

Long-Run Effects of Exchange Rate Policy on Economic: A Case of Nigeria

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Abstract

Very few erudite scholars of economists realised with conviction the intensely unusual, unstable, complicated, unreliable, temporary shock of exchange rate fluctuation in the economy. This study investigates the long run effects of exchange rate fluctuation on economic growth with particular emphasis on Nigeria between 1970-2012. The study identifies the gap between recent economy theory and current economic reality in Nigeria using the Ordinary Least Square (OLS) regression techniques to draw out inferences on the exchange rate dynamics and growth. The Overall, finding, reported that real output is negatively influenced by exchange rate, gross capital formation and positively influenced by broad money supply and fiscal balances, suggesting that fiscal discipline exists but currency depreciation persists. In all, appropriate policy towards boosting the national output requires stabilization of currency as well as encouraging investment.

JEL Classification: F31, F40, F49

Keywords: Long-run effects, exchange rate, macroeconomic indicators, economic growth in Nigeria.

1.0 Introduction

To a greater extent, the exchange rate variables have been largely characterized by growing instability for most part of the period, reflecting a problem of information asymmetry resulting in inefficiency in the foreign exchange market operations. A number of problems such as excess demand for foreign exchange caused by the desire for imported products, siphoning of corrupt funds abroad, and frequent changes in foreign exchange policy caused by changes in government, prevented these policies from having their full circle. Others were unethical and sharp practices by the authorized dealers and other operations in the foreign exchange market, especially the prevalent issue of round tripping of foreign exchange, sought at the official and diverted to the parallel market, the fiscal dominance which reduced the efficacy of the monetary policy and the failure of the government to accede to the harmonization of monetary and fiscal policies hindered the policy from achieving its set goals.

Beginning from 1986 to 1994, there was observed demand pressure, which culminated in a wide premium. The exchange rate at the official market was ₦2.02 per dollar compared with ₦4.17 a dollar on the parallel market in 1986, representing a premium of 106.4 per cent. The introduction of the DAS in 1987 helped in no small measure to curtail the high premium to 33.1 per cent following the increased supply of foreign exchange by the CBN. However, the year 1989 witnessed the phenomenon of excessive demand pressure in the foreign exchange market as US\$17.3 billion was demanded against a supply of US\$17.3 billion was demanded against a supply of US\$2.4 billion. This was in spite of the policy initiatives to liberalize the market and the initiative of the government to institutionalize the Bureau de Change along with the encouragement of inter-bank foreign exchange transactions.

The rising demand trend continued in 1990 from US\$20.2 billion as against a marginal rise supply level to US\$2.5 billion. This represented a wide demand gap of US\$17.7 billion to 87.6 percent. Consequently, the CBN immediately modified the procedure in the IFEM and reintroduced as DAS in 1990 which in effect helped to prune down demand to US\$9.5 billion in 1991 and later to US\$6.5 billion in 1992, while the supply of foreign exchange trended between US\$2.9 and US\$4.05 billion during the review period. In a continued pursuance of a liberalized foreign exchange market, the government fully deregulated the market on March 5, 1992 and was sustained till December 1993. Unfortunately, the demand peaked at US\$40.6 billion, a reflection of the growth rate of money supply at 49.8 percent, the highest level of demand during the period under review. It later moderated to US\$35.7 billion in 1994. Throughout the period, the CBN continued to reduce supply, having observed the incidence of speculative demand by authorized dealers. Thus, the supply of foreign exchange declined significantly from US\$4.05 billion in 1992 to US\$1.96 billion in 1994.

Against this background, demand suddenly trended downward from US\$35.69 billion in 1994 to US\$1.72 billion in 1995. During the period, the CBN endeavored to supply all that was demanded by the authorized dealers, and consequently moderated the excess demand pressure in the foreign exchange market. However, the premium trended upward from 64.3 percent in 1994 to 302.9 percent in 1998, owing to the high incidence of speculative trading by foreign exchange operators in the market and the lack of confidence in the

ability to the CBN to meet the foreign exchange requirements of the operators. This impetus contributed to the flourishing activities of the parallel market.

From October 25, 1999, the IFEM was re-introduced to further deepen the foreign exchange market. Although it was intended to assuage the over dependence of the dealers on the CBN for foreign exchange and beef-up the autonomous sources, but could not be realized due to existing distortions in the domestic economy. Thus, the CBN continued to play the role of a major supplier of foreign exchange in the market. By July 22, 2002, the DAS was re-introduced with the aim of narrowing the gap between official and parallel market rates official and evolving a realistic exchange rate of the Naira, consequently, the single digit of 7.6 per cent in December 2005. At the end of January 2013, the official exchange rate stood at ₦155.74 per dollar. From the above, it's clear that an exchange rate has undergone substantial transformation since 1960 till date. Though, Some erudite scholars have made several attempts to investigate the link between exchange rate determination and macroeconomics variables in Nigeria, Osuntogun (1993); Obi; Obada and Abu (2010); Odusola and Akinlo (2001); Ekpo (2003); Ogunleye (2008); Osinubi and Amaghionyeiwe (2009); Dada (2012) among others. However, many of these previous studies were inconclusive as further statistical analysis is necessary to validate not only the long run policy implication of the exchange rate in the economy, but to logically reunite the recent economic theory with current economic reality in Nigeria. Undoubtedly, the study as a unique feature: first, it question whether the statistical techniques for existing studies are sufficiently accurate and sufficiently uniform in their indications; to form the basis of a reliable policy stand on exchange rate in Nigeria. Second, it attempts to determine the whether exchange rate or economic growth is the prime mover of the economy. It also calls for model domestication as a better way of solving the current economy challenges and policy break in Nigeria. In a clear-cut, the findings of this study would not only reveal the crucial role of the exchange rate economy as well as other macroeconomic variable in Nigeria economy, but will provide adequate measures for dealing with the trend in macroeconomic variables. Furthermore, as a conductor for a pre-emptive appropriate policies that influences directional changes in the economy.

The rest of this paper is presented in four sections: Section two focuses on the theoretical underpinnings as well as a review of previous studies while section three provides a robust description of the research methodology. In all, section four shows the analysis and empirical result of the study while discussion and possible policy recommendation are the focus of section five.

2.0 Literature review

The knowledge that exists today about the way the economy function is the result of prolonged research efforts often involving intense controversy and an ever increasing data bank of experience (Blanchard 1977). Marshall and learner (1926) investigate the link between exchange rate and output using an index popularly known as Marshall-learner index as a substitute for monetary framework, but the findings were inconclusive due to the unavailability of better econometric analysis during the period. Eichengreen and lablang (2003) attempted the statistical enquiry on the link between exchange rate and output growth in 16 countries using a panel data of 120 years. The result indicated a negative relationship between exchange and growth rate. The result was supported by the investigation of Schnable (2003) who found a strong negative relationship between exchange rate and output level.

Barro and Sala-Martins (1995) estimated the impacts of trade protection on growth using tariff on capital good and reported a negative impact. Kamin (1991) estimated the role of foreign exchange market on macroeconomic variables in Nigeria and found an inconclusive result. Morley (1991) analyzed the effect of real exchange on output for twenty-eight countries' devaluation experience in developing countries using regression analysis and found concluded that exchange rate devaluation is a major factor for rising inflation. Mauna and Reza (2001) study the impact of trade liberalization, real exchange rate and trade diversification in selected African countries using exchange rate fundamentals and monetary determinants and exchange risk measure found that exchange rate fluctuation has a reverse implication on African countries. Broda and Romails (2003) found that real exchange rate volatility depresses trade in differentiated products.

Osuntogun (1993) in the analysis of strategic issues determine the effect of exchange rate risk on export and found that exchange rate act as a shock on exported product. Ogunleye (2008) investigated the relationship between exchange rate vitalities and foreign direct investment (FDI) in Nigeria and South Africa. The study observes that exchange rate volatility is negatively influenced by FDI inflows. Abdul (2009) survey a link between exchange rate and capital inflow in Pakistan for the period of 1991 to 2007 using granger causality test. The study observed significant link between foreign capital flow and exchange rate volatility and recommended need to manage capital inflow.

Udoh and Egwaikhide (2008) study the effect of exchange rate volatility and inflation uncertainty on FDI in Nigeria for the period of 1970 to 2005, using GARCH MODEL. The result showed that exchange volatility and uncertainty exerted significantly negative influence of FDI. Due and Sen (2006) attempted to verify the link between the real exchange rate, capital flow, fiscal and monetary policy indicator in India uses a quarterly data

spanning 1993 to 2004. The study observed the existence of cointegration among the variables. Bernardian (2004) investigates the impact of real exchange, real non oil GDP and the world income on Russian non oil export by using an error correction model in the period of 1994 to 2001. The study observes a long run negative relationship between exchange rate and non oil export in Russia. Against this background, it is crystal clear that the key determinants of macroeconomic exogenous shock in Nigeria economy are yet to be determined.

Terry and Steven (2008) confirmed that commodity price and interest rate differentials increase the exchange rate while volatility reduces it. Agu (2002) study the real exchange rate and distortion and external balance position in Nigeria for the period of 1970-2010. The study notices that there is a positive relationship between exchange rate and external balance. On one hand, the studies of Agu could be questioned on technical grounds, as his statistical techniques are robust but not in line with new econometric analysis. On the other hand the theoretical underpinnings of the previous agreed conclusions could also be questioned. Yu Hsing (2006) studies the determinants of exchange rate in Venezuela. Hsing observes that government deficit has significant impact on the exchange rate. Usman (2008) investigated the impact of exchange rate fluctuation in less developing countries. The study observes that exchange rate stability and trade openness are essential for growth and sustainability of economy in less developing countries like Nigeria.

Kiyota (2001) investigated the exchange rate in Japan for the period of 1978-1999 focusing on machinery industries. The study observes that depreciation of the currency of the host country as a result of exchange rate fluctuation. Kandil (2004) examines exchange rate fluctuation and economic activities in developing countries. The study observes a negative trend and call for an appropriate policy framework that will ensure stability of exchange rate that will enhanced development in the observe countries. Obi, Obada and Abu (2010) estimated the link between exchange rate and other key macroeconomic determinate in Nigeria. They observe that the interest rate is statistically and economically significant in explaining exchange rate. They argued that interest rate has a link with the exchange rate and suggested that policy for ensuring exchange rate stability should also capture interest rate.

Adelowokan (2012) studies determinate of the exchange rate in Nigeria for the period of 1970-2010. The study recommended that a monetary authority in Nigeria should rescue the economy by ensuring stability of the exchange rate in the economy. Dada and Oyeranti (2012) study the link between exchange rate and macroeconomic variables in Nigeria. The study observes that transparent policy that will pave way for stability of exchange rate is a better option for economic acceleration in Nigeria. Okenyis (2012) attempted to investigate the impact of dollars exchange rate on foreign direct investment using the ARCH base as a measure of exchange rate for the period 39years. The study notes that exchange rate depreciates Nigeria currency, but attracted FDI while volatility on FDI revealed a positive result. Akonji (2013) examines the impact of exchange rate volatility on economic variables in Nigeria for the period of using correlation matrix and granger causality test. The study observes a positive link between exchange rate and other macroeconomic variables and warns that reduction in importation is preferred for Nigeria to enhance economy growth.

Certainly different view of the world can be compared and empirical evidence can have some bearing on such comparisons. Unfortunately, the resulting literature above is not yet developed enough to have reached any general accepted conclusion. More worrisome, the current investigation techniques used are still subject to dispute. Consequently, various existing studies have been challenged on the ground of incorrect techniques and wrong policy recommendation..

3.0 Method

The econometric model approach employed by Ocran (2009) for the case of South Africa is adopted to analyze the inter-relationship between exchange rate policy and economic growth in Nigeria based on their methodological relevance in explaining precisely, the growth effect on the Nigerian economy. The adopted empirical study models are formulated using the Solow growth theory stated that labour and capital affect economic output. The adopted econometric model is expressed as:

$$RGDP_t = f(K, L) \tag{i}$$

Thus, mathematically stated as thus:

$$RGDP_t = \alpha_0 + \alpha_1 K_t + \alpha_2 L + \alpha_3 Z + u \tag{ii}$$

Where; RGDP = economic growth Indicators (like GDP growth rate); K = capital, L = labour, X = set of exogenous factor, α_0 = intercept or constant; α_{1-3} = parameters or co-efficient of explanatory variables; and u = error term.

However, the empirical models adopted from the work of Ocran (2009) is modified taking into consideration main focus of this study, the relevance of exchange rate policy (measure as Naira to Dollar) on the Nigerian economy. These are the most quantifiable in terms of data generation and as such should provide an acceptable

approximation for the external sector impact on Nigeria. Therefore, the empirical model for this study is specified as:

$$RGDP = \alpha + \beta_1 GCF + \beta_2 FP + \beta_3 MS + \beta_4 EXR + \mu \quad (iii)$$

Where: RGDP = Real gross domestic product; GCF = Gross capital formation; FP = Fiscal policy proxy by fiscal balances; MS = Broad money supply; EXR = Exchange rate of Naira vis-à-vis U.S dollar; α = Intercepts; β_{1-4} = Co-efficient or parameters of explanatory variables; and μ = Error term. This is basically referred to the sign and size of the parameters of economic relationship. It is purely determined by the principle of economic theory. However, in general terms, there is a positive and direct relationship between the real gross domestic product (RGDP) and the independent variables employed. Thus, the economic a priori expectation of the model specified above is given below:

$$\frac{\partial RGDP}{\partial GCF} > 0; \frac{\partial RGDP}{\partial FP} > 0; \frac{\partial RGDP}{\partial MS} > 0 \text{ and } \frac{\partial RGDP}{\partial EXR} > 0$$

The data for this study would be obtained from secondary sources, particularly from Central Bank of Nigeria (CBN) publications such as the CBN Statistical Bulletin, CBN Economic and Financial Review Bullion, CBN monthly reports, CBN Annual Reports and Statement of Accounts of various years, CBN Briefs, data from the National Bureau of Statistics and relevant journals on exchange rate policy and economic growth in Nigeria. The time series properties of the variables incorporated in multiple regression model (iii) is examined using the Augmented Dickey-Fuller unit root test in order to determine the long-run convergence of each series to its true mean. The test involves the estimation of equations with drift and trends as proposed Dickey and Fuller (1988). The test equations are expressed as:

$$\Delta Z_t = \eta_0 + \eta_1 Z_{t-1} + \sum_{i=1}^n \pi_i \Delta Z_{t-i} + v_t \quad (iv)$$

$$\Delta Z_t = \eta_0 + \eta_1 Z_{t-1} + \eta_1 t + \sum_{i=1}^n \pi_i \Delta Z_{t-i} + v_t \quad (v)$$

$$H_0 : \eta_1 = 0$$

$$H_1 : \eta_1 < 0$$

The time series variable is represented by Z_t and v_t as time and residual respectively. Equation (iv) and (v) are the test model with intercept only, and linear trend respectively. The specified multiple regression model (iii) is estimated through the use of Ordinary Least Square Estimator and other time series diagnostic tests are employed such as Ramsey RESET test for the entire structural stability of the model in line with underlining classical assumptions; residual diagnostic tests like Histogram normality test, Breusch Godfrey serial correlation LM test, Breusch-Pagan-Godfrey (BPG) and ARCH Heteroskedasticity tests; and Variance Inflation Factors (VIF) test to examine the level at which the estimated coefficient variance is inflated due to multicollinearity.

4.0 Results

4.1 Unit Root Test Results

Table 4.1 presents the results of the time series properties of the variables included in the model. This pre-test was carried out before estimating the long-run relationship between exchange rate policy and economic growth in Nigeria (1970-2012).

Table 4.1: ADF Unit Root Test Results

Variable	ADF Tau Statistics		Order of Integration
	Intercept	Linear Trend	
GCF	-7.0125*(0) [-3.6056]	-6.9230*(0) [-4.2050]	1
FP	-6.2200*(0) [-3.6056]	-6.0992*(1) [-4.2119]	1
MS	-7.2305*(0) [-3.6056]	-7.1483*(0) [-4.2050]	1
EXR	-8.4435*(0) [-3.6056]	-8.8851*(0) [-4.2050]	1
RGDP	-10.4090*(1) [-3.6156]	-10.8804*(1) [-4.2191]	1
<i>ect_t</i>	-3.6057*(0) [-3.6010]	-35716**(0) [-3.5236]	0

Note: * significant at 1%; ** significant at 5%; *** significant at 10% Mackinnon critical values and are shown in parenthesis. The lagged numbers shown in brackets are selected using the minimum Schwarz and Akaike Information criteria.

Source: Author's Computation, 2014.

The Augmented Dickey Fuller (ADF) unit-root test results in growth rates presented in table 4.1 indicate that all the variables i.e. gross capital formation (GCF), fiscal policy proxy by fiscal balances (FP), broad money supply (MS), real gross domestic product (RGDP) and exchange rate of Naira vis-à-vis U.S dollar (EXR) are stationary at first difference. Thus GCF, FP, MS, RGDP, and EXR as proxies for fiscal policy are *non-mean reverting at levels and do not converge to their long-run equilibrium* until they are first differenced. Econometric literature argued that regressing a non-stationary series on non-stationary series has severe implications in drawing policy inference. Hence, the long-run association among the series based on generated residual [*ect_t*] was also determined.

Following the Engle-Granger cointegration procedure, the generated residual or error correction term (ECT) confirmed existence of long-run relationship among exchange rate policy and economic growth that the null hypothesis at level is rejected.

4.2 Long-Run Estimates

The table 4.2 below reported that fiscal policy proxy by fiscal balances (FP) and broad money supply (MS) exert positive influence on economic growth in Nigeria between a decade period after Nigeria's independence and 2012 fiscal year and all the effects conform with the theoretical expectation. This implies that for a per cent increase fiscal balances (FP) and broad money supply (MS); the Nigerian economy will grow by 0.00168 and 1.039 per cent respectively. From the table, it shows that log of gross capital formation (GCF) and exchange rate of Naira in growth rate vis-à-vis U.S dollar (EXR) exerts negative effects on economic growth in Nigeria during the review periods and this does not conform to the a priori expectations based on sign. However, in terms of magnitude of effect, a percentage increase in the log of gross capital formation (GCF) and exchange rate of Naira in growth rate vis-à-vis U.S dollar (EXR) will deteriorate the economic growth by 0.3321 and 0.3165 per cent respectively.

Table 4.2: Estimated Long-Run Model Results and Diagnostic Test

Dependent Variable: LOG(RGDP)			
Method: Least Squares			
Observation (n) = 42			
Variable	Coefficient	Std. Error	Prob.
C	4.039761	1.519033	0.0116
LOG(GCF)	-0.332118	0.294180	0.2664
FP	1.68E-06	6.90E-07	0.0202
LOG(MS)	1.039433	0.189985	0.0000
LOG(EXR)	-0.316580	0.169495	0.0699
R-squared	0.84943	Durbin-Watson stat	1.5409
Adjusted R²	0.83270	F-statistic	50.7717
S.E. of regression	0.62065	Prob (F-statistic)	0.0000
Residual Normality Test			
Jarque-Bera	3.8774	Prob (J.B)	0.1439
Breusch-Godfrey Serial Correlation LM Test			
F-statistic	10.0720	Prob. F(1, 36)	0.1152
Obs*R-squared	9.1818	Prob. Chi-Square(1)	0.0721
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.0816	Prob. F(4,26)	0.3859
Obs*R-squared	4.4227	Prob. Chi-Square(4)	0.3518

Source: Authors' Computation (2014) using E-Views 7.1

In assessing the partial significance of the estimated parameters for the incorporated economic growth, exchange rate policy and other macroeconomic indicators, the t-statistics results are presented in the table. The estimated result shows that the estimated parameters for fiscal policy proxy by fiscal balances (FP) and broad money supply (MS) were found to be partially statistically significant at 5% critical level because their *p-values* are less than 0.05 and exchange rate of Naira in growth rate vis-à-vis U.S dollar (EXR) was statistical significant at 0.1 critical value. Thus, gross capital formation (GCF) is not significant at both 5% and 10% significance level.

Although, the F-statistic result shows that all the incorporated economic growth and macroeconomic indicators are simultaneously significant at 5% critical level. While, the adjusted R-squared result reveals that 83.3% of the total variation in economic output growth is accounted by changes in exchange rate policy and other macroeconomic variables during the review period. The Durbin-Watson test result reveals that there is presence of semi-strong positive serial correlation among the residuals, because of the d-value (1.5410) is far

from zero but close to two. The residuals from the model formulated show the variability in its error term.

However, the Breusch-Godfrey serial correlation test result from table 4.2 reported that we do not reject the null hypothesis “no serial correlation” at 5% significance level, and likewise for the Breusch-Pagan-Godfrey heteroskedasticity test, the result indicated that we do not reject the null hypothesis “no heteroskedasticity” at 5% significance level. The table also reports the probability value of the Jarque-Bera statistic (0.1439) shows that the estimated residual series is normally distributed with zero mean and constant variance. This tends to improve the reliability of the estimated parameters and thus, necessitate other residual diagnostic test such as higher order serial correlation and heteroskedasticity tests.

Thus, table 4.3 below shows that there is no multi-collinearity among the explanatory variables incorporated except for money supply with a small variation from 10 in the estimated cointegrating model as evaluated by the centered Variance Inflation Factor (VIF).

Table 4.3: Variance Inflation Factors

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
EXR	0.000866	17.05785	1.892002
FD	327.9014	72.35877	5.034976
MS	12.98661	138.4248	12.15615
GCF	0.213332	11.52733	4.836370
C	6315313.	25.97960	NA

Source: Authors’ computation, 2014.

5.0 Discussion

The study investigate possible determinants of exchange rate in Nigeria economy for the period of 1981-2012 using a multiple regression analysis to better understand the present, in the light of the past, for the purposes of the future implication on other macroeconomic variables. The study review changes in exchange rate policy during period and uses evidence from series of studies by erudite scholars to examine the state of knowledge and possible gap. The study observe that real output is negatively influenced by exchange rate, gross capital formation and positively influenced by broad money supply and fiscal balances. More essentially, the observe results poses several policy implications on the Nigeria economy as the Central Bank need to continue to ensure price stability in other to accelerate investment which in turn will enhance greater output and improve the standard of living of the country. In all, policy toward boosting the national output require stabilization of currency and increase in investment.

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