

# Exchange Rate Misalignment and Stock Market Performance In Nigeria

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## ABSTRACT

Exchange rate as a key macroeconomic variable can have serious implications on economic behaviour when it is seen to deviate from its equilibrium value. Companies and investors with foreign exchange exposure often experience unexpected costs from exchange rate misalignment and this can dampen stock prices. This paper contributes to the literature on the extent to which such misalignment affects the performance of stock markets. Based on the Flow- and Stock-oriented models, the paper applies the Vector Error Correction Model to Nigerian monthly data between January, 2000 and March, 2017. Results show that exchange rate misalignment, measured as the difference between parallel market and official exchange rates, weakens the growth of the Nigerian stock market. The paper therefore underscores the importance of exchange rate to the country's stock market and offers policy advice towards strengthening the current efforts at solving Nigeria's exchange rate misalignment and foreign exchange challenges.

**Key words:** exchange rate misalignment, stock market performance, Nigerian Stock Exchange, Vector Error Correction Model.

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# 1 INTRODUCTION

Exchange rate is an important variable affecting many other economic indicators and decisions. Therefore, it is crucial that the rate is fairly determined to avoid distortions in the investment, production and consumption choices made in an economy (Ndhlela, 2012). Exchange rate can be said to be misaligned when it is incorrectly determined, making it deviate from its equilibrium value (Frenkel & Goldstein, 1989). The resultant distortion from such misalignment can be pronounced in an open and commodity-dependent economy like Nigeria.

The exchange rate of the Nigeria currency (the naira) to the US dollar has changed significantly over the years, rising from N98.78/US\$ in January, 2000 to N306.40/US\$ at the end of the first quarter of 2017. During the same period, the average rate at the parallel market rose from N102.18/US\$ to N429.70/US\$. These widening variations between the two rates are suggestive of exchange rate misalignment in the country. Although the monetary authority is making significant efforts at closing the gap, it has tended to persist especially during periods of economic crisis and external shocks.

Companies in the country are typically affected by movements in exchange rate and its misalignment as many depend on imported inputs and engage in little or no export activities. This phenomenon has been known to raise the cost of production, reduce competitiveness and lower firm value (Mao & Kao, 1990). If international investors also interpret the observed exchange rate misalignment as the amount of further depreciation/devaluation needed for a currency to attain its fair value, they are likely to be bearish on a market, leading to lower stock prices. For instance, the Nigerian All Share Index (ASI) closed the first quarter of 2017 at 25,516.34, a value similar to what was attained about eighteen years earlier. The low growth performance of the market can equally be appreciated when it is noted that within this period, the ASI closed at 65,652.38 in February, 2008 and at 42,482.48 in June, 2014. These fluctuations can be explained by a number of economic factors amongst which is the exchange rate.

The objective of this paper therefore is to examine whether, and the extent to which, exchange rate misalignment affects the performance of the Nigerian stock market. In addition to the current situation of the foreign exchange and stock markets pointed above, this study is further justified by the need to contribute to an empirical study of this nature. The link between exchange rate and stock market is yet to be resolved as previous studies have offered mixed results (Adjasi, Harvey & Agyapong, 2008; Alagidede, Panagiotidis & Zhang, 2010; Dimitrova, 2005; Harjito & McGowan, 2004; Tian & Ma, 2010; Umoru & Asekome, 2013).

Moreover, specific studies on the impact of exchange rate misalignment on stock markets are rare. Previous efforts have tended to concentrate on the impact of exchange rate volatility on stock prices or the influence of exchange rate misalignment on other macroeconomic variables (Frenkel & Goldstein, 1989; Ndhlela,

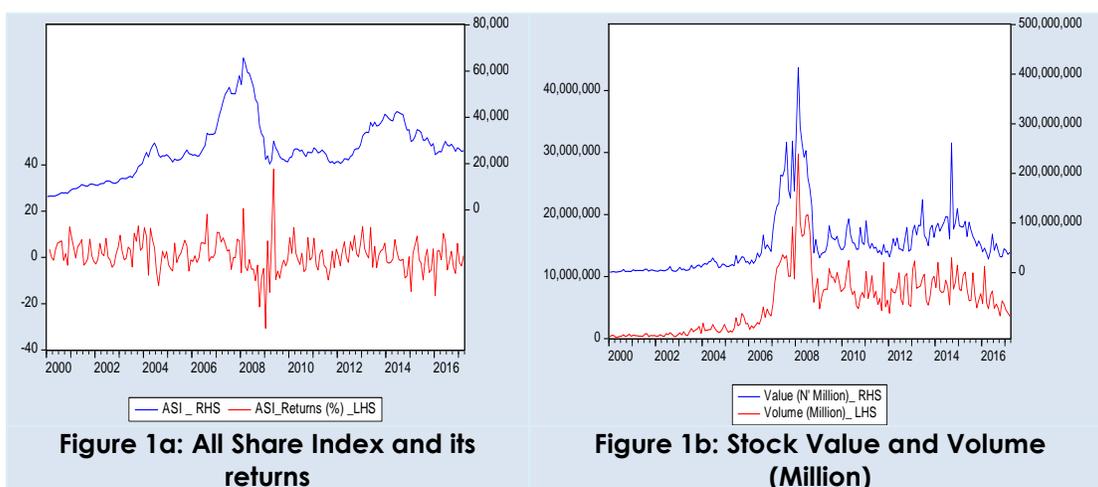
2012; Nwokoye, Zubairu & Ayuba, 2015). There is also the need to consider recent evidence so as to offer relevant policy implications to complement ongoing efforts at addressing the misalignment.

The rest of the paper is divided into five sections. Section two is the background to the study while section three is the review of previous studies. Research methods are outlined in section four while section five presents the results. Section six contains the discussions and implications.

## 2 BACKGROUND TO THE STUDY

The Nigerian stock market has undergone several changes and development since the establishment of the Nigerian Stock Exchange (NSE) as the Lagos Stock Exchange in 1960. The NSE provides a platform for buying and selling of securities for the purpose of raising funds for investment purposes. The major instruments listed and traded are equities, bonds and exchange traded funds (ETFs). At the end of 2016 for instance, the total market capitalization of the NSE was N16.19trn and the equities, bonds and ETFs segments accounted for 57.19%, 42.78% and 0.03% respectively.

Figure 1a shows that the All Share Index (ASI) increased across the years to peak at 65,652.38 in February 2008. The index however suffered a major decline during the financial crisis. Some rebounds were observed between 2012 and 2014, but the trend recently has been one of decline. Closing at 26,874.62 by the end of 2016, the ASI plummeted to 25,516.34 by the first quarter of 2017. As Figure 1a also shows, average returns on the ASI have clustered around zero, except in few cases. Figure 1b depicts the trends of the volume and value of equities traded on the NSE. Similar to the pattern in Figure 1a, it is observed that periods of increase in ASI and returns also correspond to those of high traded volume and value.



Source: NSE Annual Report and Daily Official List

The behaviour of the stock market as depicted in Figure 1 can be explained by a number of global and local factors which affect the macroeconomic, industrial and business operating environments in Nigeria. The level of exchange rate and its misalignment are of particular interest in this study because they affect a company's operations as well as investors' preferences for stocks. Nigeria earns its foreign exchange mainly from a single source, crude oil, which accrues mainly to the government. Thus, companies' operations and investor choices are susceptible to the inevitable fluctuations in the global crude oil prices as well as the mechanism for allocating foreign exchange by the monetary authority. As shown in Table 1, between 2000 and the first quarter of 2017, different foreign exchange policies have been introduced in Nigeria.

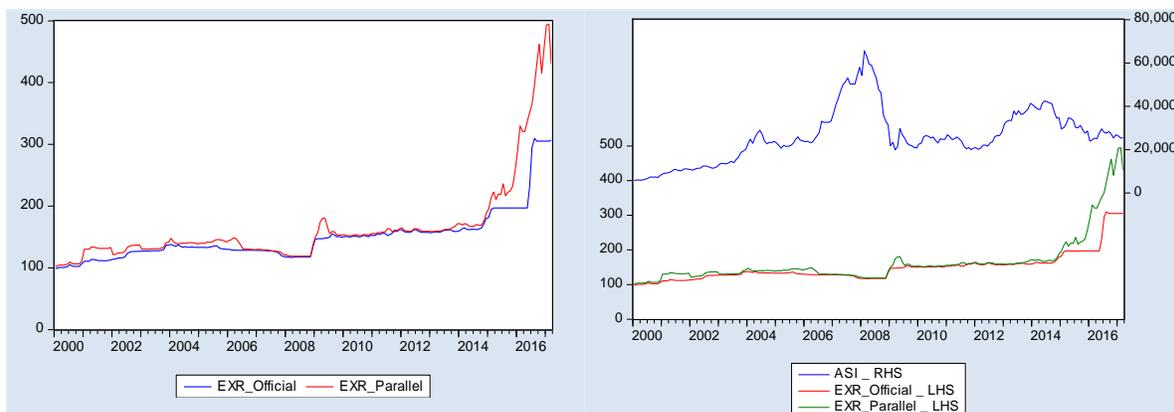
As shown in Table 1, the country has implemented a combination of relatively liberal exchange rate policies when supply of foreign exchange was not a challenge, and relatively stringent ones in periods of low foreign exchange earnings.

Figure 2a shows the trends of the official and parallel market exchange rates. It is seen that the two rates have been rising, implying the depreciation of the naira. The two generally exhibit similar trends, but the latter is often higher; especially from March, 2015. Meanwhile, the 2017 intervention by the Central Bank of Nigeria (CBN) through a constant supply of foreign exchange in the market is gradually closing the gap between the two rates. Figure 2b depicts that in periods when the ASI suffers a major decline, the gap between the official and parallel exchange rates has tended to widen. This suggests a relationship between these two rates and stock market performance in Nigeria.

**Table 1: Exchange rate policies**

Year	Policies
2002	Replacement of the Inter-Bank Foreign Exchange Market System with the Retail Dutch Auction System (RDAS)
2006	Introduction of the Wholesale Dutch Auction System (WDAS) for further liberalisation
2009	Q1: Re-introduction of the RDAS, partial suspension of trading in the inter-bank market, directives to oil companies and government agencies to sell foreign exchange earnings to the central bank only, suspension of the sale of foreign exchange to the Bureaux de Change (BDCs).  Q2: Re-introduction of WDAS, oil companies and government agencies again permitted to sell foreign exchange directly to authorized dealers of their choice, resumption of sales to BDCs
2010	Reduction in the number of BDCs foreign exchange is sold to through the withdrawal of 132 class 'A' licenses in November
2011	Wholesale Dutch Auction System-Forward (WDAS-FWD) Market was introduced as foreign exchange risk management tool
2012	Reduction of the net open position (NOP) limit to 1.0 percent, from 3.0 percent, to curtail the demand pressure in WDAS, introduction of quarterly reviews of the foreign exchange activities of banks to ensure compliance
2015	RDAS introduced and closed in February, movement of eligible demands to inter-bank segment, exclusion of 41 items from the list of goods valid for foreign exchange at the official window, limited usage of naira-denominated cards overseas to US\$300 per person, per day, stringent regulations and supervisions of BDCs, reduction in weekly sales to BDCs from US\$15,000.00 to US\$10,000.00 per BDC
2016	Introduction of a two-way quote interbank foreign exchange market; banks to execute all foreign exchange traded with corporates on FMDQ-advised FX trading and surveillance systems; International Money Transfer Operators required to remit foreign currency to the agent banks for disbursement in naira to the beneficiaries and the foreign currency proceeds to be sold to BDCs; authorised dealers to allocate at least 60% of total foreign exchange purchases for importation of raw materials, plant and machinery.
2017	Release of guidelines to ease access to PTA and school fees; continuous intervention of CBN in the interbank market; allocation of foreign exchange to small scale importers

*Source: Author's review from various issues of CBN Annual Reports and Circulars*



**Figure 2a: Official and Parallel Exchange Rates**

**Figure 2b: Trends of ASI and Exchange Rate Rates**

Source: NSE Annual Report, Daily Official List and CBN Statistical Bulletin

### 3 REVIEW OF PREVIOUS STUDIES

The theoretical relationship between exchange rate and stock prices is often explained by two major frameworks: The Flow-oriented model (Dornbusch & Fisher, 1980; Gavin, 1989) and the Stock-oriented model (Branson, 1983; Frankel, 1983). The Flow-oriented model assumes that exchange rate is related to the current account balance of a country. The depreciation of a domestic currency leads to improved competitiveness and profitability through exports and this is expected to reflect as improved stock prices in efficient markets. Thus, depreciation will lead to the attractiveness of local stocks to the extent that companies export (Joseph, 2002; Mao & Kao, 1990; Mlambo, Maredza & Sibanda, 2013; Yau & Nieh, 2006).

In the Stock-oriented model, emphasis is placed on the relationship between the capital account and exchange rate. The portfolio balance version of the model postulates that increase in domestic stock prices encourages capital inflows, leading to increase in demand for local currency and exchange rate appreciation. It has also been argued that the relationship postulated by this model can run from exchange rate to stock prices given that the latter relates the demand and supply of assets. In this case, expectation of local currency depreciation makes investors prefer holding foreign assets, thereby leading to a fall in domestic stock prices (Adjasi & Biekpe, 2005; 2008).

Past studies have employed broadly three measures of exchange rates when analyzing the relationship between exchange rate and stock prices. These are: exchange rate value, exchange rate volatility and exchange rate misalignment. Most of the past studies use exchange rate values while those that use exchange rate misalignment are quite rare. In terms of the method of analysis, volatility-based studies often employ the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) models (Adjasi et al., 2008; Apere & Karimo, 2015; Mlambo et al., 2013;

Perera, 2013). Common methods that have been used by studies based on the other two measures of exchange rate include Granger Causality test, Cointegration test and Vector Error Correction Models (Alagidede et al., 2011; Dimitrova, 2005; Nwokoye et al., 2015; Umoru & Asekome, 2013).

The empirical evidence of the direction and magnitude of the relationship between exchange rate and stock prices also vary and is inconclusive. Among studies that use the volatility approach, Adjasi et al. (2008) document a negative relationship between exchange rate volatility and stock market in Ghana. Yaya & Shittu (2010) also record similar result for Nigeria. Conversely, Apere & Karimo (2015), Mlambo et al. (2013) and Perera (2013) find weak impacts of exchange rate volatility on stock market for Nigeria, South Africa and Sri Lanka respectively.

The results of studies analyzing the impact of exchange rate values on the stock market are equally mixed. Alagidede et al. (2010) find no long-run relationship between foreign exchange and stock markets of Australia, Japan, Canada, Switzerland and UK; but there is a causal link running from exchange rate to stock prices in the last three markets. Similar results have also been documented by the studies of Harjito & McGowan (2007), Mishra (2004), Rahman & Uddin (2009) and Zubair (2013). Conversely, Tian & Ma (2010) show a positive influence of exchange rate on stock prices in China while Dimitrova (2005) and Zohrabyan (2005) find a negative impact of exchange rate on stock prices. In the study by Mao & Kao (1990), exchange rate appreciation is found to exert positive influence on the stock markets of import-dominant economies but negative effect on those of export-dominant economies. Studies that have also documented significant relationship between exchange rate and stock prices include Abdalla & Murinde (1997), Kasman (2003), Tabak (2006), and Umoru & Asekome (2013).

Frenkel & Goldstein (1989) see exchange rate misalignment as deviations of real exchange rates from their equilibrium values, signifying the extent to which actual exchange rates are incorrect. This can be distinguished from exchange rate volatility which is the short-run variations of exchange rates from their long-term trends. However, the literature on the impact of exchange rate misalignment on stock price is generally scanty (Dubas, 2012; Frenkel & Goldstein, 1989; Ndhlela, 2012; Olimov & Sirajiddinov, 2008). Nwokoye et al. (2015) identified this gap and attempt to provide evidence for Nigeria. They show that exchange rate misalignment has an insignificant impact on stock market volatility.

## **4 RESEARCH METHOD**

In order to measure the impact of exchange rate misalignment on the performance of the Nigerian equity market, this study examines the time series properties of the variables of interest as well as test for long-run relationship among them using the Johansen (1995) cointegration test. Because the variables were found to be

integrated of order one and cointegrated, a Vector Error Correction Model (VECM) was employed. The VECM is designed to restrict the long-run trend of the endogenous series, making them converge to their long-run cointegration with the incorporation of short-run dynamics. The impulse response generated from the VECM is also interpreted to analyze the effect of a one-time shock to exchange rate misalignment on the current and future values of the ASI. The general form of VECM is given in Equation (1):

$$\Delta Y_t = B_1 \Delta Y_{t-1} + \dots + B_{p-1} \Delta Y_{t-p+1} + \Pi \cdot Y_{t-p} + U_t \quad (1)$$

$$\text{and } \Pi = \alpha \cdot \beta'$$

Where  $Y$  is the vector of variables which include All Share Index (ASI), Exchange Rate (EXR), Exchange Misalignment (EXD), Foreign Portfolio Investment Inflow (FPI), Foreign Portfolio Investment Outflow (FPO) and Interest Rate (INT).  $B_i$  is the matrix of parameters;  $\Pi$  contains long-run information; The matrix  $\alpha$  is the matrix of error correction coefficients. The  $\alpha$  parameters measure the speed of adjustment which the variables adjust to restore long run equilibrium. Matrix  $\beta$  is long run coefficients and  $p$  is the number of lags. The inclusion of foreign portfolio investments is based on the observed impact and role of foreign investors in the Nigerian stock market while interest rate is included to capture the tradeoff between the returns earned on equities and fixed income instruments.

There are different approaches to measuring exchange rate misalignment (EXD) in the literature. These include the Purchasing Power Parity (PPP), Fundamental Equilibrium Exchange Rate (FEER), Behavioural Equilibrium Exchange Rate (BEER) and Parallel Market Premium (PMR) approaches. There are merits and demerits of using each of these approaches given the difficulty in establishing the equilibrium value of a currency (see Frenkel & Goldstein, 1989; Ndhlela, 2012). In this study, EXD is computed using the Parallel Market Premium approach. This assumes that the parallel rate can be used as an indicator of the long-run equilibrium real exchange rate and is what the official rate could have been if left to market forces. This approach is also preferred because it is easily observable.

Monthly data for the period January 2000 to March 2017 was obtained from the Nigerian Stock Exchange (NSE) Annual Report, Daily Official List, Foreign Portfolio Investment Report and the Central Bank of Nigeria (CBN) Statistical Bulletin.

## 5 PRESENTATION OF RESULTS

This section presents and discusses the results of this paper based on the unit root, cointegration and VECM tests.

## 5.1 Unit Root Tests

The results of Augmented Dickey Fuller (ADF) and Phillip Peron (PP) Unit Root tests are presented in Table 2 and it is observed that all the variables are non-stationary as they are integrated of order one, I (1). This therefore underscores the need to conduct a cointegration test to see if a long-run relationship exists among the variables.

**Table 2: Unit Root Test Summary**

Variables	ADF @ Level	PP @ Level	ADF @1 <sup>st</sup> Difference	PP @1 <sup>st</sup> Difference	Decision
ASI	-1.750	-1.900	-12.711***	-12.703***	I(1)
EXR	-0.468	-0.318	-9.618***	-7.896***	I(1)
EXD	-2.193	-2.118	-13.892***	-14.337***	I(1)
FPI	-1.081	-2.277	-14.676***	-23.880***	I(1)
FPO	-2.254	-2.188	-15.564***	-15.624***	I(1)
INT	-2.136	-2.276	-13.528***	-13.507***	I(1)

Source: Author's Computation, underlying data from NSE and CBN

Note: \*\*\* represents the level of significance at 1%

## 5.2 Cointegration Test

Table 3 shows that the variables are cointegrated as the Johansen cointegration test identifies three cointegrating equations, thereby establishing the presence of a long-run relationship among the variables of interest.

**Table 3: Cointegration Test Result**

Number of Cointegrating Equation(s)	Eigenvalue	Trace Statistic	Prob.**	Max-Eigen Statistics	Prob.**
None *	0.220315	137.1238	0.0000	48.77754	0.0041
At most 1 *	0.182434	88.34623	0.0008	39.47908	0.0097
At most 2 *	0.139196	48.86715	0.0400	29.37815	0.0291
At most 3	0.072577	19.48901	0.4582	14.76777	0.3055
At most 4	0.023020	4.721237	0.8377	4.564745	0.7955
At most 5	0.000798	0.156492	0.6924	0.156492	0.6924

Trace and Max-eigenvalue tests indicate 3 cointegrating equation(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

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

Source: Author's Computation, underlying data from NSE and CBN

### 5.3 Vector Error Correction Mechanism

Table 4 shows that at the 10% level, exchange rate misalignment of the immediate past month has a negative and significant influence (-0.02) on the returns on the ASI. Although part of this negative influence is corrected after two months (lag 2), the effect is not significant. Equally, exchange rate depreciation is found to exert a negative and significant influence (-.056) on ASI returns after one month, becoming positive after two months. Other variables are also found to exert no significant influence on the returns on ASI. For instance, foreign portfolio inflow contributes positively to ASI returns while foreign portfolio outflow and interest rate's impact are negative. The error correction term (ECT) in the equation is equally found to be correctly signed and significant. It depicts that the speed of adjustment of the model towards equilibrium is 4.3% every month.

**Table 4: Vector Error Correction Mechanism Result**

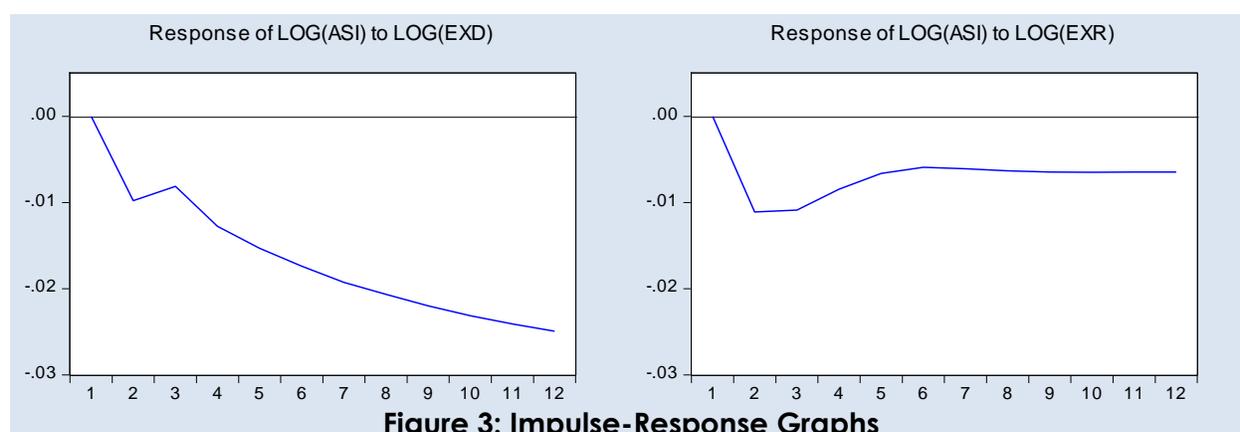
Error Correction:	D(LOG(ASI))	D(LOG(EXR))	D(LOG(FPI))	D(LOG(FPO))
ECT	-0.0431***	-0.0041	0.063163	-0.000345
D(LOG(ASI(-1)))	0.1261*	-0.0040	1.1952**	0.2392
D(LOG(ASI(-2)))	0.1345*	-0.0211	0.0533	0.6298
D(LOG(EXR(-1)))	-0.5641***	0.6182***	0.4016	-1.1561
D(LOG(EXR(-2)))	0.3649*	-0.2688***	0.7397	0.8848
D(LOG(FPI(-1)))	0.0105	0.0026	-0.5104***	-0.0004
D(LOG(FPI(-2)))	-0.0118	0.0002	-0.2304***	-0.0246
D(LOG(FPO(-1)))	-0.0093	0.0040	-0.1616**	-0.0940
D(LOG(FPO(-2)))	-0.0135	0.0014	0.0539	-0.0882
D(LOG(EXD(-1)))	-0.0211*	0.0023	-0.0011	0.0291
D(LOG(EXD(-2)))	0.0051	0.0028	-0.0186	0.0139
D(INT(-1))	-0.0037	-0.0006	0.0319	-0.0407
D(INT(-2))	0.0020	-0.0022	0.0411	0.0318
C	0.0076	0.0033*	0.0388	0.0449
R-squared	0.1504	0.3057	0.2648	0.0321
Adj. R-squared	0.0923	0.2582	0.2145	-0.0341
Sum sq. resids	0.8680	0.0950	42.7305	53.0320
S.E. equation	0.0676	0.0223	0.4742	0.5283
F-statistic	2.5871	6.4362	5.2633	0.4850
Log likelihood	267.4247	493.0468	-130.0163	-152.0466
Akaike AIC	-2.4846	-4.6965	1.4119	1.6279
Schwarz SC	-2.2568	-4.4688	1.6396	1.8556
Mean dependent	0.0071	0.0054	0.0259	0.0423
S.D. dependent	0.0709	0.0260	0.5351	0.5195
Determinant resid covariance (dof adj.)		1.32E-07		
Determinant resid covariance		9.94E-08		
Log likelihood		486.8152		

Akaike information criterion	-4.184463
Schwarz criterion	-3.208546

Source: Author's Computation, underlying data from NSE and CBN

**Note:** \*\*\*, \*\* and \* represents the level of significance at 1%, 5% and 10% respectively

Figure 3 further presents the Impulse-Response graphs to aid the understanding of the impact of exchange rate and its misalignment on the Nigerian stock market. The forecast is conducted over a period of one year (12 months). It is observed that the impact of a shock to exchange misalignment is a decline in the ASI throughout the period of analysis. The impact of depreciation is also negative, tending to fall over time.



**Figure 3: Impulse-Response Graphs**

Source: Author's Computation, underlying data from NSE and CBN

## 6 DISCUSSIONS AND IMPLICATIONS

This study finds support to the argument that exchange rate misalignment may dampen the growth of the Nigerian stock market. Similarly, exchange rate depreciation also has a negative influence on stock prices. These results mean that the influence of exchange rate in the Nigerian stock market can be better appreciated. These findings are in line with those of Adjasi et al. (2008), Dimitrova (2005), Yaya & Shittu (2010) and Zohrabyan (2005). The results of Nwokoye, et al. (2015) also offer similar conclusions for Nigeria, but the negative influence of exchange rate misalignment is not significant in their study. This may be explained by the difference in methods of analysis and frequency of data upon which these studies were conducted. For example, while this paper utilized monthly data, most other studies used quarterly data. Additionally, unlike most other studies on the subject, this paper employed the VECM model.

Following Mao & Kao (1990), this type of result is typical of an import-dependent economy like Nigeria where many companies depend on imported inputs and hardly engage in export activities. Thus, currency depreciation directly raises their

costs of production while the failure to obtain the required foreign exchange from the official window implies sourcing at a more expensive parallel market, with adverse effects on their costs and profitability. Exchange rate misalignment may cause foreign investors to take a bearish position which in turn may depress the stock market especially where the market is not efficient enough to price in the exchange rate risk.

These have a number of policy implications. There is the need to minimize uncertainties in the generation of foreign exchange and in the setting of its rate in Nigeria. The sources of generating foreign exchange have to be diversified gradually away from a single primary commodity such as oil. One way is to use a certain proportion of the revenue from oil to develop other sources where carefully-conducted research outputs have identified that the country has comparative advantage in production and exports. The monetary authority has to work at avoiding surprises and uncertainties in the setting of exchange rates as investors are averse to these and may demand a high premium which the market may not be efficient enough to price. There is also the need to come up with financial instruments, especially derivatives, which can be used to hedge exchange risk as well as other risks (Olowookere & Agama, 2016).

Equally, the recent intervention by the Central Bank of Nigeria to close the gap between the inter-bank and parallel market exchange rates is expected to provide some comfort, pending when a more sustainable approach is introduced. Finally, it is important that the outcome of this paper be validated with further research; especially those that may apply other measures of exchange rate misalignment like the PPP, FEER and BEER as identified earlier.

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