an effect on Botswana's competitiveness in the short and medium term. The study also reveals that the effect of the net foreign assets not being in line with *a priori* expectations is very small.

Ajao and Igbekoyi (2013) investigate the determinants of real exchange rate volatility in Nigeria from 1981 to 2008, results reveal that openness of the economy, government expenditures, real interest rates movements as well as the lagged exchange rate are among the major significant variables that influence real exchange rate volatility during this period. Money supply and productivity index have no significant influence on real exchange rate volatility. Danmola (2013) analyses the impact of exchange rate volatility on Macroeconomic variables in Nigeria and with the help of Correlation Matrix, Ordinary Least Square (OLS) and Granger Causality test. The finding of the study shows that exchange rate volatility has a positive influence on Gross Domestic Product, Foreign Direct Investment and Trade Openness, but with negative influence on the inflationary rate in the country.

Adarmola (2012) investigates the dynamic relationship between stock market performance and exchange rate in Nigerian economy over 1985:1 – 2009:4 using the Johansen cointegration technique and error correction mechanism. The empirical results show a significant positive stock market performance to exchange rate in the short-run and a significant negative stock market performance to exchange rate in the long-run. The Granger causality test shows strong evidence that the causation runs from exchange rate to stock market performance; implying that variations in the Nigerian stock market is explained by exchange rate volatility.

Azeez, Kolapo and Ajayi (2012) employ empirical analysis in examining the effect of exchange rate volatility on macroeconomic performance in Nigeria from 1986 to 2010. The short run and long run analysis show a negative relationship between GDP and BOP, indicating persistent unfavourable position of Nigeria's Balance of Payment. Oil Revenue is positively related to GDP in the short-run but negatively related to it in the long run, showing a high level of mismanagement of fund by government, so also, is Inflation. Oil revenue is significant in both long and short run while BOP and INF are significant in the long run but insignificant is the short run. It has been observed in this study that Exchange Rate Volatility is significant and has positive relationship with macro-economic performance both in the long and short run. The study thus confirmed that the purchasing power parity (PPP) approach provides a useful benchmark for analyzing the process of exchange rate determination in a less developed country like Nigeria.

3.   METHODOLOGY

Model Specification

The foundational model used in this study was adopted from the behavioural equilibrium exchange rate model developed by Macdonald (1997) and Clark and Macdonald (1998). This approach is more suitable for developing countries in which large and complex model are often not feasible because of data limitation. The REER approach focuses on the dynamic behaviour of the rate, including short run movements and deviations, and taking broader macroeconomic conditions into account. The choice of fundamentals may vary depending on the theoretical model used. The determinants of macroeconomic fundamentals to be used is not predefined by theory, it is set on an ad hoc basis. This method through a single equation setting links the real effective exchange rate to a set of fundamentals. With ease and absence of bias, the observed values prevailing in the economy at present are the main features that make this model appropriate to fit the required data in developing countries. The REER model highlights the impact of productivity on traded goods sectors and terms of trade shocks. The discussion about this approach is based on Clark and Macdonald

(1999). The approach starts by estimating a reduced form equation that explains the stochastic process of the REER over the period. The reduced form equation can be specified as:

$$q_t = \beta'Z_t = \tau'T_t + \varepsilon_t$$

(1)

Where Z_t is a vector of fundamental variables that influence on the real exchange rate over the medium term and long run. T_t is a vector of variables which only have transitory impact on the REER. β, τ are vectors of reduced-form coefficients. ε_t is the random disturbance term and q_t is the real effective exchange rate.

Following Clark and MacDonald (1999) ideas, it is very useful to differentiate the actual value of the real exchange rate and the current equilibrium exchange rate, q_t. The q_t value is defined for a position where the transitory and random terms are zero:

$$q'_t = \beta'Z_t$$

(2)

Then the related current misalignment, cm, is then given as:

$$cm_t = q_t - q' = \tau'T_t + \varepsilon_t$$

(3)

Where cm is simply the summation of the transitory and random errors. As the current values of the economic fundamentals can deviate from the sustainable levels, so the total misalignment, tm, is defined as the difference between the actual and real rate given by the sustainable, or long-run, values of the economic fundamentals. Therefore, total misalignment can be denoted as:

$$tm_t = q_t - \beta'Z_t$$

(4)

The measure of the fundamentals at their desired levels may be achieved through the some judgments on what values the actual variables should have been during the sample time period. This may also be achieved by using statistical filter, such as the Hodrick-Prescott filter. Then by adding and subtracting q_t' from the right hand side of (3.2) the total misalignment can be written into two components:

$$tm_t = (q_t - q') + \beta'(Z_t - Z_t)$$

(5)

and since $q_t - q' = \tau'T_t + \varepsilon_t$, the total misalignment in equation (3.3) can be rewritten as:

$$tm_t = \tau'T_t + \varepsilon + \beta'(Z_t - Z_t)$$

(6)

Looking at the equation (3.6), we can conclude that the total misalignment at any period of time can be divided into three factors, (1) the effect of the transitory factors, (2) the random disturbances, and (3) the extent to which the economic fundamentals depart from their equilibrium values. The estimate of the equilibrium exchange rate misalignment is obtained as the residual between the fitted REER, from the long-run cointegrating model (referred to as BEER), and the actual REER (see Clark and MacDonald, 2000).

The fundamental variables employed, in this study, are similar to those utilised by MacDonald (2000) and Aliyu (2011) which include money supply, terms of trade, net foreign assets, and trade openness. In view of the diverse nature of economic performance and to avoid estimation bias, five determinants of economic performance are used to ensure the strength of empirical findings. Instead of the predictable determinants of economic performance used in previous studies, this paper adopted a new set of determinants that measure economic performance. In addition to the fundamental variables already mentioned above, this study employs the use of the real gross domestic product and gross fixed capital formation. The gross fixed capital formation would be used as a proxy for technological progress as adopted in a study by Zhang (2001) in China which reveals that an increase in technological progress will result in a depreciation of the RER and is not in line with the theoretical literature. Likewise, the GDP used for this study is used to capture

macroeconomic performance and it is adopted from a study by Iossifov and Loukoianova (2007) in Ghana which reveals that an increase in GDP leads to an appreciation of the REER. In conjunction with the objective of this paper, five economic fundamentals have been chosen as the variables in the vector Z_t, or in the other words, the current equilibrium exchange rate has been formulated as a function of these variables:

$$\hat{q}_t = f(MS, NFA, OPEN, TOT, GFCF, GDP)$$

(7)

Where $\hat{q}_t$ is real effective exchange rate, MS is money supply, NFA is net foreign assets, OPEN is trade openness, TOT is the terms of trade, GFCF is gross fixed capital formation, and GDP is gross domestic product.

Following the theoretical review (BEER) of the study and methodology of previous empirical studies, a model can be specified below to examine the exchange rate and macro economic performance in Nigeria. The model is presented in an implicit form to give this equation:

$$REER_t = f(MS_t, NFA_t, OPEN_t, TOT_t, GFCF_t, GDP_t)$$

(8)

It says that the real effective exchange rate is a function of MS, NFA, OPEN, TOT, and GFCF, t is the time of observation. The explicit form of the model is given below;

$$REER_t = \beta_0 + \beta_1 MS + \beta_2 NFA + \beta_3 OPEN + \beta_4 TOT + \beta_5 GFCF + \beta_6 GDP + U_t$$

(9)

Applying Log to equation 3.1 gives

(10)

This can be rewritten as;

(11)

Where; $reer_t = InREER_t$, $\beta_0 = In\beta_0$ and $\mu_t = InU_t$. Then U_t is a white noise disturbance, β_1, β_2, β_3, β_4, β_5 are the unknown parameters.

4.   RESULT AND DISSUSION

The results of the Augumented Dickey Fuller (ADF) unit root test shows that all the variables are stationary at first difference. The decision rule for the ADF Unit root test states that the ADF Test statistic value must be greater than the Mackinnon Critical Value at 5% absolute term for stationarity to be established at level and if otherwise, differencing occurs using the same decision rule. Table 4.2 shows the results of the stationarity test in summary and the order of integration.

Table 4.2: ADF Unit Root Test and Order of Integration

Variables	Lag length	ADF Test Statistic Value	5% Mackinnon Critical Value	Remark	Order of Integration
D(logerer)	1	-5.9004	-2.935	Stationary	I(1)
D(loggdp)	1	-5.9757	-2.935	Stationary	I(1)
D(loggfcf)	1	-5.0216	-2.9639	Stationary	I(1)
D(logms)	1	-6.4200	-2.9350	Stationary	I(1)
D(lognfa)	1	-5.3073	-2.9350	Stationary	I(1)
D(logopen)	1	-6.3451	-2.9350	Stationary	I(1)
D(logtot)	1	-7.0021	-2.9369	Stationary	I(1)

Source: Author's Computation from Eviews

It is, therefore, worth concluding that all the variables are integrated of order one. That is, the log of REER, GDP, GFCF, MS, NFA, OPEN and TOT were all stationary after first difference.

CO-INTEGRATION TEST

In order to empirically analyse the long run relationship and short run dynamic interactions among the variables of interest (REER, RGDP, GFCF, MS, NFA, OPEN and TOT). The Johansen Co-integration test is employed. This test establishes whether a long-run equilibrium relationship exist among the variables of interest. The table below present the results.

Unrestricted Cointegration Rank Test (Trace)

The

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.999699	463.1721	125.6154	0.0001
At most 1 *	0.949126	228.0712	95.75366	0.0000
At most 2 *	0.883007	141.6976	69.81889	0.0000
At most 3 *	0.694725	79.47407	47.85613	0.0000
At most 4 *	0.656678	45.06432	29.79707	0.0004
At most 5	0.374273	14.06082	15.49471	0.0813
At most 6	0.015887	0.464418	3.841466	0.4956

Source: Author's Computation from Eviews
Trace test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 4.5: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.999699	235.1010	46.23142	0.0000
At most 1 *	0.949126	86.37359	40.07757	0.0000
At most 2 *	0.883007	62.22353	33.87687	0.0000
At most 3 *	0.694725	34.40975	27.58434	0.0057
At most 4 *	0.656678	31.00350	21.13162	0.0015
At most 5	0.374273	13.59640	14.26460	0.0635
At most 6	0.015887	0.464418	3.841466	0.4956

Source: Author's Computation from Eviews

Max-eigenvalue test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

results of the co-integration test indicates that five equations are co-integrated at 5 percent significance

level and it confirms that their is a long run relationship among real effective exchange rate, real GDP, gross fixed capital formation, broad money supply, net foreign assets, openness and terms of trade. The trace statistics indicates and the maximum Eigen value indicates 5 co-integrating relationship, which means that they do not diverge away from each other in the long run.

VARIANCE DECOMPOSITION

The impulse response and variance decomposition analyses will be applied in order to assess the magnitude and effect of shocks of the explanatory variables on the REER that caused misalignment.

Variance decomposition of Real exchange rate (LERER)

Period	SE	LERER	LGDP	LGFCF	LNFA	LMS	LOPEN	LTOT
1	0.782551	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.967011	96.46233	0.026452	0.010709	0.725368	1.134717	1.636429	0.003992
3	1.212199	86.12070	0.020797	5.490933	3.015846	3.816040	1.362297	0.173387
4	1.501048	76.80449	0.044614	8.256952	8.741146	4.905277	0.962458	0.285061
5	1.640275	71.20148	0.154114	10.53355	12.01597	4.580881	0.852448	0.661554
6	1.739188	66.66777	0.235418	11.05073	16.10662	4.074709	1.088041	0.776713
7	1.754689	65.53964	0.405242	10.87168	16.01487	4.570671	1.748848	0.849059
8	1.786887	63.87564	0.424637	11.46125	15.53016	5.513595	2.360322	0.834395
9	1.845765	61.67915	0.570564	12.38180	16.03226	5.902602	2.651584	0.782041
10	1.899489	60.33323	0.739289	12.63755	17.21785	5.718806	2.602482	0.750803

Variance decomposition of forecast errors is used to aid in the interpretation of a vector auto regression VAR model ones it's has been fitted. The variance decomposition indicates the amount of information each variable contributes to the other to the other variable in the auto regression. It determines how much of the forecast error variance of each of the variables can be explained by the exogenous shocks to the other variables. In the Variance Decomposition of the real exchange rate above; in period one, the real exchange variation is explained about 100 percent variation in the forecast error shock of its self. In period two, the variation of the forecast error shock trade openness (LOPEN) is explained about 1.6 percent of the variation in the real exchange rate. In period three, the variation of the forecast error shock in the terms of trade (LTOT) is explained about 0.17 percent variation in the forecast error shock of the variation of the real exchange rate. In period 4 about 4.9 percent of the forecast error shock real exchange rate is explained by the variation in Money supply (LMS), in period 5 about 10.5 percent variation of the shock of the forecast error is explained by the variation of Fixed Gross capital formation (GFCF), in period 6 about 16.05 percent variation of the forecast error of the shock is explained the variation of Net foreign asset (NFA).

In period 7, about 65.5 percent variation in the forecast error of the shock is explained in the variation of itself (real exchange rate); in the next period there was an increase. In period 8, about 11.46 percent variation of the forecast error of the shock is explained in the variation of Gross Fixed Capital formation (GFCF), there was an increase afterwards to period 10. In period 9, about 16.0 percent in the variation of the forecast error shock of is explained by the variation of Net foreign Asset (NFA). In period 10 about 2.6 percent variation in the forecast error shock is explained in the variation of trade openness (LTOT) and about 0.73 percent in the variation of the forecast error shock of the real exchange rate is explained in the variation of Gross domestic product(LGDP). (See appendix for variance decomposition of other variables).

ERROR CORRECTION MODEL (ECM)

The existence of long-run co-integrating equilibrium as confirmed from the Johansen Co-integration test provides for short fluctuations. In order to straighten out or absolve these fluctuations, an

attempt was made to apply the Error Correction Model (ECM).

Results of ECM Test

Error Correction:	D(ERER)	D(GDP)	D(GFCF)	D(MS)	D(NFA)	D(OPEN)	D(TOT)
	-0.144404	1.29E+08	2.38E+08	0.049812	22986.72	-1.892418	-9.16E-05
	(0.12870)	(7.2E+07)	(6.9E+07)	(0.02308)	(5639.45)	(0.89019)	(0.00162)
CointEq1	[-1.12207]	[1.78536]	[3.45770]	[2.15797]	[4.07606]	[-2.12586]	[-0.05642]

Source: Author's Computation from Eviews

The negative coefficient of effective real exchange rate which also lies between 0 and 1 are the conditions for the significance of the ECM result. Therefore, the coefficient reveals that the speed of adjustment of variables in disequilibrium in short run into equilibrium in the long run of the co-integrating ERER equation is 14.44 percent every year

5.   CONCLUSION AND RECOMMENDATIONS

This study investigates the exchange rate misalignment and macroeconomic performance in Nigeria from 1970 to 2012. This study employed the behavioural exchange rate model where the explanatory variables are gross domestic product, gross fixed capital formation, broad money supply, net foreign assets, trade openness and terms of trade while the dependent variable is the real effective exchange rate (variable of interest).

This study found evidence of long run relationship between the variable of interest and its explanatory variables using the Johansen Co-integration test. In the long run, 1 percent increase in gross domestic debt will leads to approximately 39.6 percent fall in effective real exchange rate, 1 percent rise in gross fixed capital formation will cause effective exchange rate to rise by 2.4 percent. Also 1 percent increase in money supply and net foreign asset will increase effective exchange rate by 13.3 percent and 1.67 percent respectively. While 1 percent rise in trade openness and terms of trade will individually raise effective real exchange rate by 4.5 percent and 50.2 percent respectively.

However, variance decomposition is performed and confirmed that the REER is endogenous in Nigeria. The results showed that the variance decomposition for Nigeria over 10 periods The variance decomposition reveals the proportion of the movements in the dependent variables that are due to their own shocks versus the shocks of the exogenous variables. VAR decomposition and impulse response indicated a significant misalignment of the exchange rate in period eight was driven by gross fixed capital formation in the economy. This shock was estimated to account for 65.5 percent variations misalignment of exchange rate in the second period. While economic growth explained about 10 percent of the forecasted shock error in exchange rate during period 10. Finally, the disequilibrium in the short run is corrected by equilibrium in the long run by 14.44 percent yearly.

Based on the findings of this study, the following recommendations were made:

The Central Bank of Nigeria needs to formulate monetary policy that will stabilise the exchange rate as well as allow such policy to complete their gestation period before subjecting them to change. One of the things that aid exchange rate misalignment is the frequent change of monetary policies, such changes could trigger shock in the fundamentals;

The government should stimulate the productive sector of the economy so that the Nigeria economic growth can sufficiently stimulate the appreciation of the Naira. The negative effect of GDP on exchange rate could be explained by the import driven economic growth experience in Nigeria which will continue to trigger the depreciation of the domestic currency, if not reversed;

The Nigeria government should promote a stable macroeconomic environment through monetary policy as well as effective utilization of foreign exchange earnings and diversification of the country's foreign assets;

Government should ensure policy that will create a socio-economic environment that is conducive for accumulation of capital formation which in turns enhances productive capabilities and promote

trade;

The Central Bank of Nigeria should as a matter of policy aim at achieving a realistic exchange rate of the naira. This is because a realistic exchange rate would result in the simultaneous achievement of sustainable economic growth and development in the country.

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APPENDIX

Variance decomposition of Gross Domestic Product (GDP)

Variance decomposition of Gross Fixed Capital Formation (GFCF)

Variance decomposition of Net Foreign Asset (NFA)

Variance decomposition of Money Supply (MS)

Period	S.E.	LERER	LGDP	LGFCF	LNFA	LMS	LOPEN	LTOT
1	0.029817	6.734066	93.26593	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.048445	6.228693	61.15720	18.21633	4.339883	0.054787	7.640702	2.362409
3	0.067635	4.094377	34.07342	33.55042	5.248117	0.039228	16.66507	6.329368
4	0.085457	2.840651	22.11855	34.89005	3.409499	0.828082	28.80069	7.112473
5	0.097789	2.341510	16.90888	33.46099	3.608217	2.232431	34.12682	7.321152
6	0.107876	2.201944	13.91603	29.72810	3.260547	4.210978	39.74306	6.939336
7	0.114875	2.572193	12.31202	26.55338	4.041330	5.088226	42.59809	6.834758
8	0.122951	2.546128	10.79381	23.27698	8.641943	4.886735	43.38076	6.473646
9	0.129992	2.812954	9.838164	21.29500	12.63711	4.401115	42.78724	6.228414
10	0.138724	2.917453	8.866825	20.40265	16.88560	4.440941	40.66343	5.823097

Period	S.E.	LERER	LGDP	LGFCF	LNFA	LMS	LOPEN	LTOT
1	0.301165	0.645049	1.865731	97.48922	0.000000	0.000000	0.000000	0.000000
2	0.417984	2.674371	16.02302	66.15540	6.542205	2.880491	2.842842	2.881670
3	0.727658	2.122667	13.88162	25.59284	49.93797	2.053611	4.545360	1.865928
4	0.849989	1.707374	25.68402	23.61055	42.63361	1.548087	3.336500	1.479861
5	0.991132	1.469058	21.70886	19.86885	50.53547	2.501351	2.697729	1.218682
6	1.108115	1.988365	20.85317	16.35525	46.13976	7.289944	6.219496	1.154008
7	1.211348	1.808632	19.57718	14.06894	44.59979	11.96371	6.899132	1.082610
8	1.309911	1.720944	20.21133	13.09777	40.12445	16.41282	7.495097	0.937576
9	1.400215	1.576343	21.69712	12.08699	38.78271	17.81189	7.212586	0.832362
10	1.482426	1.585483	24.70454	10.85775	36.97756	18.02803	7.094391	0.752256

Period	S.E.	LERER	LGDP	LGFCF	LNFA	LMS	LOPEN	LTOT
1	1.357675	4.024186	0.514295	13.65712	81.80440	0.000000	0.000000	0.000000
2	1.652002	5.621669	6.674012	11.04486	75.26136	0.453296	0.026951	0.917854
3	1.978149	4.825252	6.701771	7.769191	74.36192	5.185971	0.167472	0.988421
4	2.226334	3.898225	8.945046	7.955863	67.26316	10.57288	0.448097	0.916730
5	2.441605	3.339674	11.04168	11.68652	58.51968	14.16953	0.422719	0.820190
6	2.644050	3.035150	13.82317	13.53272	52.81624	15.63798	0.368308	0.786430
7	2.864662	2.607499	18.22800	12.08327	51.10224	14.88057	0.349063	0.749352
8	3.148489	2.365046	22.35390	10.03599	50.98840	13.30565	0.300834	0.650187
9	3.533667	2.154813	24.07786	8.616390	52.45616	11.82733	0.350507	0.516941

Period	S.E.	LERER	LGDP	LGFCF	LNFA	LMS	LOPEN	LTOT
1	0.145293	0.988820	1.719882	12.40079	4.665008	80.22550	0.000000	0.000000
2	0.179286	0.670761	2.198257	19.25934	8.304318	66.06975	3.055810	0.441766
3	0.256005	0.896826	1.639365	28.20409	32.21380	34.91886	1.697047	0.430012
4	0.265065	2.838046	1.747124	29.27862	30.16732	32.71471	2.853003	0.401177
5	0.297599	11.84626	4.064223	25.96922	26.01936	28.84433	2.659178	0.597429
6	0.360277	17.75364	4.244825	23.85109	27.99611	22.35534	3.213056	0.585938
7	0.407122	17.12424	4.364862	25.72415	32.02828	17.65522	2.580603	0.522646
8	0.440749	16.15174	4.164976	24.37044	36.56170	15.37311	2.931941	0.446095
9	0.455126	15.16875	4.276280	22.86862	36.29585	16.86478	4.105120	0.420594
10	0.471740	14.19063	4.351100	22.63719	34.75467	18.95521	4.712218	0.398984

Variance decomposition of Trade Openness (OPEN)

Period	S.E.	LERER	LGDP	LGFCF	LNFA	LMS	LOPEN	LTOT
1	0.343665	0.992544	0.359689	27.79965	15.77747	17.85285	37.21779	0.000000
2	0.400272	0.756554	5.570532	22.48544	23.93602	18.82398	28.17316	0.254324
3	0.505685	18.82331	6.561024	15.66692	26.47194	11.98423	20.31485	0.177727
4	0.580482	21.63862	7.256917	12.48403	30.72875	9.327960	18.02619	0.537524
5	0.806500	22.83068	6.509021	7.423971	47.22529	4.850919	10.28707	0.873051
6	0.991309	22.44495	9.180435	5.317443	50.90911	3.442139	7.499915	1.206006
7	1.161079	19.23025	10.32801	3.954711	55.85916	3.701471	5.618552	1.307854
8	1.313643	16.03702	12.28026	3.123757	57.63171	5.264323	4.404998	1.257927
9	1.452234	13.32620	14.57133	3.127389	56.65724	7.489893	3.638706	1.189237
10	1.598531	11.01164	17.10665	3.315587	54.76834	9.638801	3.066353	1.092628

Variance decomposition of Terms of trade (TOT)

Period	S.E.	LERER	LGDP	LGFCF	LNFA	LMS	LOPEN	LTOT
1	0.036716	14.32621	7.574142	1.545924	17.76381	14.56312	9.527152	34.69964
2	0.049646	22.22814	5.093525	6.039314	23.73256	16.94118	6.727902	19.23738
3	0.092027	11.37710	1.541085	21.81319	52.21306	5.422220	2.008756	5.624584
4	0.104167	9.941892	4.854981	23.69342	51.03884	4.330180	1.630810	4.509880
5	0.109410	9.014717	4.508450	21.63332	50.32777	7.708330	2.652434	4.154972
6	0.116849	8.824111	3.965746	21.15057	44.15518	12.64228	5.429416	3.832694
7	0.124316	8.192144	3.578646	24.61978	39.98012	14.53323	5.689821	3.406251
8	0.127651	7.781270	3.978584	26.73244	38.25536	14.60030	5.396790	3.255260
9	0.129292	7.862149	5.710384	26.15859	37.38716	14.24348	5.422081	3.216155
10	0.132927	8.078878	7.494802	25.85964	36.57028	13.76250	5.190397	3.043499