GUSAU JOURNAL OF ECONOMICS AND DEVELOPMENT STUDIES (GUJEDS)
ISSN: 2786-9695
DOI: https://10.57233/gujeds.v3i1.8 **Vol. 3(1) July 2023**

DOES OVERVALUATION OR UNDERVALUATION OF NAIRA EXCHANGE RATE AFFECT STOCK PRICES DIFFERENTLY? EVIDENCE FROM NONLINEAR ARDL

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Abstract

The relationship between stock prices and exchange rates misalignment has not received too much attention. The result from most of the previous studies have shown that the relationship between the variables is short run with few indicating that they have long run relationship. Also, the few existing studies on the nexus between exchange rate misalignment and stock prices assumed a symmetric relationship between the two variables. The mixed result from previous study is due to the assumption of linearity. In this paper, we use quarterly data for Nigeria from 1991 to 2018 to check the possibility of asymmetry in the relationship by decomposing the misalignment series into overvaluation and undervaluation using non-linear ARDL method. The result show evidence of short run and long run asymmetry, this implies that the effects of undervaluation will last over much longer period than the effects of overvaluation. These findings have implication for market participants as well as policy makers. In managing the exchange rate, policy makers must be aware of the asymmetric effect of their action on the stock market as they try to devalue domestic currency for the purpose of improving trade balance.

Keywords: Overvaluation, Undervaluation, Exchange rate, Stock prices, NARDL

1. Introduction

The relationships between exchange rates and stock prices have drawn the attention of policy- makers and practitioners in recent times, this is because they both play significant roles in influencing the development of a country's economy (Nieh and Lee, 2001). The conclusion about the relationship between exchange rate and stock prices is yet to be settled. In the theoretical literature, two main approaches explain the nexus between exchange rate and stock prices, these are the flow-oriented approach (Dornbusch and Fischer, 1980) and the stock-oriented approach (Frankel, 1984). According to the traditional open economy model proposed by Dornbusch and Fischer, there is a positive link between the stock market performance and exchange rate behavior. The models showed that variation in exchange rates has a significant impact on the competitiveness of firms, same way as it affects the value of the earnings as well as the cost of its funds. This is mainly because many companies borrow in foreign currencies to finance their operations and hence their stock price. While in the stock oriented approach exchange rate is determined by the supply and demand of financial assets, the portfolio balance model and the monetary model which later emanated from the stock oriented approach claim a negative link between the exchange rates and stock prices.

In the Portfolio Balance Theory, the dynamics of short run exchange rate adjustment are driven by developments in the asset market where an increase (decrease) in stock prices induces capital inflows

ISSN: 2786-9695
DOI: https://10.57233/gujeds.v3i1.8 Vol. 3(1) July 2023

(outflows) which encourage (discourage) the demand for such stocks both from local and foreign investors causing appreciation (depreciation) of the domestic currency. Due to their impact on the exchange rate, domestic demand, and current account imbalances, cross-border capital flows may give rise to widespread concerns about their potential effect on exchange rate misalignment Comunale (2018). Thus, as an important macroeconomic policy indicator, equilibrium real exchange rate enables an assessment of a country's external competitiveness. In addition, investigating whether a country's real effective exchange rate is close to its trajectories helps in determining the future adjustment paths of economic fundamentals like stock prices. Companies suffer adjustment cost in the face of exchange rate misalignment, this is because most domestic firms that depend on imported inputs for their survival will experience an increase in cost of production which eventually will affect their competitiveness and firm value (Mao and Kao, 1990).

According to Bahmani-Oskooee (2001) changes in real exchange rate is mostly driven by fluctuations in nominal exchange rate, which causes a shift in the real exchange rate. Fluctuations in real exchange rate causes exchange rate misalignment, which send signal to market participants about the likely state of the economy. International investors view exchange rate misalignment, especially overvaluation, as prelude to currency crisis. In this case, they are likely to be bearish on a market, leading to lower stock prices. The existing empirical evidence on how stock prices interact with exchange rate misalignment is inconclusive. However, majority of the studies on the nexus between exchange rate misalignment and stock prices were based on models that overlooked the time series properties of the variables in the model. Also, some have used the linear (symmetric) framework and obtained varied results. For instance, Adjasi et al. (2008), Dimitrova (2005), Yaya and Shittu (2010), Zohrabyan (2005) and Olowookere (2019) found negative relationship between stock prices and exchange rate misalignment. Similarly, Nwokoye, et al. (2015) found negative but insignificant relationship. The hypothesis that the effect of exchange rate misalignment on stock prices are symmetric constitute the core assumptions of these studies, meaning that overvaluation and undervaluation changes stock prices in opposite direction, but by the same proportion. Similar view is also applicable to the impact of exchange rate on stock prices in a symmetric framework.

The current paper contributes to the literature by using the nonlinear auto-regressive distributed lag model (NARDL) which enables us to separate the effect of overvaluation and undervaluation of exchange rate on stock prices. The second contribution of the paper is to separate the effect of appreciation and depreciation of the real effective exchange rate on stock market prices in Nigeria. The remainder of the paper is organised as follows: Section two the literature review Section three. Presents the methodology in Section four is the findings and discussions. Section five concludes the

ISSN: 2786-9695
DOI: https://10.57233/gujeds.v3i1.8 Vol. 3(1) July 2023

paper and highlights some policy implications.

2. Literature Review

The modelling framework used to address the nonlinearity or asymmetry in the relationship between exchange rate misalignment and stock prices are based on the Portfolio Balance Theory which is an upshot of the stock oriented approach. The adjustment of short run exchange rate movement in the portfolio balance approach is driven by dynamics in the asset market where increases in stock prices encourage the demand for such stocks both from local and foreign investors. This create a mismatch in the demand for domestic currency and foreign currency, the upsurge in the demand for domestic currency compared to foreign currency leads to appreciation of the domestic currency. Also, fall in stock prices have contrary effect on currency movement by leading to depreciation of the local currency as investors seek investments elsewhere with higher returns. An additional mechanism through which decline in stock prices could lead to depreciation of domestic currency is when such decline in stock prices caused incipient outflow of capital mostly driven by increase in the demand for foreign currency compared to local currency thus, leading to depreciation of the domestic currency (Salisu and Ndako, 2018). These provide the building block for the theoretical link between exchange rate and stock prices. However, this linear (symmetric) relationship between the two variables raise important question about the role of expectations.

Previous work on the relationship between exchange rate misalignment and stock prices volatility is negative and insignificant. For instance, Nwokoye, Zubairu and Ayuba (2015) examine the nexus between exchange rate misalignment and stock market volatility before and after financial liberalization era using Granger-Causality technique between the period 1985:Q1-2011:Q4. The result suggest that exchange rate misalignments had a negative and insignificant relationship with stock market volatility. Similar study by Olowookere (2019) examine the impact of exchange rate misalignment on stock market performance in Nigeria, the result from the Vector Error Correction model shows that exchange rate misalignment weakens the growth of stock market in Nigeria. Majority of studies on the nexus between exchange rate and stock prices were mostly done within the framework of real exchange rate and the volatility of exchange rate using various econometrics method to estimate its impact on stock market. For volatility-based studies (see Adjasi et al., 2008; Lawal and Ijirshar 2013; Apere and Karimo, 2015; Mlambo et al., 2013; Perera, 2013; Okechukwu et al. 2019; Oladapo et al 2017 among others). Other studies use econometrics method that ranges from Granger Causality test, Cointegration test and Vector Error Correction Models (Alagidede et al., 2011; Asaolu and Ogunmuyiwa, 2011; Zubair, 2013; Dimitrova, 2005; Umoru and Asekome, 2013; Suriani et al. 2015; Bala and Hassan 2018).

Although the empirical studies reviewed in this study used different econometrics

ISSN: 2786-9695
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methods to explore the nexus between stock prices, exchange rates/volatility and exchange rate misalignment. They have one feature in common. Implicit in all the models is the assumption that exchange rate has symmetric effect, in other words, if exchange rate appreciate, the tendency is for stock prices to rise while depreciation has opposite effect by causing stock prices to fall. Similarly, studies that investigates the relationship between exchange rate misalignment and stock prices also assumed that the relationship is symmetric. According to Bahmani-Oskooee and Saha (2015), since expectations drives the decision of most players in the stock market, exchange rate changes could have asymmetric effects on stock prices. The study found support for the asymmetric effects of exchange rate changes by using US data in a multivariate framework. Bahmani-Oskooee and Saha (2016) employed similar multivariate model for some numbers of countries and found further evidence of asymmetric effect of exchange rate. Their result support the evidence that exchange rate changes have asymmetric effects on stock prices, though the effects are mostly short-run. In line with the work of Bahmani-Oskooee and Saha (2016), this study adds to the literature by looking at the separate impact of exchange rate misalignment (overvaluation and undervaluation) on stock prices in Nigeria using non-linear ARDL framework of Shin et al. (2014).

3. Methodology

According to Bahmani-Oskooee and Saha (2015) studies on the nexus between exchange rate and stock prices can be classified into two groups. While the first includes studies that rely upon a bivariate model between the stock price index and the exchange rate, the second includes studies that use multivariate models where some additional variables are included in the model. To account for the effects of other variables we employ the multivariate model of Moore and Wang (2014) and Bahmani-Oskooee and Saha (2015, 2016) as follows:

$$LnASI_t = \alpha + \beta_1 LnEM_t + \beta_2 LnREER_t + \beta_3 LnCPI_t + \beta_4 LnM2GDP_t + \varepsilon_t \text{----------1}$$

where ASI denotes an All Share Index a proxy for stock prices, EM denotes exchange rate misalignment, CPI denotes Consumer Price Index as a measure of price level, and M2 is a measure of nominal money supply while REER denotes real effective exchange rate. As mentioned in the introductory section, estimate of β_1 could be positive or negative depending on whether more firms gain international competitiveness and export more or more firms are hurt by increase in their production cost due to exchange rate misalignment. Similarly, Production cost and input prices go up in the event of inflation, this will hurt profit margins and hence stock prices. Empirical work by Fama (1981) and Chen et al. (1986) showed that inflation have negative effect on stock prices. Although, Anari and Kolari (2001) argued that while in the short run there is negative correlation between stock prices and inflation, this relation could be positive in the long run. In other words, when held over a longer period, stocks serve as a hedge against inflation thus,

ISSN: 2786-9695
DOI: https://10.57233/gujeds.v3i1.8 Vol. 3(1) July 2023

a positive relationship between inflation and stock prices is expected. Similarly, Boonyanam (2014) finds a positive relationship between inflation and stock prices. The same analogy goes for the relationship between stock prices and money supply, M2. An increase in M2 precipitates a decrease in interest rate which leads to an increase in investment and output hence an increase in stock prices. Conversely, an increase in money supply could lead to inflation which in turn might decrease stock prices (Fama 1981). However, the empirical literature is in support of both effect.

To disentangle the separate effect of overvaluation and undervaluation of exchange rate which is our main independent variable of interest, this study uses a cointegrating nonlinear autoregressive distributed lag (NARDL) model of Shin, Yu and Greenwood-Nimmo (2014), wherein regressors can be decomposed using the partial sum of positive and negative changes. This method allows the model to exhibit only long-run asymmetry, only short-run asymmetry or combined short and long-run asymmetries. This technique tests simultaneously the long and short-run nonlinearities through the positive and negative partial sum decompositions of the regressors (Augustine et al. 2017). Following the work of Shin et al. (2014), the approach to NARDL requires building new variables that capture incidents of undervaluation and overvaluation. The idea is to decompose a time series, EM_t, into two series (EM_t^+) and (EM_t^-) as follows:

$EM_t^+ = \sum_{j=1}^{t} \Delta EM_t^+ = \sum_{j=1}^{t} Max(\Delta EM_t^t, 0)$, $EM_t^- = \sum_{j=1}^{t} \Delta EM_t^- = \sum_{j=1}^{t} Max(\Delta EM_t^-, 0)$

Where ΔEM_t^+ and ΔEM_t^- are the partial sum of undervaluation and overvaluation respectively. In line with Shin et al, (2014) the NARDL model can be stated as

$$\Delta ASI_t = \varphi_0 + \varphi_1 ASI_{t-1} + \varphi_2^+ EM_{t-1}^+ + \varphi_3^- EM_{t-1}^- + \varphi_4 REER_{t-1} + \varphi_5 CPI_{t-1} + \varphi_6 M2_{t-1} + \sum_{i=1}^{p} \omega_i \Delta ASI_{t-1} + \sum_{i=0}^{q} \partial_i^+ \Delta EM_{t-1}^+ + \sum_{i=0}^{q} \delta_i^- \Delta EM_{t-1}^- + \sum_{i=0}^{r} \vartheta_i^+ \Delta REER_{t-1}^+ + \sum_{i=0}^{r} \vartheta_i^- \Delta REER_{t-1}^- + \sum_{t=i}^{s} \gamma_i \Delta CPI_{t-1} + \sum_{t=i}^{u} \rho_i \Delta M2_{t-1} + \varepsilon_t \quad \text{----------2}$$

where $-\frac{\varphi_2^-}{\varphi_1}, -\frac{\varphi_3^+}{\varphi_1}$ are the coefficients of long-run estimate of the misalignment series respectively. Eqn. 2 implies that the model may exhibit asymmetries in both the short- and the long-run, only in the long-run or only in the short-run. The level terms in the equation represent the long-run relationship that can be evaluated via the bounds testing approach of Pesaran, Shin and Smith (2001), also, short-run asymmetries are captured by the lags of the asymmetric exchange rate terms that appear in the first – difference. Eqn. 2 is estimated using ordinary least squares (OLS), and tests for the existence of an asymmetric nonlinear (cointegrating) long-run relationship is based on the F-test for the joint null hypothesis that coefficients on the level variables are jointly equal to zero ($H_0: \varphi_i = \varphi_2^+ = \varphi_2^- = \varphi_3 = \varphi_4 = 0$) against alternative hypothesis that the coefficient of the lagged variables are jointly not equal to zero ($H_1: \varphi_i = \varphi_2^+ = \varphi_2^- =$

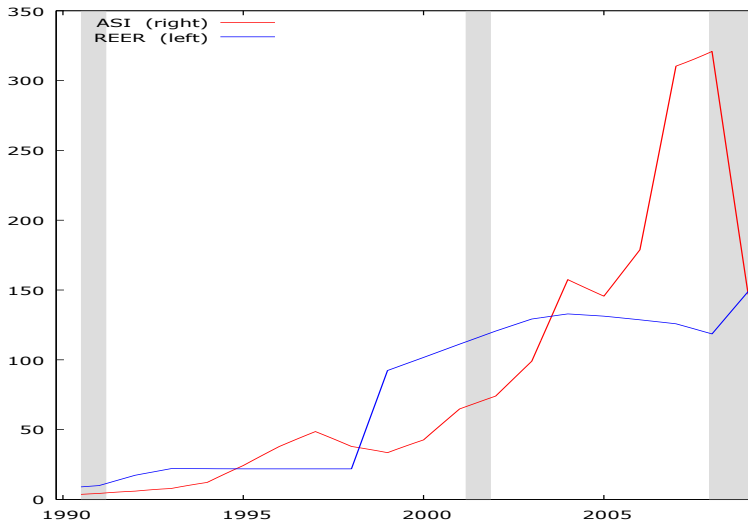
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ISSN: 2786-9695
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$\varphi_3 = \varphi_4 \neq 0$). The long-run coefficients are obtained as follows: $L_r^+ = -\frac{\varphi_2^+}{\varphi_1}$ and $L_r^- = -\frac{\varphi_2^-}{\varphi_1}$. Similarly, the long run symmetry can be tested with the use of Wald test $L_r^+ = L_r^-$. Also, short run symmetry in the model can be tested via $\partial_i^+ = \delta_i^- \ (strong\ form)$ or $\sum_{i=1}^{q-1} \partial_i^+ = \sum_{i=1}^{q-1} \delta_i^- \ (weak\ form)$, in both cases, Wald test can be carried out on each pairwise combination of – and + or sum of each of them (Augustine et al. 2017)

3.1 Data and Sources

The period considered for this work dates from first quarter of 1991 to the fourth quarter of 2018. Data for real effective exchange rate is obtained from International Financial Statistics (*IFS*) database, M2GDP, CPI and ASI (All Share Index) are obtained from Central Bank of Nigeria Statistical bulletin. The data sets are annual and have been interpolated to quarterly using the Chow and Lin (1971) method. The rationale for interpolating our dataset is that, economic phenomena exhibit fluctuations at a higher frequency than the annual level. As such, interpolating to a quarterly frequency, enable us to capture more detailed and short-term variations in the underlying economic processes, which may be crucial for understanding certain aspects of the economy or for forecasting. Other variables used in the estimation of Natural Equilibrium Exchange Rate (NATREX)[1] are GCON, ODR, TOT and PROD. Where GCON is government fiscal stance, ODR represents old dependency ratio, TOT is commodity terms of trade while PROD represent productivity, all four variables are obtained from International Financial Statistics (*IFS*).

The next step is to determine the time series properties of our key variables of interest. The top panel of Figure 1 shows the real effective exchange rate (REER) and All Share Index (ASI), it is evident that both variable are moving in opposite direction meaning that depreciation/appreciation of REER have significant effect on the trend of ASI. In other words, appreciation of REER may lead to improvement in stock prices while depreciation may decrease stock prices.



[1] All the variables that entered our NATREX model *(REER, ODR, TOT, PROD, GCON)* are integrated of order one *I(1),* as such VAR was used in the estimation of our model and the misalignment series was generated thereafter. To conserve space this result is not presented here but is available on request

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ISSN: 2786-9695
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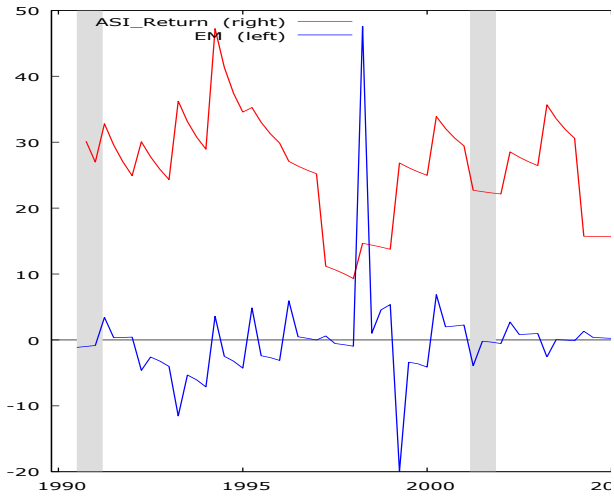


Figure 1: All Share Index (*ASI*), Real Effective Exchange Rate (*REER*), ASI Return, Exchange Rate Misalignment (*EM*) (1991-2018)

Similarly, the trend in Panel 2 indicates some possible co-movement between exchange rate misalignment (EM) and stock return which suggest a possible long run relationship between exchange rate misalignment and stock market performance. To further investigate the characteristics of our variables of interest, we explore the descriptive statistics. As presented in Table 1. The kurtosis for EM and *REER are greater than 3*, which is suggestive that two out of the series peaked to the surface or leptokurtic relative to the normal distribution. While ASI, CPI and M2GDP have skewness values close to 0 and Kurtosis values less than 3 meaning they are platykurtic relative to normal distribution. The high standard deviation of most of the series suggest the possibility of certain shocks driving the variables away from their mean value. The correlation statistics shows high positive correlation between ASI, CPI and M2GDP, suggesting that both inflation and money supply are important determinants of all share index (ASI). Also, the high negative correlation between ASI, exchange rate misalignment (EM) and REER suggest that exchange rate and its misalignment are crucial to the performance of stock market.

Table 1: Descriptive Statistics and Correlation Matrix

	ASI	CPI	EM	
Mean	19299.58	73.06529	4.50E-09	
Median	23091.55	54.41058	0.087545	
Maximum	50424.70	240.1429	47.58665	
Minimum	570.4968	2.571131	-19.94257	
Std. Dev.	14283.92	62.61107	5.879436	
Skewness	0.314018	0.936787	4.224674	
Kurtosis	1.994605	2.937874	41.48042	
Observations	111	111	111	

Correlation Analysis

	ASI	CPI	EM	
ASI	1.000000			
CPI	0.735065	1.000000		
EM	-0.619862	0.012268	1.000000	
M2GDP	0.431952	0.821640	-0.017383	
REER	-0.604301	-0.025903	0.220508	-

Source: Computed from Eviews 10

4.0 Discussion of Results

To derive the appropriate econometric specification, this study conduct unit root test as presented in Table 2 with several univariate stationarity test for the data. The unit root result for ASI, REER and M2GDP indicates that the null hypothesis of a unit root in each of the series cannot be rejected in both Augmented Dickey Fuller test (ADF) and the Philip Perron test (PP) while CPI and EM are stationary at level. This therefore underscores the need to conduct bound test for cointegration to see if long run relationship exists among the variables.

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Table 2: Unit Root Test Result

	ADF				PHILIP PERRON				
	Levels		1st Diff		Levels		1st Diff		
	C	C&T	C	C&T	C	C&T	C	C&T	OOI
ASI	-2.33	-2.30	-3.61	-3.86	-2.92	-1.83	-3.61	-3.86	I(1)
CPI	-3.42	-5.03			-4.01	-3.35			I(0)
EM	-9.75	-9.72			-9.72	-9.69			I(0)
REER	-2.92	-2.88	-4.49	-4.50	-2.21	-2.17	-4.55	-4.54	I(1)
M2GDP	-1.37	-2.19	-3.60	-4.08	-1.16	-2.16	-4.12	-4.09	I(1)

Source: Computed by the Authors

Note: The ADF and Philip Perron test statistics for the null hypothesis of a unit root process for the variables in the levels and in first differences. The critical value at the 1 percent significance level is 4.05 if a constant and a linear trend (c&t) are included in the regression, 3.49 with only a constant term (c).At the 5 percent significance level these values are 3.45, 2.89 and 1.94, respectively (MacKinnon, 1996). OOI means order of integration.

By first considering a linear model in Table 2, the short run result indicates that exchange rate misalignment (EM) is positive and significant. Similarly, in the long run exchange rate misalignment coefficient is negative and significant indicating that exchange rate misalignment has negative impact on stock prices. In both the long run and short run M2GDP, REER and CPI significantly affect stock prices. However, for the long run estimate to be valid we must establish cointegration. The result of the bound test revealed that our calculated F statistics of 5.8 is higher than the upper bound critical value of 4.36, 3.49 and 3.09 respectively at 1, 5 and 10 percent. However, an alternative test of cointegration showed evidence of long run relationship as indicated by the error correction term (ECM). The size of the coefficient indicates that 5 percent of adjustment takes place within one quarter. To ensure that the model is a best fit we conducted some other diagnostic test. The LM statistics show no evidence of serial correlation as indicated by its insignificant statistics at 5% critical value. To check if the model is correctly specified, Ramsey RESET statistics is reported to judge misspecification. The RESET statistics is highly insignificant indicating that our model is correctly specified. To check the stability of our short run and long run coefficients, CUSUM and CUSUMSQ are relied upon, and they results show that our coefficient estimate are stable.

Table 3: Short run and Long run Result (Linear ARDL)

Panel A: Short run Result			
Variable	Coefficient	Std. Error	t-Statistic
C	0.629315	0.163978	3.837789
LASI(-1)	-0.042601	0.012728	-3.347076
EM	0.672279	0.066023	10.18251
LCPI(-1)	0.056779	0.014839	3.826354
LM2GDP	-0.093065	0.033380	-2.788022
D(LASI(-1))	0.690702	0.067904	10.17170
D(LREER)	0.220738	0.089128	2.476650
D(LREER(-1))	-0.141532	0.089252	-1.585766
D(LCPI)	0.760425	0.335101	2.269239
D(LCPI(-1))	-0.628276	0.310829	-2.021289
Panel B: Long run Result			
Variable	Coefficient	Std. Error	t-Statistic
EM	-0.040852	0.024135	-1.692613
LREER	-0.959836	0.395920	-2.424317
LCPI	1.332817	0.233537	5.707095
LM2GDP	-2.184568	0.933597	-2.339947
C	14.77228	3.326103	4.441318
Panel C: Diagnostic Statistics			
ECM_{t-1}	**LM**	**ARCH**	**RESET**
-0.05	0.73(0.31)	0.68(0.41)	1.06(0.30)
	CUSUM	**CUSUMSQ**	**Bound Test (F)**
	Stable	Stable	5.8

Source: Computed from Eviews 10

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DOI: https://10.57233/gujeds.v3i1.8 Vol. 3(1) July 2023

From the result in Table 3, it is evident that exchange rate misalignment have positive and significant impact on stock prices but in the long run it has negative effect. How does this affect the result? Could the mismatch between short run and long run effect be due to assuming linearity in the dynamic adjustment process? What becomes of the result if we rely on non-linear adjustment process? To answer this question, we move to the result of non-linear model reported in Table 3. The result shows that both in the short run and the long run undervaluation (EM^-) increase stock prices while overvaluation (EM^+) hurt or decreases stock prices both in the short and long run. This implies that exchange rate misalignment has asymmetric effect on stock prices. Although, the coefficients of overvaluation is not significant in the short run but it is significant in the long run. The result is not surprising as the long run and short run estimate of depreciation of REER is negative and significant indicating that depreciation of REER hurt stock market performance while REER appreciation increases stock prices. Although, depreciation raises cost of imported inputs and makes exports cheaper but input-import oriented firms will lose and overall stock prices will fall. However, the slow adjustment lags that confronts exporters (e.g. decision lags, production lags, delivery lags among others) will shield them from the impact of appreciation for some time while the importers of inputs will benefit, thus overall stock prices will rise. This result is in line with Bahmani-Oskooee and Saha (2017). In other words, undervaluation boost stock prices in the long and short run. For instance, a 1% undervaluation increase stock prices by 5% in the long run while in the short run a 1% undervaluation increase stock prices by 0.3%.

To test for short-run and long-run asymmetric effects, Shin et al. (2014) recommend applying the Wald test to establish whether symmetry or otherwise. The long run symmetry can be tested with Wald test $L_r^+ = L_r^-$. Also, short run symmetry in the model can be tested via $\partial_i^+ = \delta_i^- \ (strong\ form)$ or $\sum_{i=1}^{q-1} \partial_i^+ = \sum_{i=1}^{q-1} \delta_i^- \ (weak\ form)$. The result from the Wald Test indicates that asymmetric short-run and long run effects. However, short-run asymmetry results in this case implies that the effects of undervaluation will last over much longer period than the effects of overvaluation. The implication of this result is that, in the linear model when exchange rate misalignment affect stock price positively in the short run but has negative and significant coefficient in the long-run, we would not have arrived at the conclusion that exchange rate misalignment affect stock prices differently in terms of overvaluation and undervaluation. Other diagnostic statistics shows the model is correctly specified as indicated by the Ramsey RESET statistics, the result show no evidence of misspecification. CUSUM and CUSUMSQ are relied upon to check the stability of our coefficient estimates, and they results show that our coefficient estimate are stable. The LM statistics show no evidence of serial correlation as indicated by its insignificant statistics at 5% critical value. The result of

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the bound test revealed that our calculated F statistics of 7.14 is higher than the upper bound critical value at 1, 5 and 10 percent respectively which shows evidence of cointegration. Similarly. The error correction term also shows evidence of long run relationship

Table 4 Short run and Long run Result (Non-linear ARDL)

Panel A: Short run Result				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.447446	0.113685	3.935830	0.0002
LASI(-1)	-0.050481	0.013085	-3.857911	0.0002
EM_POS	-0.001130	0.000836	-1.352002	0.1794
EM_NEG(-1)	0.002610	0.001098	2.377694	0.0194
LREER_POS	0.039302	0.043894	0.895369	0.3728
LREER_NEG(-1)	-0.122187	0.037670	-3.243609	0.0016
LCPI(-1)	0.094055	0.036040	2.609767	0.0105
LM2GDP	-0.096680	0.035835	-2.697882	0.0082
D(LASI(-1))	0.685691	0.065985	10.39162	0.0000
D(EM_NEG)	0.000955	0.000988	0.966763	0.3361
D(LREER_NEG)	0.078479	0.073418	1.068931	0.2878
D(LCPI)	1.045491	0.325863	3.208571	0.0018
D(LCPI(-1))	-0.814527	0.311049	-2.618646	0.0103
Panel B: Long run Result				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EM_POS	-0.747064	0.065355	-11.43066	0.0000
EM_NEG	0.051711	0.023263	2.222456	0.0285
LREER_POS	0.676441	0.320548	2.110264	0.0374
LREER_NEG	-2.420456	0.846026	2.860972	0.0052
LCPI	1.863170	0.740241	2.516978	0.0135
LM2GDP	-1.915166	0.844938	-2.266935	0.0257
C	8.863636	1.661507	5.334696	0.0000
Panel C: Diagnostic Statistics				
ECM_{t-1}	**LM**	**ARCH**	**RESET**	**DW**
-0.06	0.85(0.91)	1.41(0.32)	1.15(0.25)	2.03
CUSUM(CUSUMSQ)	**Bound Test (F)**	**Wald Short run**	**Wald Long run**	
Stable (Stable)	7.14	8.49(0.102)	6.10(0.005)	

Source: Computed from Eviews 10

5.0 Conclusion and Policy Implication

The relationships between exchange rates and stock prices have drawn much attention because they both play significant roles in influencing the development of a country's economy. Based on the Portfolio Balance Theory, the dynamics of short run exchange rate adjustment is driven by developments in the asset market where increases in stock prices encourage the demand for such stocks both from local and foreign investors. Through this mechanism, the demand and supply of domestic currency relative to foreign currencies precipitate depreciation/appreciation of domestic currency which has far reaching impact on exchange rate misalignment. Large and persistent misalignments can have significant negative economic impacts, including an eventual currency crisis (Frankel and Rose, 1996 and Kaminsky and Reinhart, 1999). As such, this paper examine the relationship between exchange rate misalignment and stock market performance in Nigeria using quarterly data for the period 1991-2018. The analysis of exchange rate misalignment is based on the BEER, in calculating the equilibrium path of the REER, the NATREX approach (Natural Equilibrium Exchange Rate) is relied upon.

Exchange rate misalignment affect stock prices of domestic firms. Currency overvaluation precipitates economic crisis through rising cost of imported inputs, hence increasing the cost of domestic production. Rising cost of production has implication on competitiveness of domestic firm, profit margin and eventually the stock prices. Currency undervaluation have opposite

ISSN: 2786-9695
DOI: https://10.57233/gujeds.v3i1.8 Vol. 3(1) July 2023

effect as it stimulate exports and growth if a domestic firm is export oriented, undervaluation will encourage higher sales and profits and thus an increase in its stock price. However, the mechanism through which undervaluation or overvaluation will affect stock prices depends on the forces causing disequilibrium as well as if the firm in question is input-import dependent or is export oriented.

The problem of asymmetric effects of exchange rate changes on stock prices was recently addressed by couple of studies for a limited number of countries. In this paper we consider the relation between stock prices and exchange rates misalignment using an asymmetric framework. For this purpose, we employ a cointegrating nonlinear autoregressive distributed lag (NARDL) model of Shin et al. (2014), where decomposition of regressors are done using the partial sum of positive and negative changes, which allows for short and long run nonlinearities to be tested. To this end, we first use the linear ARDL and bound testing approach of Pesaran et al (2001) to ascertain the previous literature. Subsequently, we use the non-linear ARDL approach attributed to Shin et al. (2014) to assess the symmetric or asymmetric effect of exchange rate misalignment on stock prices. In summary, the result shows that undervaluation has positive impact on stock prices while overvaluation has negative impact. The result also show evidence of short run and long run asymmetry, this implies that the effects of undervaluation will last over much longer period than the effects of overvaluation. The implication of this result is that, in the linear model when exchange rate misalignment affect stock market positively in the short run but has negative and significant coefficient in the long-run, we would not have arrived at the conclusion that exchange rate misalignment affect stock prices differently in terms of overvaluation and undervaluation. These findings have implication for market participants as well as policy makers. In managing the exchange rate, policy makers must be aware of the asymmetric effect of their action on the stock market as they try to devalue domestic currency for the purpose of improving trade balance.

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