CBN Journal of Applied Statistics (JAS)

Volume 7 | Number 1 Article 5

6-2016

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This paper examines the impact of real effective exchange rate misalignment on economic growth in Nigeria using an annual data spanning 1960 to 2011. The augmented growth model was estimated using purchasing power parity (PPP) and generalized method of moment (GMM) approaches. Through series of iterative processes, it was observed that it will take four years for the exchange rate to revert back to equilibrium. The result from the PPP approach shows that the period of flexible exchange rate regime is characterized by a relatively lower real exchange rate misalignment over time compared with the fixed exchange rate regime. The GMM estimate reveals that real exchange rate misalignment has negative but significant impact on economic growth over the period under consideration. In view of the findings, the study recommends appropriate exchange rate to minimize the problem of exchange rate misalignment and to ensure sustainable economic growth over time.

Key words: Effective Exchange Rate, PPP, Misalignment, GMM, Flexible and Fixed, economic growth

JEL Classification: O40, F31

1.0 Introduction

In order to achieve reasonable economic growth and sustainable internal and external balance, country's exchange rate must be in alignment with its long-run equilibrium value (Edwards and Savastano, 1999). Thus, the extent at which actual real effective exchange rate of a country deviate from the ideal (equilibrium) rate will determine the level of economic imbalance in a country, especially developing country such as Nigeria. One of the major factors that may be responsible for real exchange rate misalignment in any country is the choice of exchange rate regime (Aguirre and Calderon, 2005). The more flexible an exchange rate regime, the less is the extent of real exchange rate misalignment and the less flexible an exchange rate regime the more is the level of real exchange rate misalignment (Rodrick, 2007).

This suggests that the choice of exchange rate regime has some consequences for economic growth and the performance of economy in general. According

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to Coudert and Coudharde (2008), floating exchange rates tend to create misalignment in open developing countries. On the other hand, fixed exchange rate regime has been considered an adequate choice for many less developed countries for long time. In the last decade, however, there have been several crises in these countries operating fixed exchange rate regime. These countries include Mexico (1995), East Asian (1997), Brazil (1998), Russia (1999) and Argentina (2001). In all these crises, shocks could not be accommodated or offset by conventional means and these countries were left to defend exchange rates that are no longer in line (Williamson, 2005). Thus, suggesting that the fixed rate may be extremely susceptible to over-valuation. The lesson is that, misalignments played a significant role in bringing about the currency crises.

As a result of the significant role the real exchange rate and its misalignment play in any economy, less developed countries, in particular, are encouraged to conduct their policies so as to get this relative macroeconomic price right.

Nigeria, since 1960 up to 2011, has operated different exchange rate regimes ranging from fixed to flexible rates (for detailed review of exchange rate policy in Nigeria see the work of Jimoh, 2006:87 and Aliyu, 2008). Each of these regimes is associated with varying degree of real exchange rate misalignments as pointed out by these Nigerian authors. However, the effects of these misalignments on economic growth in Nigeria have not been thoroughly evaluated.

Thus, a proper assessment of the extent of deviation of the real exchange rate from its equilibrium path and its consequences can go a long way in helping policy makers to design exchange rate policies that would ensure long term sustainability of the external balance and long term economic growth and development.

This work is justified in the sense that, though, the procedure of selecting the most suitable exchange rate regime and keeping exchange rate at a correct level may be the biggest challenge of most developing countries such as Nigeria, notwithstanding, knowing the equilibrium real exchange rates and the way in which exchange rate misalignment influences economic performances is the first step in resolving the associated problems. Thus, this study sheds

light on this important first step in formulating the right exchange rate policy. Thus from the foregoing the paper is set out to achieve following objectives:

(i) Obtain the extent of real exchange rate misalignment in Nigeria over the period 1960-2011,
(ii) Calculate the mean reversion period for the exchange rate over the period of study and,
(iii) Investigates the effect of real exchange rate misalignment on economic growth in Nigeria for the under study.

Apart from this introductory section, the paper is divided into four sections. Section two reviews the relevant literature while section three deals with research methodology. In section four, the paper presents and analyzes the results of regression model, while section five concludes the work.

2.0 Review of Literature

This section reviews the theoretical basis of the method (Purchasing Power Parity) employed in the computation of equilibrium real exchange rate and the empirical connections between real effective exchange rate misalignment and economic growth.

2.1 Approach for Determining the Equilibrium Real Exchange Rate

A large number of equilibrium real exchange rate methodologies have been proposed by various authors (Rughruam, 2006 and Isard, 2007),some of these approaches are; macroeconomic balance approach, PPP Ballasa- Samuelson approach, Behavioural Equilibrium Exchange rate approach(BEER) and External sustainability approach. See the above authors for detail review of methodologies. The Purchasing Power Parity (PPP) approach used in this study is justified based on the fact that various authors (Striker, 1990 and Ogun, 2004) have employed it for data in developing nations and the results have been satisfactory. However, it has not been used extensively on Nigeria's data.

2.1.1 The Purchasing Power Parity Approach

The PPP hypothesis states that the nominal exchange rate should reflect the purchasing power of one currency against another. According to Qayyum*et al.* (2004), the purchasing power exchange rate is measured by the reciprocal of

one country's price level, $1/P_t$ against another, $1/P_t^*$. The purchasing power parity rate is a rate at which one country's currency is exchanged for another.

It is expressed as:

$$E_t = \frac{(1/P_t^*)}{(1/P_t)} = \frac{P_t}{P_t^*} \quad (1)$$

where, E_t is the nominal exchange rate at time t, P_t and P_t^* are the prices at time t in the domestic and foreign economies respectively. The theory predicts that a fall in a currency's domestic purchasing power (as indicated by an increase in the domestic price level) will be associated with proportional currency depreciation in the foreign exchange market. In the same vein, PPP also suggests that an increase in the currency's domestic purchasing power will be associated with a proportional currency appreciation (Krugman and Obstfeld, 2003).The purchasing power parity theory has two main variants, namely, absolute and relative purchasing power parity theories. The absolute purchasing power parity in equation (1) implies that:

$$p_t = E_t P_t^* \quad (2)$$

Taking natural logarithm of equation (1), we have:

$$\ln(E_t) = \ln(P_t) - \ln(P_t^*) \quad (3)$$

On the other hand, the relative purchasing power parity theory implies that:

$$P_t = kE_t P_t^* \quad (4)$$

where, k is constant and other variables are as defined before. Thus, E_t is written as:

$$E_t = 1/k(P_t/p_t^*) \quad (5)$$

Taking natural logarithm of equation (5):

$$\ln(E_t) = a + \ln(P_t) - \ln(P_t^*) \quad (6)$$

where, a= -ln(k)

According to Isard (2007), the empirical validity of PPP is usually based on the relative PPP. The reason was attributed to different base years on which

the data on average price levels of various countries are indexed. Either variant of the relative PPP implies a constant real exchange rate. That is, if the nominal exchange rate (E) multiplied by the relative prices of the domestic and foreign economies (P*/P)was used as a proxy for real exchange rate (R), then the equilibrium real exchange rate will be a constant (1/k) over time. The real exchange rate is given as:

$$R_t = \frac{E_t P_t^*}{P_t} \tag{7}$$

At the empirical level, there are various methods of testing the validity of PPP and using it to obtain the equilibrium real exchange rate. These methods include, co-integration techniques as used by various authors (Taylor, 2002; Engel,2002, among others), the use of charts as done by Isard(2007) and identification of some initial base period as given by Williamson(1994).

Stryker (1990) applied the PPP approach to determine the equilibrium exchange rate for the exports of agricultural commodities in Ghana. The work uses the average price of agricultural products of Ghana as a proxy for domestic price index and fitted a log-linear regression model as follows:

$$ln\left(S_t\right) = \beta_1 + \beta_2 ln\left(P_t\right) - \beta_3 ln\left(P_t^*\right) + u_t \tag{8}$$

The model expresses the value of nominal effective exchange rate (S_t) as a function of the differences between the domestic price index (P_t) and the weighted foreign prices (P^*_t). The author uses OLS method of estimation and divided the period of analysis into periods of exchange control and flexible exchange rate regime. The fitted values obtained from the regression of equation (8) were taken as equilibrium real exchange rates. The study concluded that the period of strong exchange rate control was characterized by over-valuation of national currency while the period of flexible exchange rate indicated more of under-valuation of exchange rate in the country.

2.1.2 Real Exchange Rate Misalignment and Economic Growth

A number of empirical studies have investigated the effect of real exchange rate misalignment on macroeconomic performance using various selected macroeconomic variables. For instance, Cottani*et al.*(1990) examines the view that real exchange rate behaviour and economic performance are correlated,

using empirical evidence from a cross-section of less developed countries. This was examined by regressing per capita growth of GDP, investment, export growth and agricultural output on real exchange rate misalignment. In separate regression, using OLS technique of estimation, the results show a strong negative relationship between real exchange rate misalignment and these measures of economic performance.

Dollar (1992) investigates the relationship between distortion in real exchange rate and GDP growth for the period 1976 to 1985. The investigation was done by running regression and correlation between real exchange rate misalignment and economic growth for a cross-section of 95 developing countries and 22 developed countries. The regression was estimated using OLS method. The investigation reveals that real exchange rate misalignment has a negative impact on economic growth, and maintenance of stable real exchange rate can improve growth in many poor countries.

Ghura and Grennes (1993) examine the impact of real exchange rate instability and real exchange rate misalignment on economic performance for 33 countries in sub-Saharan Africa for the period 1972 to 1987. The measures of economic performance were GDP growth, export to GDP, Import to GDP, investment to GDP and saving to GDP. The study uses generalized method of moment technique for estimation. The pooled time series and cross-section data confirmed that there is a negative relationship between real exchange rate misalignment and economic performance. Higher levels of real exchange rate misalignment are associated with higher levels of macroeconomic instability.

Easterly, Loayza and Montiel (1997) estimate the growth equation for 81 Latin American countries for the period 1960 to 1993. The dependent variable was real GDP per capita and among others, real exchange rate misalignment proxied by black market premium was an explanatory variable. The paper employs the generalized method of moment and instrumental variable technique for estimation. The estimation reveals that real exchange rate misalignment has a negative impact on real GDP per capita.

Razins and Collins (1997) investigate the relationship between economic growth and real exchange rate misalignment and stated that, there are two channels through which the exchange rate misalignment can influence a country's economic growth. First, it could act through domestic and foreign

investments, by influencing the capital accumulation process which is a well-known engine of growth. Second, real exchange rate which deviates from its equilibrium value could affect the tradable goods' sector and the competitiveness of this sector in respect of the rest of the world. They classified the periods of misalignment into periods of undervaluation or overvaluation, using panel data from 93 developed and developing countries, a total 1450 observations. They fitted a model that has the growth of GDP as the dependent variable and some growth determinants variables (human capita lagged of GDP etc) as explanatory variables. They observe that, it was only a very high overvaluation that has a significant negative effect on growth, the undervaluation periods of real exchange rate has no significant relationship with economic growth.

Aguirre and Calderon (2005:9-16) use a sample of 60 countries and 2280 annual observations. They estimate their regression using both time series and panel data. After series of stationarity test on the data, an error correction model was later estimated. In their analysis, they observe a negative and significant relationship between growth (proxy by RGDP growth) and the real exchange rate misalignment. They further explore the existence of asymmetries on the one hand between growth and undervaluation and on the other hand between growth and overvaluation using generalized method of moment technique. Finally, their results distinguish two important effects: both large over and undervaluation negatively affects growth in developing countries, while a moderate undervaluation (up to 12 percent) would increase growth.

In his own study, Rodrik (2007) empirically demonstrates that, in developing countries, an increase in undervaluation facilitates growth just as well as a decrease in overvaluation. He uses PPP model that adjust for Balassa-Samuelson effect to determine the periods of over-valuation and under-valuation. He later employed the GMM and instrumental variable technique to determine the effect of real exchange rate misalignment on GDP growth. His result shows that the real exchange rate plays a more fundamental role in growth process than as it has been thought before. In a study of 184 countries and a 5-year period for each one (2000 to 2004), he obtained that episodes of undervaluation are followed by higher economic growth periods and episodes of over-valuations have negative impact on economic growth.

In a more recent time, Miao and Berg (2010) re-examine the position of Washington consensus and the results of Rodrick (2008) on the impact of real exchange rate misalignment on economic growth. According to them, the Washington consensus holds that real exchange rate misalignments are bad for growth. While Rodrick (2008) was of the view that the undervaluation relative to purchasing power parity is good for growth because it improves the efficiency of tradable goods sector. Their study use both the Rodrick(2008) under-valuation index and the fundamental equilibrium real exchange rate (FEER) under-valuation index to obtain different misalignment indexes. The indexes were then included in separate regression models that have GDP growth as dependent variable and among others, terms of trade, openness and government consumption expenditure, lag-investment and time dummies as explanatory variables. The results obtained confirmed that not only are over-valuations bad but under-valuations are also good for economic growth.

3.0 Research Methodology

3.1 The PPP Modeling

The PPP theory is empirically specified from the literature as:

$$\ln(e_t) = \beta_0 + \sum_{i=1}^{k} \beta_i \ln(e_{t-i}) + \gamma_1 \ln(\mathrm{r}_t) + \sum_{j=1}^{p} \alpha_j \ln(\mathrm{r}_{t-j}) + u_t \qquad (9)$$

where:

$r_t = P_t / P_t^*$;

e_t represents nominal effective exchange rate at time t; r_t is the real effective exchange rate obtained from using domestic price index levelP_t at time t, and the weighted foreign price index P_t* of 17 Nigeria's trading partnerswhile u_t is the error term at time t.

The consumer price index (CPI) was employed for both domestic and foreign prices due to non-availability of data on wholesale price index for Nigeria. The main thrust of PPP which is captured by equation (9) is that nominal effective exchange rate is set so that, the real purchasing power of currency is constant over time. In the short run, nominal exchange rate may deviate from the level implied by the PPP in equation (9). However, in the long run, the rate

of change of the nominal exchange rate tends to equalize the differential in inflation between countries.

In order to confirm the existence of a long run relationship between nominal effective exchange rate and price differential, the study tested for co-integration between the variables. The error correction form of equation (9) is written as:

$$\Delta \ln(e_t) = \beta_0 + \sum_{i=1}^{k} \beta_i \Delta \ln(e_{t-i}) + \gamma_1 \Delta \ln(\mathrm{r}_t) + \sum_{j=1}^{p} \alpha_j \Delta \ln(\mathrm{r}_{t-j}) + \delta u_{t-1} + v_t \qquad (10)$$

Where Δ= change, and δ= coefficient of adjustment to equilibrium in the long run and v_t is the error term. A negative and statistically significant δ indicates the tendency for the nominal effective exchange rate to revert to the equilibrium value in the long run. Unit roots test is conducted to ensure that nominal effective exchange rate and real effective exchange rate have the same order of integration. Then, a co-integration test is conducted to confirm the long run relationship between nominal effective exchange rate and real effective exchange rate as stated earlier.

3.2 Economic Growth and Exchange Rate Misalignment Model

Following the literature on the subject matter (Aguirre and Calderon, 2005; Dosse, 2007; Razin and Collins, 1997), the growth equation takes the following form:

$$gY_t = \delta_0 + \delta_1 gY_{t-1} + \delta_2 \ln\left(\frac{GE_t}{Y_t}\right) + \delta_3 \ln\left(\frac{CF_t}{Y_t}\right) + \delta_{43} \ln\left(\frac{P_x^*}{P_{mt}^*}\right)_t + \delta_5 \ln(OPEN_t) + \delta_6 mal_t + \xi_t \qquad (11)$$

where gY is Real GDP growth rate, ($OPEN_t$) is the degree of openness, GE represent total government expenditure, CF is capital formation, the ratio of total government expenditure to GDP (GE_t/Y_t) accounts for the stance of domestic fiscal policy, while, the ratio of capital formation to GDP (CF_t/Y_t) represents the effects of investment on economic growth, P^*_x/P^*_m represents terms of trade while mal_t is a measure of absolute value of misalignment over time.

The method of estimation of equation (11) is the generalized method of moments (GMM). As described and used by various authors on the subject matter (Aguirre and Calderon, 2006; Gala, 2007, Alvaro and Cesar, 2005), the

method is suitable because it controls the endogeneity problems in the explanatory variable and flexible enough to deal with measurement errors.

3.3 Data source

The external data especially those of Nigeria's major trading partners were obtained from International Financial Statistics (IFS) and IMF direction of trade statistics. Data used to obtain the terms of trade were also sourced from (IFS). All other data are sourced from the Central Bank of Nigeria Statistical Bulletin (various issues).

4.0 Results

4.1 Equilibrium Real Exchange Rate

The analysis of equilibrium real exchange rate using PPP approach starts by testing the stationary properties of nominal effective exchange rate (NEER) and the real effective exchange rate (REER). The results of the unit root test using Augmented Dickey Fuller (ADF) procedure is reported in the Table1.

Table 1: ADF Unit Root Test

Variable	Level	First Difference	Lag Length	Order of Integration
NEER	0.7636	-3.3844**	1	I (1)
REER	1.0575	-4.9153**	1	I (1)

** denotes significance at 5% Level
Critical values: 1% = -3.574; 5%= -2.9238; 10%= -2.5999

The variables were tested in their natural logarithm form while the lag lengths were chosen based on Schwarz Information Criterion (SIC). As it can be observed from Table 1, the variables, the nominal effective exchange rate and the real effective exchange rate are all integrated of order one I(1). Since the two variables that would enter the PPP model are integrated of the same order I(1), it is possible to test for the presence or otherwise of co-integration using Johansen maximum likelihood method. The result of the co-integration test is reported in the Table 2.

Table 2: Unrestricted Co-integration Rank Test

Trend assumption: Linear Deterministic Trend (restricted)
Series: Nominal Effective Exchange Rate and Real Effective Exchange Rate

Null Hypothesis	Eigen Value	Trace Statistic	0.05 critical	Max-Eigen statistic	0.05 critical
r = 0	0.3701	22.4466	15.4947	22.1844	14.2646
r ≤ 1	0.0054	0.2622	3.8415	0.2622	3.8415

Trace and max-Eigen value test indicates 1 co-integrating equation at the 0.05 level.

It indicates that the nominal effective exchange rate and the real effective exchange rate are co-integrated. This shows the rejection of null hypothesis of r = 0 and the acceptance of alternative hypothesis of unrestricted co-integration rank equal one (r = 1). The results confirm the existence of a unique co-integrating vector and thereby establish the existence of a long-run relationship between the nominal effective exchange rate and relative prices. In other words, the co-integration result confirms that PPP holds in the long-run in Nigeria, suggesting it could be a good guide for what equilibrium real exchange rate should be. The maximum Eigen-value statistic test also supports the findings.

Table 3 presents the result of vector error correction estimation as specified in equation 10 in the methodology section. The essence of its estimation is to determine the long-run adjustment coefficient, which is then used to obtain the number of years it takes for exchange rate to revert to its mean in Nigeria.

Table 3: Vector Error Correction Estimates

Dependent variable: Δln(NEER)		
Variable	**Coefficient**	**t-value**
Constant	0.069	0.407
Δln(NEER(-1))	-0.01	-0.046
Δ ln(NEER(-2))	0.272	1.097
Δln (NEER (-3))	0.399	1.720***
Δ ln(NEER (-4))	-0.464	-0.097
Δ ln (NEER(-5))	0.031	0.151
Δ ln(NEER(-6))	0.11	0.538
Δln(NEER(-7))	0.369	1.894***
Δln(Price differential(-1))	-0.346	-2.205**
Δln(Price differential (-2))	0.335	0.739
Δln(Price differential (-3))	-0.264	-1.679***
Δln(Price differential (-4))	-0.085	-0.196
Δln(Price differential (-5))	0.244	0.577
Δ ln(Price differential (-6))	0.034	0.076
Δ ln (Price differential(-7))	-0.436	-3.367
δ	-0.768	-3.725*

*,**, *** indicates significance at 1%, 5% and 10% level respectively

R^2 = 0.74 Adjusted R^2= 0.73 F= 21.916

The selection of lag length in the above estimates was based on the Schwarz Information Criterion (SIC) and Akaike Information Criterion (AIC). The two criteria suggested maximum of 3 lag length. The results show that the adjustment coefficient (δ) is -0.937 and highly significant at 1 per cent level. This was used to determine the time it will take for mean revision in exchange rate to be completed in Nigeria within the period of study. The resulting geometric series was quantified as shown in Table 4.

Table 4: Result of Iteration Exercise to Determine the Time Mean Reversion in Exchange Rates is completed

T	**[1-/δ/]^t**	/δ/ **[1-/δ/)^t**	**Σ**/δ/ **(1**-δ)^t
1	0.77	0.77	0.77
2	0.23	0.1771	0.947
3	0.051	0.041	0.988
4	0.012	0.0094	0.997
5	0.003	0.0022	0.999
6	6E-04	0.0005	0.999
7	1E-04	0.0001	1

The results show that it takes 4 years for mean reversion in exchange rate to be completed. Consequently, a 4-year non-overlapping moving average of the past values of effective real exchange rate is generated to obtain the implied PPP equilibrium effective real exchange rate over the period of study. Table 5 presents the PPP implied equilibrium real effective exchange rate andthe associated misalignment using the 4-year non-overlapping moving average of the actual real effective exchange rate.

Table 5 shows for some selected years the equilibrium real exchange rate and the corresponding real exchange rate misalignment based on PPP approach. The extent of misalignment in absolute term appears to have varied over time, culminating in an all-time high of about 97.88 per cent in the year 1960. It move from 97.88 per cent in 1960 to about 13 per cent in 1980 and remain relatively high till around 1994 (32 per cent). It observed an all-time lowest in 1995 with absolute level of misalignment of around 1 per cent. In the year 2000, it rose sharply to around 12 per cent and dropped sharply down to 3 per cent in 2005. The scenario of low exchange rate misalignment persists until

2008, later in the year 2009 it rose again to 14 per cent. The rate shows a very close alignment in the year 2006(2 per cent) and 2007 (1 per cent) respectively. The value obtained for these two periods may indicate various exchange rate realignment policies such as Dutch Auctions embarked upon by the government of that time. The extent of misalignment rose to about 19 per cent undervaluation in 2011.

Table 5: Equilibrium Real Exchange Rate and Exchange Rate Misalignment in Nigeria for some selected years

YEAR	REER(N/$)	PPP Equilibrium	Misalignment(%)
1960	0.509796	22.1579	-97.6993
1961	42.18014	22.1579	90.3616
1962	23.0911	22.1579	4.2116
1963	30.46367	22.1579	37.4845
1964	28.2286	22.1579	27.3975
1965	19.46146	22.1579	-12.1692
1966	11.17084	22.1579	-49.5853
1967	13.57229	7.1549	89.6922
1968	11.8705	7.1549	65.9073
1969	8.04079	7.1549	12.3816
1970	5.460371	7.1549	-23.6835
1971	3.843841	7.1549	-46.2768
1972	3.71894	7.1549	-48.0225
1973	3.577444	7.1549	-50.0001
1974	3.29604	1.8269	80.4171
1975	2.227965	1.8269	21.9533
1976	1.527194	1.8269	-16.4052
1977	1.409694	1.8269	-22.8368
1978	1.202918	1.8269	-34.1552
1979	0.893527	1.8269	-51.0905
1980	2.230721	1.8269	22.1042
1981	2.40515	3.4429	-30.1417
1982	2.986981	3.4429	-13.2423
1983	2.687838	3.4429	-21.931
1984	2.25264	3.4429	-34.5714
1985	3.049496	3.4429	-11.4265
1986	3.684342	3.4429	7.0128
1987	7.034086	3.4429	104.307
1988	6.955402	20.6902	-66.3831
1989	11.08056	20.6902	-46.4454
1990	15.4282	20.6902	-25.4323
1991	16.80163	20.6902	-18.7943
1992	27.32077	20.6902	32.0469
1993	35.70904	20.6902	72.5891
1994	31.53569	20.6902	52.4185
1995	32.43249	74.6069	-56.5288
1996	32.36499	74.6069	-56.6193
1997	33.31495	74.6069	-55.346
1998	32.97546	74.6069	-55.8011
1999	82.45886	74.6069	10.5244
2000	147.92	74.6069	98.2658
2001	160.7819	74.6069	115.5054
2002	177.1267	183.9005	-3.6834
2003	184.132	183.9005	0.1259
2004	190.6564	183.9005	3.6737
2005	189.518	183.9005	3.0546
2006	187.702	183.9005	2.0672
2007	181.2812	183.9005	-1.4243
2008	176.8874	183.9005	-3.8135
2009	219.2297	183.9005	19.211
2010	225.345	183.9005	21.564
2011	229	183.654	23.674

N.B (+) = currency undervaluation
(-) = currency overvaluation

4.2 Misalignment and Economic Growth in Nigeria

The study presents the result of estimates of the effect of exchange rate misalignment on economic growth using PPP approach in Table 6.

Table 6: Growth Regressions

Dependent Variable: Real GDP Growth
Method: Generalized Method of Moments
Instrument specifications: All regressors in levels and first differences

Variable	Coefficient(T-value)
Real GDP growth (-1)	0.21**(2.65)
Openness of the economy	0.15***(4.43)
Govt exp ratio GDP	-0.32**(-2.45)
Capital formation ratio GDP	0.08(0.079)
Terms of trade	0.27**(1.81)
Absolute misalignment	0.06**(3.61)
Constant	0.20**(2.53)
R2	0.84
Adjusted R2	0.82
DW	2.01
LM	1.13

(*), (**) and (***) denote significance at 1%, 5% and 10% levels respectively
Numbers in parenthesis are t- statistics.

All variables in Table 6 are in their natural logarithm form except absolute misalignment indicators which is expressed in percentage. The results in the table indicate that all the explanatory variables used conform to a priori expectations. The variable of interest (extent of misalignment) turns out positive and statistically significant, which means a long period of currency undervaluation (depreciation) in the country, has been resulting to lower growth of real GDP to the extent that a 1 percent change in absolute misalignment results in a 0.06 percent change in the growth of real GDP over the period of study. Thus, the relative impact of exchange rate misalignment on economic growth in Nigeria is small. Nevertheless, the effect of misalignment should not be left to generate a greater impact on the rate of economic growth in the country. This result supports most previous authors that have investigated the relationship between exchange rate misalignment

and economic growth. Some of the authors works supported are, Razins and Collins (1997), Aguime and Calderon (2005), Dosse (2007) among others. The channel through which real exchange rate misalignment may affects real GDP growth according to this result may be through its effect on the major tradable good (oil) in Nigeria, which may effect on foreign exchange earnings and thus reduce growth. Also, another channel could be through its effects on capital accumulation which in turn affects real GDP growth in the country.

Other variables that encourage growth according to the result are; openness of the economy, terms of trade and one period lag of real GDP growth. The three variables also prove statistically significant. The variable that captures the fiscal stance of government over time (total government expenditure ratio GDP) turns out negative and statistically influential in determining real GDP growth in Nigeria. Capital formation ratio GDP turn out positive and statistically the variable was not significant in determining real GDP growth over the period of study.

Various specification tests were conducted to confirm the robustness of the regression estimate some of which are the DW and lag-range multiplier (LM) tests to test for first and second order serial correlations of the error term. The DW statistic indicates that there is no first order serial correlation among the errors with a computed value of 2.01. Furthermore, the LM statistic which was used to test for higher order serial correlation indicates that there is no second order auto-correlation in the errors. This was confirmed with F-statistic (1.1300) that's less than the critical F-value (2.6198).

5.0 Conclusion

The study investigates the effects of real exchange rate misalignment on economic growth. The PPP iteration processes indicate four years for mean-reversion in exchange rate to be completed in Nigeria and thus, four years non-overlapping moving average of the computed real effective exchange rate was used to obtain the PPP implied equilibrium effective real exchange rate over the period under study.

The investigation on the effect of real exchange rate misalignment on economic growth using generalized method of moment (GMM) revealed that the relationship between the two is negative. Thus, an increase in the rate of exchange rate misalignment reduces real output growth rate in the country over the period of study. The main variables that were pro-growth in the

country according to the study are terms of trade, openness of the economy and government expenditure.

In view of the results obtained in this study, the following policy prescriptions emerge; in order to minimize exchange rate misalignment, government must be ready to supply adequate fund to the foreign exchange market as she is the major supplier in this market, to ensure sustainable growth in the country, effort must be made to improve the condition of terms of trade and government expenditure should always be targeting productive investment activities. Lastly, according to the result, period of flexible exchange rate regime exhibit relatively lower extent of misalignment than the fixed period, thus, adequate flexibilty is require in the foreign exchange market to minimize real effective exchange rate misalignment in the country.

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