Macroeconomic Performance Indicators and Exchange Rate Misalignment in Nigeria

Kenny S, Victoria

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Abstract

This study employed an econometric approach to assess the relationship between effective real exchange rate and selected macroeconomic variables in Nigeria from 1981to 2014. This study investigate the relationship between REER misalignment and economic growth as well as examine the short run and long run relationship between real effective exchange rates misalignment and macroeconomic performance. The study found evidence of a long run relationship between real effective exchange rate and macroeconomic variables with 46 percent speed of adjustment. Also, the positive relationship exists between effective exchange rate, openness and terms of trade indicated that the Nigerian economy is highly opened and this openness has made it highly vulnerable to external shocks and exchange rate policy changes. Likewise, the real gross domestic leads to the appreciation of naira. Hence, the government should stimulate the productive sector of the domestic economy.

1. Introduction

Exchange rate is an essential macroeconomic variable in the context of international economics for policy formulations, and a key price variable which governments take very active interest in. The exchange rate is one of the most important fundamentals in an economy that trades goods and services internationally. As a price that measures the market value of common baskets of international and domestically produced goods, the level and stability of the real exchange rate are crucial elements in the process of macroeconomic adjustment and performance. Also, by influencing the allocation of productive resources between tradable and non-tradable goods and services, the real exchange rate is a major determinant of the external competitiveness of a country domestically, and its balance of payments. It can also be a pointer of the incentives used by economic agents in making decision in production and consumption choices between domestic and foreign goods. The real exchange affects decisions to save and invest, hence, the composition and direction of international capital flows. Variations in the real exchange rate have direct effects on imports and this affects the stability of commodity and factor prices, employment, government finances, distribution of income and wealth, and on the overall success of economic policies.

The real exchange rate can be defined as the nominal exchange rate that takes the inflation differentials among the countries into account. According to Ahmet and Mehtap (1997), the RER relies on the assumption that the home country has only one trading partner which does not hold in the real world. Economists and policy makers are more interested in the real effective exchange rate (REER) when measuring a currency's overall misalignment. The REER is an average of the bilateral RERs between the country and each of its trading partners, weighted by the respective trade shares of each partner. A country's REER, being an average may be in "equilibrium" when its currency is overvalued relative to that of one or more trading partners in as much as it is undervalued relative to others (Luis, 2007).

2. Review of Literature

Ghura and Grennes (1993) investigates the relationship between indicators of macroeconomic performance and real exchange rate (RER) misalignment and instability in Sub-Saharan Africa (SSA). Based on pooled time series and cross-section data for 33 countries, five indicators of macroeconomic performance are considered: growth rate in real GDP per capita, total exports and imports to GDP ratios, and savings and investment to GDP ratios. They found a negative impact of RER misalignment on macroeconomic performance and the expected results are statistically stronger with the pooled time series data than with cross-section data alone. Using the black market premium, the PPP-based measure of misalignment, and a model based misalignment index, they show that high levels of RER overvaluation are associated with periods of macroeconomic instability, while lower levels of overvaluation correspond to better economic performance. They concluded that inappropriate domestic macroeconomic, trade, and exchange rate policies appear to be one of the important factors that contributed to the economic distress in virtually all Sub-Saharan African countries.

Masters and Ianchovichina (1998) investigate exchange rate misalignment in Zimbabwe in the period 1967 to 1987. Two different models, the multilateral RER model and the internal RER model are used and compared. All the variables result in an appreciation of the currency in both models which are in line with the economic theory, with the exception of the time variable in the multilateral RER equation which results in exchange rate depreciation. The variables used in the model to estimate the equilibrium exchange rate include the terms of trade, the restrictiveness of trade policy, the net capital inflow, the domestic credit creation in excess of its sustainable level and a time variable which is the proxy for the Balassa-Samuelson appreciation. Their findings reveal that using cross-country differences in overall inflation as a proxy measure of a country's RER can result in vague results. When estimating the equilibrium RER, the study suggests the use of indices of domestic relative prices, especially in the case of single country studies in order to avoid getting biased results.

Rahman and Basher (2001) adopt a single equation approach to examine the real exchange rate behavior and exchange rate misalignment in Bangladesh. The paper finds that real exchange rate and the macroeconomic fundamentals affecting real exchange rate and the macroeconomic fundamentals affecting real exchange rate form a co-integration vector. It observes that trade liberalization and increase in debt service burden result in a real depreciation of the currency; while increase in capital inflow, improvement in terms of trade, and increase in government consumption of non-tradable result in a real appreciation of currency. Nominal devaluation has been able to partly retain its effect to have a real devaluation in the short run. Estimation of long run equilibrium real exchange reveals that the currency was considerably overvalued until late 1980s. However, real exchange rate broadly was in equilibrium during the 1990s.

Gala (2007) investigated the relationship between growth and real exchange rate misalignment (measured based on deviations from purchasing power parity) using panel data for a group of 58 developing countries. In line with other works in the literature, his results suggested a negative relationship between growth and overvaluations during his estimation period of 1960 to 1999.

Sallenave (2009) studied the growth effects of real effective exchange rate misalignments for the G20 countries over the period 1980-2006. He adopted the behavioural equilibrium exchange rate (BEER) approach to estimate real effective equilibrium exchange rates for the countries and thereafter computed the misalignment levels. His results showed that misalignments are more pronounced in the case of emerging countries than in industrialized ones. Based on the dynamic panel growth model estimated, he found that misalignments have negative effect on economic growth in the countries.

Usman (2007) also adopted the cointegration and error correction methodology to examine the relationship between real exchange rate misalignment and macroeconomic performance in Nigeria using annual data for the period 1970-2007. He found that real exchange rate misalignment was responsible for the country's dependence on imports in the 1970s and 1980s.

Conclusively, in a similar but more recent study, Anigbogu et al (2014) investigated the impact of real exchange rate misalignment on Nigeria's agricultural sector using the single regression ordinary least squares approach. They also found 112 Real Exchange Rate Misalignment and Economic Growth in Nigeria Ali et al. that real exchange rate misalignment as well as its volatility impact on growth negatively. An evaluation of the works reviewed above revealed that empirical work on the relationship between real exchange rate misalignment and economic growth is still sparse in Nigeria, while the few ones found failed to account for the effects of structural breaks in their modelling approach. This study seeks to address this gap by contributing to the debate on the effects of real effective exchange rate misalignment on economic growth in Nigeria using the Gregory and Hansen (1996) approach to cointegration.

3. Model Specification

The models used to investigate the extent of relationship of real effective exchange rate misalignment on macroeconomic performance (economic growth) is be specified in its implicit form as:

$$REER_t = F(RGDP_t, GFCF_t, MS_t, NFA_t, OPEN_t, TOT_t) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 1$$

Where
REER: Effective Real Exchange Rate,
RGDP: Real Gross Domestic Product,
GFCF: Gross Fixed Capital Formation,
MS: Money Supply,
NFA: Net Foreign Asset,
OPEN: Openness (which is total trade),
TOT: Terms of Trade.

The explicit form of the model is given as

$$REER_t = \beta_0 + \beta_1 RGDP_t + \beta_2 GFCF_t + \beta_3 MS_t + \beta_4 NFA_t + \beta_5 OPEN_t + \beta_6 TOT_t + U_t \quad (2)$$

Applying Log to equation 1 gives

$$REER_t = ln\beta_0 + \beta_1 lnRGDP_t + \beta_2 lnGFCF_t + \beta_3 lnMS_t + \beta_4 lnNFA_t + \beta_5 lnOPEN_t + \beta_6 lnTOTt + U_t$$

Where t= Time series Data

β_0 – intercept value or constant parameter

β_1– β_6 are parameters attached

e – Error term or stochastic variable

The *'a priori'* or theoretical expectations are given as β_1, β_2, β_3. B_4 β_5 $\beta_6 > 0$. This indicates that it is expected based on economic theory that all the exogenous parameters impact positively on the endogenous parameters (REER).

4. Data Analysis and Discussion Of Results

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 1: 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(logrgdp)	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 8.0

Table 1 shows the results of the stationarity test in summary and the order of integration. It is, therefore, worth concluding that all the variables are integrated of order one. That is, the log of REER, RGDP, GFCF, MS, NFA, OPEN and TOT were all stationary after first difference at 5 percent significant level.

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 was employ. This test establishes whether a long-run equilibrium relationship exist among the variables of interest. The table below present the results.

Table 2: Unrestricted Cointegration Rank Test (Trace)

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

Table 3: 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

The results of the co-integration test indicate that five equations are co-integrated at 5 percent significance level. Hence, there is a long run linear 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

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Error Correction Model

After a long run linear relationship had been established in the model as revealed by the Johansen Co-integration test. Then, an Error Correction Model is employed to assess the speed of adjustment of the model. The Error Correction Term (ECT) or speed of adjustment coefficient for these equations is also significant, that is, it lies between 0 and 1 hence; about 46 percent of the errors generated in the previous period are corrected in the current period in the effective real exchange rate (LERER).

The previous period effective real exchange rate, real gross domestic product, openness, and terms of trade are significant at 10 percent while other indicators are not significant at 10 percent.

Specifically, 1 percent rise in real domestic productivity will cause exchange rate to appreciate by 0.22 percent. While 1 percent increase in openness will appreciate the currency by 0.15 percent. Also, 1 percent rise in terms of trade will result in 5.433 percent in exchange rate.

Table 4: Error Correction Model

Dependent Variable: LERER
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LERER(-1)	1.091241	0.118773	9.187609	0.0000
LRGDP	0.228910	1.349874	-0.169579	0.0669
LGFCF	0.108208	0.227617	0.475398	0.6392
LM2	-1.494884	0.983388	-1.520136	0.1427
LNFA	0.001215	0.076124	0.015960	0.9874
LOPEN	0.151210	0.328797	0.459889	0.0501
LTOT	-5.433441	2.964092	-1.833088	0.0804
ECT(-1)	-0.468756	0.237765	-1.971511	0.0614
C	15.82467	28.44359	0.556353	0.5836

R-squared	0.891780	Mean dependent var	3.147358
Adjusted R-squared	0.852428	S.D. dependent var	1.817277
S.E. of regression	0.698109	Akaike info criterion	2.356817
Sum squared resid	10.72183	Schwarz criterion	2.773136
Log likelihood	-27.53067	Hannan-Quinn criter.	2.492527
F-statistic	22.66131	Durbin-Watson stat	2.053061
Prob(F-statistic)	0.000000		

Source: Author's Compilation from Eviews 8.0

Discussion of Findings

The positive relationship between effective exchange rate, openness and terms of trade indicated that the Nigerian economy is highly opened and this openness has made it highly vulnerable to external shocks and exchange rate policy changes. Also, gross domestic leads to the appreciation of naira. Hence, the government need to stimulate the productive sector of the domestic economy since the speed of adjustment was fair at 46 percent.

5. Conclusion

This study found evidence of a long-run relationship between the real exchange rate and its determinants, as well as the endogenous characteristic of the real exchange rate in the model implies that policy makers in Nigeria can control the behaviour of the real exchange by influencing one of the exogenous variables. However, the speed of adjustment of effective real exchange rate misalignment is 46 percent per annum.

6. Policy Recommendation

The Central Bank of Nigeria needs to formulate monetary policy that will stabilise the Naira against other currency 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.

Also, 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

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