



## Dynamics of the Stock Market and Pass-Through Via the Exchange Rate

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### Abstract

The study was an investigation into the impact of the causal linkage that exists between movements in the rate of exchange and the impact on its pass-through to the price of stocks in Nigeria stock exchange as measured by the ASI. The study applied monthly time series data that spanned the period 2009-2018 from the CBN and NSE websites. VAR methodology was adopted with causality test (Granger) and findings indicate that the rate of exchange does not Granger cause ASI, neither does the ASI have a causal impact on the movements in the rate of exchange. The volatility in the rate of exchange derived from movements in the rate of exchange rate did granger cause exchange rate and the relationship is bidirectional. Even the one-and two-months lagged values of exchange rate had insignificant effects on the ASI. The findings further reveal that the block exogeneity Wald test shows that the ASI equation and the lagged values of the exchange rate as well as its volatility do not jointly explain the ASI in Nigeria. The impulse response function revealed that the ASI responds to changes in the rate of exchange and its volatility with small deviations from the mean. The variance decomposition of ASI shows that own shocks predominantly determined variations in the ASI, especially in the early months of forecast by accounting for 94.5 per cent after ten months, while exchange rate and its volatility accounted for about 5.5 per cent within the period of ten months. There could be distortions due to the exchange rate policy interventions by the CBN and this may have impacted on the pass-through to the price of stocks in Nigeria. The CBN should move towards a pure float exchange rate regime as the interventions could cause allocative issues in the economy in the long run.

**Key words:** VAR, ASI, CBN, NSE, Granger, Block Exogeneity, Wald Test

**JEL Classification:** C22, C58, E44, E58, F31, G1

**Paper Classification:** Research Paper

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## Introduction

### Background of Study

The magnitude of growth and expansion observed in the international cross border equity and investment has surpassed what had been observed in the previous decades. These observed increases in equity investment have led to an upward movement in the foreign exchange demand and supply Jebran and Iqbal, (2016). The foregoing has created a high demand for foreign

exchange as consequent equity flows reveal some level of interdependence between returns from stocks and the rate of exchange. This increasing interdependency seems to have increased the volatile nature of both stock and exchange rate markets as this might have led to a spike in international portfolio risk confronting investors, which has further led to a fall in the value of the returns due to the investors (Kanas, 2000; Jebran and Iqbal, 2016).

There is thus, the need to know the means or process via which financial shocks pass from one financial market to the other financial markets as well as determining the measure of such effects. The foregoing enhances the possible achievement of formulated policies (Ebrahim, 2000). Phylaktis and Ravazzolo (2005) revealed that the establishment of new capital markets, removal of controls over capital mobility and the introduction of the pure float exchange rate regime has led to more profound interest from stakeholders based on the causal linkage of foreign exchange and the movement in the financial markets.

Nigeria had adopted a fixed foreign exchange regime from independence until 1986; the introduction of the deregulation process also established a pure float exchange rate regime. Currently, the CBN adopts a managed or dirty float regime and this is neither a fixed nor a pure float regime. The choice of the regime as well as implication for macroeconomic stabilization has generated debates among the researchers and the policymakers in the past decades Egwaikhide, Adeniyi & Olanipekun (2014). The opinion canvassed by Bala-Sani and Hassan (2018) was that 'exchange rate and stock market price are interconnected directly or indirectly as the world becomes more integrated, based on increased trade liberalization and the consequent effect of exposure to the global economy'. What the foregoing shows is an established pattern, such as the fact that investors from outside the country are engaged in investing their capital in the stock markets wherever such opportunities for investment are found. This has led to a situation where international investment can be seen to be booming as capital is moving across countries. The benefits to investors are determined by the movements in the rate of exchange in the country where such opportunities abound. But where there is uncertainty as regards the rate of exchange, there may be a cause for further confusion in the minds of investors. Thus, the exchange rate can be said to be a major component as regards stock market fluctuations Khan and Ali (2015).

Nigeria's local currency has passed through much volatility during the past three decades as regards its level or rates of exchange in relation to other dominant world currencies. The records from the website of the CBN shows that between 2006 to 2008 the value of naira to the US Dollar (\$) was ₦125, but this further depreciated from ₦150.3 in 2010 to average of ₦153.90, ₦156.81, ₦305.25 and ₦306 per US\$ dollar in 2011, 2013, 2017 and 2018, respectively. The stock market moved so strongly in the same direction with the currency exchange rate (Bala- Sanni & Hassan, 2018, p.1). Statistically, the NSE composite index fell by about 71 per cent between the years 2008-2009. Monthly stock market statistics from the Nigeria Stock Exchange, revealed by the ASI dropped from 64,834.33 points in March 2008 to less than 31,000.00 points by December 31st, 2018. Though within this period the previous highest peak was never attained again, yet the data shows a high level of volatility and fluctuations within the period considered.

The real aim of the paper is to further research on the connection between the price of stocks and the rate of exchange in Nigeria as there is still no consensus on this nexus. In the study, the situation is tested using current data. The Financial markets are channels for the transfer of funds amongst savers and borrowers (investors) who will need funds Mishkin (2001). Mlambo, et al., (2013) made observations that can be construed to support the position that the volatile movements in the rate of exchange can thus influence the vibrancy in the NSE's ASI and even the entire financial sector. Suriani, Jamil, Kumar and Muneer (2015) did surmise that exchange rate of

the domestic currency will increase in value when compared to foreign currencies and shows a negative nexus and a fair reflection of the approach referred to as Portfolio Balance. They further noted that the traditional approach advocates that the nexus between the equity market and the currency market is positive and the causality run from the rate of exchange to the equity market. What this reveals may be a positive link as regards prices of stock and the rate of exchange; this exists where there is a fall in the value of the domestic currency and the local firms become more effective as well as efficient and this leads to a rise in a country's exports Suriani et al., (2015) as well as resulting in stock price increases.

There is also an Asset Market approach that propagates the view that there is no interaction and if it exists then there is a very weak relationship concerning the rate of exchange and the equity market nexus as the movement in the variables may be as a result of other causes. The globalized nature of the world's financial system and the increasing integration of countries has generated interest from researchers to study this interaction, especially the exchange rate and ASI movements. There seem not to be any definitive study on the dynamism seen in the stock market based on exchange rate pass-through that results in the stock market volatility. Some questions that characterize this research are as follows; (1) what is the degree of the link between the rate of exchange movement and the movements in the ASI? (2) What is the nexus that links the volatility of the rate of exchange and the movements in the stock market; is there a connection between fiscal buffers and a managed float exchange rate regime as operated in Nigeria? (3) To what magnitude does volatility in the rate of exchange affect the ASI's volatility?

## Research Hypothesis

The following hypotheses were tested in this study.

H<sub>1</sub>: The nexus linking the movements in the rate of exchange and the movements in the all shares index (ASI) is not significant.

H<sub>2</sub>: The volatility in the rate of exchange does not impact significantly on the volatility in the all shares index (ASI).

## Review of Relevant Literature

### Portfolio Balance (Approach)

This approach connects trade to determine the rate of exchange, when analysing cause and effect. The approach sees financial assets in the light of whether they are in the domestic or foreign markets, as imperfect substitutes, e.g. bonds. The main submission postulation of portfolio balance is that the supply or demand of financial assets such as money in determining the exchange rate is an equilibrating or balancing process. The portfolio balance approach states that when there is a rise in the availability of money in a country, it results in a reduction in the rate of interest within the economy. The Asset portfolio will be impacted upon as there is a shift from domestic financial assets to home currency and foreign financial assets. Where foreign assets (financial) are substituted for domestic financial assets; it causes a reduction in the value of the domestic country's currency. Following the presentation by Aahana (2019), the portfolio balance approach can be modelled into an equation.

$$W_p = M + D + RF$$

Where  $W_p$  represents wealth, domestic money demand is represented by  $M$ ;  $D$  represents total domestic bonds demanded.  $R$  is a representation of the rate at which the domestic currency

can be changed for a specific currency (here the US dollar) and RF represents domestic currency denominated demand for foreign bonds.

The given equation can be further rewritten as follows.

$$RF = W_p - M - D \dots\dots\dots (i)$$

$$M = a(r, r') W_p \dots\dots\dots (ii)$$

$$D = b(r, r') W_p \dots\dots\dots (iii)$$

$$RF = c(r, r') W_p \dots\dots\dots (iv)$$

The co-efficient (a) is associated with M and  $W_p$ , b connected to D with  $W_p$  and (c) reflects RF with W. Here the, a, b and c are all coefficients, and these functions relate the interest rate at home (r) with the interest rate abroad (r'). When there is an addition of all the coefficients, it is expected to be equal to one. An inverse relationship exists between M, r and r', while the relationship between D and r is direct, but to r' the relationship is rather inverse. The link that connects r and RF is inverse but directly related to r'. D rises when r rises, M and RF fall. Savings increases also raise  $W_p$  and impact positively on a rise in M, D and RF. There is a belief that if there is equilibrium in the demand and supply of financial assets it results in the equilibrium of the financial market. When there is such equilibrium in the financial market, the rate of exchange can be derived by a substitution made for above-stated equations, there is,

$$RF = W_p - a(r, r') W_p - b(r, r') W_p$$

$$RF = (1 - a - b) W_p \text{ or}$$

$$R = (1 - a - b) W_p / F$$

Since the co-efficient a and b are the functions of r and r', it can be concluded that the rate of exchange (R) is related directly to r' and W and inversely related to r and F.

This approach has its own limitations and shortcomings; (1); there is the overlooking of one of the important causes of the rate movement such as the real income. (2), there is no consideration of trade flows. (3), ignores the possible contribution of expectations. (4), the results from the empirical investigations are not definitive. (5), this approach is not an effective theory in explaining the effects of the rate of exchange on both commodity and financial markets. Despite these shortcomings, the approach is still useful in analysing volatility in the rate of exchange Aahana (2019).

According to Aron, Macdonald and Muellbauer (2014) global integration has expanded the interconnection of the emerging market financial markets with the rest of the world. They observed this as a major means via which inflation and economic cycles are transmitted internationally, this describes the movement that the rate of exchange makes and its impact on the domestic price of goods and services. The foregoing refers to the exchange rate pass-through (ERPT).

### Empirical Literature Review

There is no doubt that there seem to be an existing link connecting the stock market movements and the volatility in the rate of exchange and this has attracted real interest in many academics and professionals. This is anchored on the truism that this relationship affects the economy. But the findings that reflect the position that the stock market indexes have a relationship with the exchange rate and the direction of movements are mixed.

Dornbusch (1975) did carry out a study that was like the latter study of Boyer (1977); their similar models showed that capital flows are impacted by the price of stocks and the rate of exchange. The indication from the results was that a fall in the price of stocks might cause a reduction of wealth in the domestic economy. The attendant consequence is a drop in demand for money and even the rate of interest, leading to the outflow of capital and depreciation of the currency. But the study by Bahmani-Oskooee and Sohrabian (1992) analyzing the nexus of the price of stocks and the rate of exchange in the economy of the US; found that the relationship between the variables did not have a long-run nexus. The findings further reveal a short-run relationship via the use of granger causality tests. They did make use of S&P index (500) data and the rate of exchange; the data utilized was generated monthly and spanned 1971-1994.

Aggarwal (1981) posited that where there are movements in the rate of exchange, this affects the profit and losses accruing to global financial players as revealed in their financial reports and that also can be manifested in the composite index. As expressed in the traditional approach, the stock prices are impacted by movements in the rate of exchange. The study by Ratner (1993) tested the US dollar's rate of exchange impact on the prices of stock in the US using co-integration in the analysis, via monthly data that spanned 01/03/ 1973 -31/12/ 1989. The study found that long-term random nature of the composite index in the US and its nexus with the foreign exchange rate is tenuous as the null hypothesis could not be invalidated. The Investigations carried out by Ajayi and Mougoué (1996) analysed the connection linking the composite stock price index and the rate of exchange in specifically eight developed economies; these were Canada, France, Germany, Italy, Japan, the Netherlands, the UK and the US. Adopting an ECM model, their results showed significance for the two variables for all periods considered.

A study that focussed on Korea, Philippines, India, and Pakistan by Abdalla and Murinde (1997) studied the interactions linking stock performance and the rate of exchange and used monthly observations spanning 01/01/1985- 31/07/1994. The study utilized an ECM model and found out that the rate of exchange had impact on the price of stocks in all the sample countries, excluding the Philippines. The conclusion from that study was that the prices of stock influence the rate of exchange. But Ajayi et al (1998) made use of daily data in their analysis and found that the direction of the nexus moved from the prices of stocks to the foreign exchange market in the Philippines, along with Indonesia. But for the Korea Republic the observed results show the movement that were in reverse direction. The findings didn't reveal any significant impacton linking these variables in the countries studied. The results for Taiwan were different; they rather discovered the existence of causality that was bi-directional. Besides, these adjustments that were occurring at the same time were significant for three out of the total number of countries studied. But the conclusion from the data relating to developed countries showed that the causality was unidirectional and significant; moving from the price of stocks to the exchange rate markets and these all occurred in the same period for all the countries in the sample.

The study by Ong and Izan (1999) utilized data that was collected on a weekly basis from 90 day forward and spot rates of exchange in Australia and the G-7 countries and futures prices and the price of equity in the US, France, Britain, and Australia, from 1/10/1986-31/12/1992. There was strong nexus linking equity and markets that deal on foreign exchange. The summary of the effectiveness of their approach is their use of daily data and did impact meaningfully on the research findings. But, the study by Granger et al. (2000) did discover a bi-directional link that was significant; for the variables from Hong Kong, Malaysia, Thailand and Taiwan. Their study sample period was 03/12/86-16/06/ 98 utilizing daily data. These results confirmed that in the Korean financial markets, the existence of the traditional approach can be confirmed, but the portfolio approach was seen in the Philippines' markets.

Nieh and Lee (2001) discovered the connection that was a major long-run link; that flows among the prices of stocks and the rate of exchange in the seven most industrialized countries in the world; they utilized the causality and cointegration tests developed by Engle-Granger and Johansen. The findings revealed that indexes reflecting the prices of stock and the rate of exchange could be utilized as useful forecast tools for the variables in some of these countries. They concluded that where there is a drop in the value of the local currency, this might result in the stimulation of the stock market in Canada and the UK and that the lag period was one day, but an increase in the price of stocks leads to the fall in the domestic currency with a one-day lag.

Nwani (2011) adopted data that covered the period 2003- 2010; the research investigated the degree of dynamic response from the rate of exchange and its effect on the price of stocks in the NSE. Utilizing vector autoregression econometric analysis, it tested the impulse response and Chow-break point tests, to determine stable results derived from the sample in relation to the business cycles. The findings show there is a consistent negative, but major link as regards to the effective functioning of the financial market and the pass-through of the rate of exchange. The impact of this link was found to be not uniform and there was inconsistency among the lags tested. The study confirmed the connection between losses in the financial markets and the rate of exchange, revealing this nexus seriously greatly negative. These puzzling results give additional reason for stakeholders to give useful consideration concerning the effect of the rate of exchange and its link to investment.

Oyinlola and Oloko (2018) looked at the asymmetry in effect of the rate of currency exchange on the NSE using Nonlinear ARDL model by Shin et al. (2014) and this was the first study to adopt this approach in this direction. Their trend review showed changes in the rate of exchange/ stock market nexus and this was determined by using the structural breaks (multiple) test of Bai and Perron (2003). The study shows the absence of a short-run, but the presence of a long-run exchange rate asymmetry effect on the NSE. Furthermore, the results suggest that the banking sector recapitalization only affects the short-run movements in the systematic changes of the stock – market exchange rate relationship. They concluded that there is a spontaneous adjustment of the NSE, and this became more volatile after the CBN's banking sector recapitalization. The short-run disequilibrium in the NSE cannot be used to correct the exchange rate policy. The foregoing exists whether there be a policy of revaluation or a devaluation.

Ozcelebi (2018) adopted a PVAR model to find out the impact of volatility in the rate of exchange on the interest rates, stock returns, consumer price inflation and industrial production growth for 10 countries in Europe. Amongst other findings, the study also found that the variance decomposition supports exchange rate pass-through (ERPT). Mahapatra and Bhaduri (2019) investigated the effect of fluctuations in currency on the stock market in India, by focussing on the risk associated with the exchange. The findings of the study show that exchange rate risk was increasingly becoming a strong influence on returns from the stock market. But the study by Cheikh and Zaied (2020) investigating the occurrence of the exchange rate pass-through in a set of newly admitted EU member states; adopted a nonlinear panel approach. The study found that the main driver of ERPT was the inflation regime in place in the sampled countries and that a stable inflation environment will have a mitigating effect on ERPT. Fluctuations in the rate of exchange rate did impact on the inflation rate; the very impact of that fluctuation was not measured by this research it might have revealed a dynamic impact.

The changing dynamics of the macroeconomic situation in Nigeria calls for an updated look at the stock market/ foreign exchange nexus in terms of volatility. This is the main reason behind the use of an econometric analysis to reach an objective and unbiased conclusion.

## Methodology

### Study Design

The design of this research is quasi-experimental; because the research done after the occurrence of the events reflected by the data, is ex post facto. Data utilized is time series and this depends on a sample of features that are collected from the specific population of interest. The study focuses on the link connecting the rate of exchange dynamics and the ASI in the NSE.

### The Population of the Study

Monthly values for the rate of exchange and the main composite in the NSE were used for the study. The adoption of monthly data is aimed at capturing the effect of the rate of exchange as regards its nexus on stock price movement.

### Sample

Nigerian Stock Exchange (NSE) composite index referred to as the all shares index, is the principal index and the key performance indicator for the stock market. The index reflects the price movement of all the equities listed on the NSE at any point of time. The specific period for consideration spanned from January 2009 to May 2018.

### Sources of Data

Monthly time series data on exchange rate, stock exchange index and other key stock market indicators were used (Data on the rate of exchange rate was retrieved from the CBN web site and all shares index from the NSE).

### Model Development and Variable Description

The study adopts Vector Autoregressive method of econometric analysis. This helps to show the effect of the variables response to impulse function of exchange rate with respect to stock prices as adopted by Nwani (2011).

### Model Specification

The univariate times series is extended by the VAR model to k time series regression, here the times series repressors' k's lagged values are seen as regressors. In the VAR model a vector of times series is regressed on lagged vectors of these variables,

$$Y_i = B_0 + B_1 Y_{t-1} + \dots + B_{1p} Y_{t-p} + Y_{11} X_{t-1} + \dots + Y_{1p} X_{t-p} + Y_{12} V_{t-1} + Y_{1p} V_{t-p} + U_{1t} \dots \dots \dots (1)$$

$$X_t = B_{10} + B_{11} Y_{t-1} + \dots + B_{2p} Y_{t-p} + Y_{21} X_{t-1} + \dots + Y_{2p} X_{t-p} + Y_{12} V_{t-1} + Y_{2p} V_{t-p} + U_{2t} \dots \dots \dots (2)$$

$$V_t = B_{30} + B_{31} Y_{t-1} + \dots + B_{3p} Y_{t-p} + Y_{31} X_{t-1} + \dots + Y_{3p} X_{t-p} + Y_{33} V_{t-1} + Y_{3p} V_{t-p} + U_{3t} \dots \dots \dots (3)$$

Where Y is the all shares index (ASI), X is the rate at which the naira exchanges for the US dollar, and V is the volatility of the exchange rate.

### Method of Data Analysis

Vector autoregressive (VAR) captures the movement and interconnectedness of the variables and captures the progression and the interconnectedness that links multiple time series in

an econometric model. The variables are all treated using each of them with its own lags in an equation as well as lags of other variables considered in the investigation as expressed in the given model. Data is sourced from the CBN, the NSE and the Nigeria Bureau of Statistics for the period 2009-2018. The series in the model is expected to be stationary, hence the transformation of the model to become stationary.

A VAR (p) in the specified number of variables can be written in matrices form (where p=1) as

$$\begin{matrix}
 Y_{1,t} & & c_1 & a_{1,1} & a_{1,1} & e_{1,t} \\
 Y_{2,t} = & & c_2 + & a_{2,1} & a_{2,2} + & e_{2,t} \\
 Y_{3,t} & & c_3 & a_{3,1} & a_{3,3} & e_{3,t}
 \end{matrix}$$

### Results and Discussion of Findings

There is a presentation of the empirical analysis and results in this section.

#### Descriptive Statistics

These statistics reveal the summary of data and other basic characteristics within the series. Descriptive statistics for variables of the study are reported in Table A1.

**Table A1: Descriptive Statistics**

	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
All Share Index	29618.7	42748.4	20134.5	6601.5	0.44	1.97	9.08	0.01
Exchange Rate	197.8	371.8	123.9	65.4	0.95	2.38	19.81	<0.01

Source: Extract from E-views 8.0

In Table A1, all share index (ASI) has a mean of 29618.7 over the period 2009 to 2018 with a standard deviation of 6601.5. The maximum and minimum amounts of ASI for the period are 42748.4 and 20134.5 respectively. The value of skewness for ASI is 0.44. This shows that the distribution of ASI is skewed to the right. Its kurtosis value of 1.97 is below 3 and this indicates that the distribution of ASI is flat. The Jarque-bera value of 9.08 with probability value less than the critical value of 5 per cent indicates that ASI is not normally distributed.

The average value of exchange rate (EXCH) for the period under review is 197.8. The maximum and minimum values are 371.8 and 123.9 respectively. The skewness of 0.95 shows that EXCH is positively skewed. The Kurtosis value (2.38) indicates that the distribution is flat. The Jarque-Bera value of 19.81 with probability value less than 1% suggests that the variable is not normally distributed.

#### Pair-wise Correlation

The correlation matrix for all the variables in the study is reported in Table A2.

**Table A2: Pair-wise correlation matrix**

	All Share Index	Exchange Rate	Exchange Rate Volatility
All Share Index	1.00		
Exchange Rate	0.34	1.00	
Exchange Rate Volatility	0.33	0.91	1.00

Source: Author's computation (2019) using E-views 8.0

From Table A2, the correlation statistic between all share index (ASI) and each of the other endogenous variables that were used in the model is positive. Specifically, the correlation coefficient between all share index and exchange rate is 0.34 indicating that they are positively correlated with each other. Similarly, all share index is positively correlated with exchange rate volatility (derived from exchange rate movement data). The correlation coefficient between the exchange and its volatility index is high as indicated in Table A2.

### Analysis of Causality Tests

The causality test results from the empirical analysis are given in Table A3 below.

**Table A3: Pairwise Granger Causality Tests**

Null Hypothesis:	Obs	F-Statistic	Prob.
EXCH does not Granger Cause ASI ASI does not Granger Cause EXCH	114	0.27847 0.84900	0.7575 0.4307
EXCHV does not Granger Cause ASI ASI does not Granger Cause EXCHV	114	0.48490 0.13070	0.6171 0.8776
EXCHV does not Granger Cause EXCH EXCH does not Granger Cause EXCHV	117	5.27418 415.857	0.0065 1.E-52

Source: Results extract from E-views 8.0

In Table A3, the pair-wise Granger causality tests revealed that the rate of exchange (EXCH) does not have a causal link with the ASI. This shows that the ASI does not do the same to the exchange rate either. This, therefore, implies that no causal link exists between the ASI and the rate of exchange. Also, the test showed that the variable referred to as the volatility of the rate of exchange (EXCHV) does not Granger cause all share index (ASI) neither does the ASI Granger cause exchange rate volatility. It, therefore, implies that there is no causal link connecting all share index and the volatility in the rate of exchange. However, the test indicated that exchange Granger causes its volatility and vice versa. This reveals that a bidirectional link exists as regards the rate of exchange and its volatility.

### Results of Vector Autoregressive Model Results

The findings from the estimated VAR model are reported in Table A4 below.

**Table A4: Estimated VAR Model**

	EXCH	ASI	EXCHV
EXCH(-1)	0.505925 (0.09445) [ 5.35662]	-8.942923 (11.9140) [-0.75062]	317.3758 (11.5588) [ 27.4576]
EXCH(-2)	0.563854 (0.10549) [ 5.34511]	17.24919 (13.3068) [ 1.29627]	-318.0316 (12.9100) [-24.6345]
ASI(-1)	-0.001016 (0.00071) [-1.43263]	1.303042 (0.08946) [ 14.5655]	-0.029484 (0.08679) [-0.33971]
ASI(-2)	0.000747 (0.00071) [ 1.05751]	-0.347641 (0.08909) [-3.90228]	0.023657 (0.08643) [ 0.27371]
EXCHV(-1)	-0.000475 (0.00032) [-1.50647]	-0.055406 (0.03981) [-1.39187]	0.945603 (0.03862) [ 24.4847]
EXCHV(-2)	8.64E-05 (0.00028) [ 0.31171]	0.021856 (0.03496) [ 0.62515]	0.066641 (0.03392) [ 1.96467]
R-squared	0.964193	0.943218	0.984059
Adj. R-squared	0.962535	0.940590	0.983321
F-statistic	581.6298	358.8055	1333.392

Source: Author's computation using E-views 8.0

Notes: Standard errors are in ( ) represents and t-statistics are in [ ].

The overall goodness of fit statistics for the equations are quite impressive. The coefficient of determination ( $R^2$ ) for the all share index (ASI) equation is approximately 0.94. This indicates that the regressors in the equation account for about 94 per cent of the systematic variations in the ASI.

From the all share index equation, the product of the lagged values for the rate of exchange for one-and two months has insignificant effects on all share index. Also, one-and two-months lagged values of exchange rate volatility have insignificant effects on all share index. However, the ASI's one month lagged value is significant and positive on its current value. But two months lagged values for the ASI did induce a negative but significant effect on its current value.

## Block Exogeneity Wald Test

The results of the Vector Autoregressive (VAR) causality/block exogeneity Wald tests are revealed in Table A5.

**Table A5: VAR Granger Causality/Block Exogeneity (wald tests) Results;**

Dependent variable: ASI			
Excluded	Chi-sq	df	Prob.
EXCH	4.199586	2	0.1225
EXCHV	2.674235	2	0.2626
All	4.465524	4	0.3467

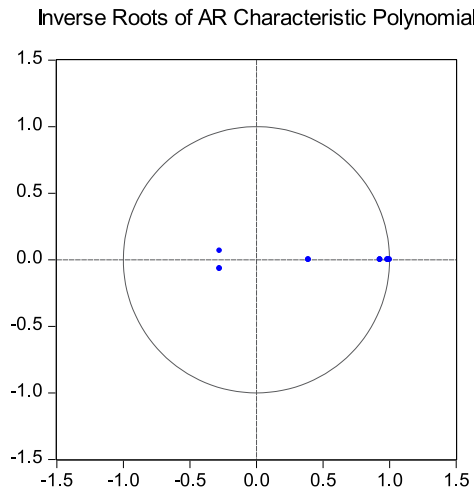
Source: Results extract from E-views 8.0

The findings from the block exogeneity Wald test for the all share index (ASI) equation revealed that all the lag values of exchange rate and its volatility do not jointly explain all share index in Nigeria.

### Vector Autoregressive Model Stability Test

The VAR models' stability test results show that the characteristics autoregressive (AR) polynomial's inverse roots is 1 as reported in Figure 1.

**Figure. 1 Inverse Roots of AR Characteristic Polynomial**

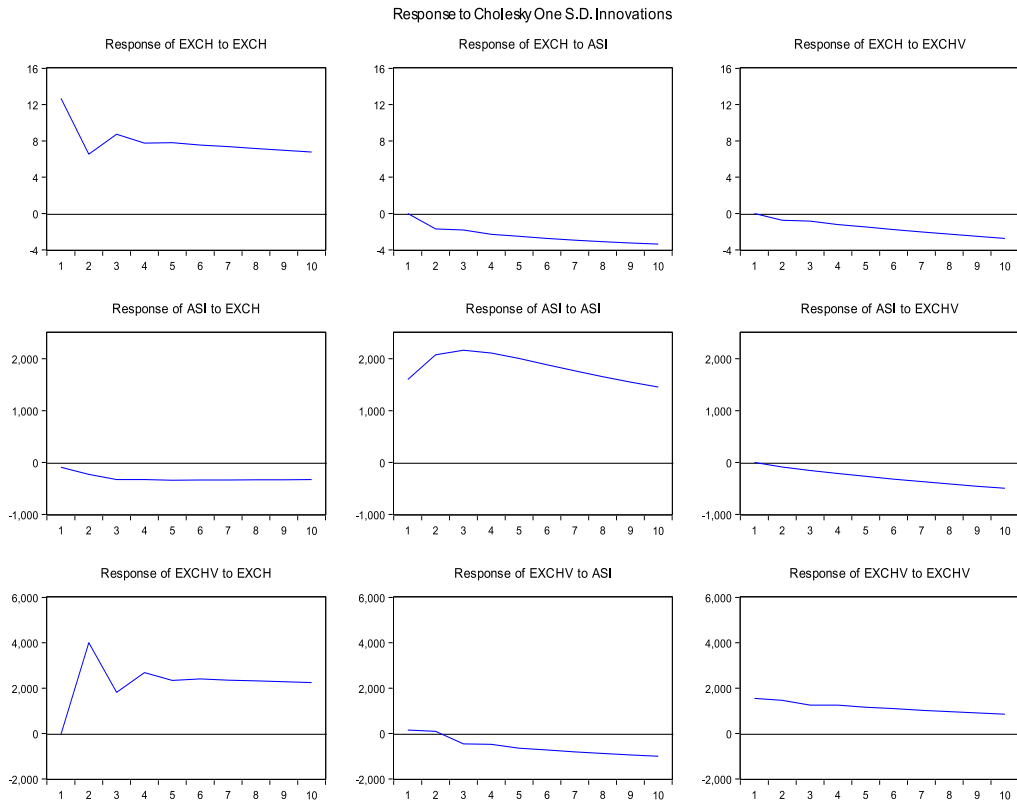


As shown in Fig. 1, there a modulus that is less than one for all the roots and these all fall within the unit circle. This shows that the VAR specification satisfies the specified condition for stability. Thus, the stability in the VAR model and as such the impulse response functions and forecast error decomposition functions are valid.

## The Impulse Response Functions

The results of the Impulse Response Functions (IRFs) of the VAR model in graphical form are presented in the Figure 2 below.

**Figure. B2 Impulse Response Function**



The IRFs of the ASI in the VAR model to a shock in the exchange rate shows that all share index responded negatively to innovations in the exchange rate throughout the ten months of forecast. However, it responded positively to innovations all through the ten months of forecast. Again, all share index reacted positively to impulses in the exchange rate volatility throughout the periods of forecast. Thus, the impulse response functions revealed that all share index responded to innovations in the exchange rate and the exchange rate volatility with small deviations from its mean.

## Forecast Error Variance Decomposition Functions

The graphs of the forecast error variance decomposition functions are reported in Figure 3 below.

## Test of Hypotheses

The two null hypotheses tested were.

$H_1$ : The nexus linking the movements in the rate of exchange and the movements in the all shares index (ASI) is not significant.

$H_2$ : The volatility in the rate of exchange does not impact significantly on the volatility in the all shares index (ASI).

### The Granger Causality/ Block Exogeneity Test

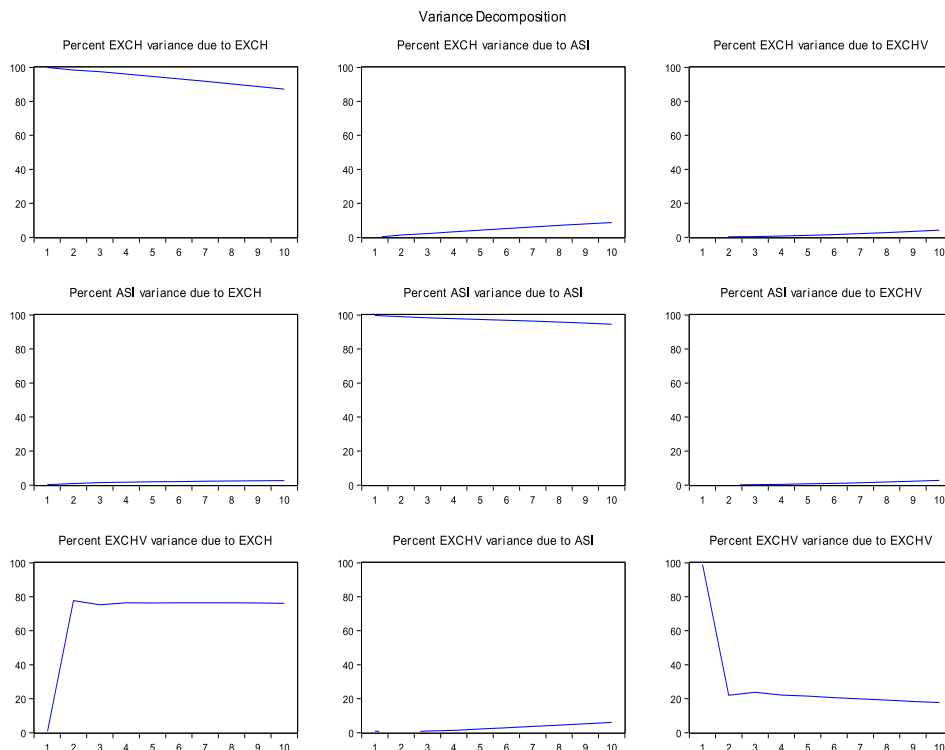
The exchange rate and its volatility does not jointly Granger cause all share index. This is because the Chi-square test statistic (4.47) for joint significance is not significant at the 5 per cent level as indicated in Table A3. The two null hypotheses are upheld as the nexus between the exchange rate movement as well as the volatility in exchange rate and the ASI are insignificant.

### The Impulse Response Function

In Figure 2, the impulse-response function of all share index in the VAR model to movements in exchange rate shows that ASI responded negatively to innovations in the rate of exchange throughout the ten months of forecast. However, it responded positively to innovations all through the ten months of forecast. Again, all share index reacted positively to impulses in the exchange rate volatility throughout the periods of forecast. Thus, the impulse response functions revealed that all ASI responded to innovations in the rate of exchange and exchange rate volatility with small deviations from its mean. The insignificant nature of the effect of impact of the independent variables on the dependent variables validates the two null hypotheses.

### Forecast Error Decomposition Function

Figure. 3: Forecast Error Decomposition Functions



As depicted in Fig. 3, it can be observed from the variance decomposition of all share index graph that fundamental shocks to exchange rate accounted for about 0.33 per cent of variations in all share index in the first month of forecast but increased gradually to about 2.66 per cent in ten months. Variations in all share index accounted for high proportion of variations in the early months of forecast but declined gradually in the later months. The innovations ranged from 99.7 per cent in the first month to 94.5 per cent in the tenth month of forecast. The Exchange rate volatility accounted for small variations in all share index initially but contributed slightly more in the later months. Though, its initial contribution to all share index was smaller than that of the exchange rate, its later contributions tended to be slightly stronger. Thus, the variance decomposition of all share index results revealed that own shocks predominantly determined variations in all share index, especially in the early months of forecast - accounting for 94.5 per cent in the tenth month while exchange rate and its volatility accounted for about a total of 5.5 per cent in the tenth month. The foregoing further confirms the validity of the two null hypotheses.

## **Summary, Conclusion and Recommendation**

### **Summary of Findings**

The pair-wise Granger causality tests revealed that exchange rate (EXCH) shows that there exists no causal link connecting the ASI and movements in the rate of exchange. However, the test indicated that the rate of exchange Granger causes volatility in the rate of exchange and vice versa. This shows that there is a movement to and fro as regards links between the rate of exchange and its volatility. The block exogeneity Wald test results for the ASI equation revealed that all the lag values of the rate of exchange and its volatility do not jointly explain all share index in Nigeria. In other words, the rate of exchange and its volatility do not jointly Granger cause all share index. This is because the Chi-square test statistic (4.47) for joint significance is not significant at the 5 per cent level of significance.

The impulse response functions revealed that all share index responded to innovations in the exchange rate and the exchange rate volatility with small deviations from its mean. Volatility in the rate of exchange accounted for small variations in the ASI initially but later contributed slightly more in the later months. Though, its initial contribution to all share index was smaller than that of exchange rate, its later contributions tended to be slightly stronger. Thus, the variance decomposition of all share index results revealed that own shocks predominantly determined variations in all share index, especially in the early months of forecast accounting for 94.5 per cent in the tenth month while the exchange rate and its volatility accounted for about a total of 5.5 per cent in the tenth month.

### **Conclusion**

Movements in the rate of exchange impact on the ASI are not significant in Nigeria for the period under study. Though exchange rate movements had impact on the magnitude of volatility in the rate of exchange rate, yet both had no significant effect on the ASI. This validates the two null hypotheses that were examined in the study and it confirms the Asset Market approach that there is no nexus and even if it exists it is insignificant.

### **Recommendations**

These findings are like that of Mlambo et al (2013) who discovered a weak relation for these variables in the South African economy in the first decade of this millennium. These

findings could be due to the counter shocks introduced by the CBN in its managed float regime interventions hence the volatility in the exchange rate has not impacted the stock prices as would have been in a pure float regime. These interventions by the CBN though effective could cause distortions as regards economic fundamentals in a free capitalist economy such as Nigeria. It is, therefore, advised that the CBN transits to a pure float and not from a pure float exchange rate regime.

## Contribution to Knowledge

The policy moves made by the CBN in the foreign exchange market via its managed float exchange rate policy regime seem to affect the transmission of foreign exchange volatility shocks to the capital market in Nigeria. This seems to suggest that the CBN's policy goal for the operation of such policy measures may have been proved to be effective.

## Suggestions for Further Study

In order to have a more certain conclusions as regards the dynamic links connecting the movements in the foreign exchange rate and the capital market in Nigeria, other independent variables such as total market capitalization, number of transactions within a specific period can be undertaken.

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