Asymmetric Effects of Exchange Rate Misalignment on Trade Balance in Nigeria: Does Marshall-Lerner Condition Hold?

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Abstract

The study examines the asymmetric effects of exchange rate misalignment on trade balance and as well investigates the existence, or non-existence, of the Marshall-Lerner condition in Nigeria between 1981 and 2021. The study uses Chow test, NARDL and Scaled Coefficients approaches. The results show that positive exchange rate misalignment has significant positive effect on trade balance while negative exchange rate misalignment has significant adverse effect on trade balance in both short-run and long-run. These imply that both positive and negative misalignments have the tendency of increasing the trade balance in Nigeria – even though negative exchange rate misalignment has greater impact. The results imply that the domestic currency (naira) has been undervalued during the study period. The Scaled Coefficients result shows that the sum of elasticities of exports and imports is less than 1, implying that devaluation of naira has worsened trade balance. Hence, this study affirms that the Marshall-Lerner condition does not hold in Nigeria. Also, both government expenditure and money supply have significant negative effect on trade balance, implying that both fiscal and monetary policies in Nigeria have encouraged imports ahead of exports. Meanwhile, the Chow test reveals the existence of structural breakpoint in 2015 though the insignificant negative effect of the dummy variable which is used to account for the effect of structural break in the estimated model suggests that the policies put in place regarding trade balance since 2015 have not yielded favourable result. The study recommends that concerted efforts should be made by both government and citizens to resist further devaluation of the naira, even if revaluation is not feasible.

Keywords: Exchange Rate Misalignment, Trade Balance, Export & Import, Marshall-Lerner Condition, Structural Breakpoint

Introduction

Over the years, the developing countries of the world have been advised to devalue their domestic currencies relative to the key currencies in order to boost their exports. The elasticity approach of balance of payment which emphasizes the relative price effects of depreciation posits that depreciation works best when demand elasticities are high. However, the Marshall-Lerner condition states that devaluation of currency will improve trade balance if, and only if, the addition of elasticities of demands for exports and imports is greater than unity (Appleyard & Field Jr, 1986; Mahmud et al., 2004; Olasubomi, 2019; Berbenni, 2021). Most developing countries are exporting primary products whose prices (and for some, volume of production) are determined exogenously. The issue of concern is how devaluation of currency helps in boosting exports in a case where the volume of exports is exogenous to the country devaluing her currency. The correct valuation of exchange rates across the globe is optimum for all nations.

Apparently, most developing countries are frequently advised by the international organizations to devalue their currencies relative to the key currencies without taking cognisance of the elasticities of demands for their exports and imports. The ideal exchange rate is the equilibrium exchange rate (Zarei, 2020). The difference between the actual exchange rate and the equilibrium exchange rate is termed exchange rate misalignment. While exchange rate overvaluation refers to a case where the actual exchange rate is lower than the equilibrium exchange rate, undervaluation of exchange rate occurs when the actual exchange rate is higher than the equilibrium exchange rate (Akosah et al., 2018). Thus, the currency of a country is regarded as overvalued in a

situation where devaluation of the domestic currency is required to enhance trade balance while the currency is regarded as undervalued in a case where revaluation of the domestic currency is required to enhance trade balance (Jehan & Irshad, 2020; Zarei, 2020).

Meanwhile, extant literature has shown that exchange rate misalignment is independent of exchange rate regimes as it has the tendency of occurrence under both fixed and flexible exchange rates, or even any form of combination of the two. Hence, Hyder and Mahboob (2006) and Akosah et al. (2018) ascribe this to intuition based on the ground that the 'market determined exchange rate may deviate considerably from its equilibrium value suggested by the fundamentals in the short-term'. Nigeria, as a mono-economy that is largely dependent on crude oil export whose price is exogenously determined by Organisation of Petroleum Exporting Countries (OPEC), has experienced exchange rate misalignment over the years as a result of structural cum macroeconomic factors. Meanwhile, Edwards (1989) points out that exchange rate misalignment suggests wrong signals to economic agents and this, subsequently leads to greater economic instability. In an attempt to determine the effect of exchange rate misalignment on trade balance, this study investigates whether Nigeria's naira has been overvalued or undervalued over the years and verifies whether Marshall-Lerner condition holds in Nigeria.

Literature Review

In explaining the relationship between exchange rate and trade balance theoretically, literature usually resorts to the use of elasticity approach, absorption approach and monetary approach (Effong et al., 2022). The elasticity approach focuses on the relative price effect of depreciation or devaluation on trade balance. The approach suggests that depreciation operates effectively in stimulating trade balance when demand elasticities are high (Helliwell, 1978). The essence of depreciation or devaluation is to make imports dearer but exports cheaper, thereby reducing imports and increasing exports. These are obtainable in an economy where the productive capacity of the domestic economy is effective and the citizens unduly imports crazy. The approch rests on the Marshall-Lerner condition which states that devaluation improves trade balance if, and only if, the sum of elasticities of exports and imports is greater than 1. Conversely, when the sum of elasticities of exports and imports is less than 1, devaluation of the domestic currency worsens the trade balance. Meanwhile, devaluation does not have any effect on trade balance when the sum of elasticities of exports and imports is exactly equal to 1.

The absorption approach of balance of payment deals with the income effect of depreciation or devaluation. The theory posits that domestic expenditure most reduce relative to income for depreciation to promote payments equilibrium (Miles 1979). The balance of payment is the difference between what a country produces and what it absorbs. There exists surplus balance of payment when income exceeds domestic absorption while there exists deficit balance of payment when income is below the domestic absorption. Hence, devaluation improves balance of payment when increase in income is higher than increas in absorption. Thus, a country is enjoined to increase income or reduce its absorption; or embark on both measures in order to achieve balance of payment equilibrium.

The monetary approach deals with the effect that depreciation has on the purchasing power of money and its subsequent impact on the domestic expenditure. The theory considers balance of payment as a monetary phenomenon (Frankel & Johnson, 2013). The approach maintains that deficit balance of payment arises as a result of unchecked excess money supply while surplus arises from an uncorrected excess demand for money in a country. Some of the empirical studies on the relationship between exchange rate and trade balance are reviewed below.

Jehan and Irshad (2020) use FMOLS technique to explore the effect of real exchange rate misalignment on economic growth in Pakistan. The findings reveal that real exchange rate misalignment has negative effect on economic growth; and that financial development helps in mitigating the negative effect. Bosupeng et al. (2019)

examine the effect of exchange rate misalignment on capital flight in Botswana. Using the ARDL technique, the results reveal that, in the long-run, when currency is overvalued, the volume of capital flight through trade mis-invoicing declines, and vice-versa.
Ilyas et al. (2021) investigate the shocks effects of inflation (INF), money supply (MS), and exchange rate (EXR) on the economies of the West African Monetary Zone (WAMZ). The study uses the Asymmetric Structural Vector Autoregressive (ASVAR) model and the results portray that, in all the countries, the shocks effects of the variables are asymmetric except in Guinea and INF in Liberia. Ilyas et al. (2021) further reveal that, for Gambia and Nigeria, only MS is impacting the economies, while for Ghana, Guinea, and Liberia, none of the variables is impacting the economies but for Serra Leone, MS and EXR are impacting its economy.

Ikechi and Anthony (2020) investigate the impact of exchange rate volatilities on international trade in Nigeria. The study uses VAR model and the results indicate an inverse relationship among export, import and real exchange rate in current periods. Variance decomposition analysis suggests that the shocks partially explain fluctuations in real exchange rate, as well as exports and imports. The Impulse response analysis indicates a negative association between export and real effective exchange rate while it was majorly positive for imports throughout the ten periods.

Nakorji et al. (2021) examine the purchasing power parity (PPP) approach to the determination of exchange rate misalignment in Nigeria by using two variants of the PPP: the absolute PPP (aPPP) and the relative PPP (rPPP). The results show that the aPPP approach to exchange rate determination is unrealistic but the exchange rate computed with the rPPP approach shows that the interbank exchange rates are overvalued in most of the period of the study.

Akram and Rath (2017) examine the impact of exchange rate misalignment on economic growth in India using the ARDL and variance decomposition techniques. The results depict an overvaluation of the exchange rate till 2000, and thereafter, an undervaluation of the exchange rate prevails. Akram & Rath (2017) also indicate a positive misalignment hurts the economic growth while a negative misalignment promotes the economic growth. Akram and Rath (2018) examine the impact of exchange rate misalignment on total factor productivity growth in 15 emerging market economies and the DOLS results indicate that real exchange rate misalignment has negatively affected the TFP growth in the majority of the countries within the EMEs and the group as a whole.

Mazorodze and Tewari (2018) explore the link between real exchange rate undervaluation and sectoral growth in South Africa. The study employs a panel generalised method of moments and finds a significant positive impact of undervaluation on sectoral growth which increases with capital accumulation. The study, however, notes that undervaluation promotes sectoral growth up to a point, beyond which increases in undervaluation retards growth. Zarei (2020) examines whether exchange rate misalignment and inflation are significant indicators of changes in the petrochemical stock index in Iran through the use of dynamic non-linear autoregressive distributed lag (DNARDL) model. The results show the existence of asymmetric and significant relationships between the variables, and that the longer the period of exchange rate undervaluation, the cheaper the export of Iranian petrochemical products.

Effiong et al. (2022) examine the effect of trade balance and exchange rate movement on economic growth in Nigeria by using the autoregressive distributed lag approach. The results show that total trade has significant positive effect on economic growth while the exchange rate exerts a significant negative effect. Also, both oil trade balance and non-oil trade balance exert a significant negative effect on economic growth. Mesagan et al. (2022) analyse the impact of exchange rate asymmetries on trade and output growth in 8 of the largest African countries using the non-linear autoregressive distributed lag (NARDL) technique. The result reveals that both appreciation and depreciation primarily exert negative impacts on the long-run trade balance; depreciation

positively impacts short-run growth, while currency appreciation remains largely negative.

Umoru and Odjegba (2013) analyse the relationship between exchange rate misalignment and balance of payments (BOP) mal-adjustment in Nigeria using the vector error correction technique. The results show that exchange rate misalignment exhibits a positive impact on the balance of payments position. In addition, the Granger pair-wise causality test indicates a unidirectional causality running from exchange rate misalignment to balance of payments adjustment in the country. Orok et al. (2022) examine the effect of export-import misalignment on gross fixed capital formation in Nigeria. The study utilizes OLS and the result indicates that export-import misalignment has a negative but insignificant impact on gross fixed capital formation.

Ali et al. (2015) investigate the impacts of naira real exchange rate misalignment (RERMIS) on Nigeria's economic growth by using ECM. The study finds a negative impact of RERMIS on economic growth; and that the naira is on the average overvalued by 0.17%. Sulaimon et al. (2017) investigate the impact of devaluation of naira on Nigerian trade balance by using VECM. The result shows that there is a long-run negative relationship between trade balance and real exchange rate in the country. The study ascribes that to portray the evidence that the Marshal-Lerner condition holds in Nigeria. Nwanosike et al. (2017) adopt regression model to ascertain the effect of devaluation of the domestic currency on balance of payment with the aim of testing the existence, or otherwise, of the Marshall-Learn condition in Nigeria. The result reveals that a unit devaluation of exchange rate, on the average, results to 2.28% decrease in balance of payment. Hence, the study concludes that the Marshall-Lerner condition is not satisfied in the short-run in Nigeria.

Sharif and Ali (2016) focus on the determinants of trade balance in Somalia by using OLS. The result reveals that foreign direct investment has negative impact on trade balance while exchange rate and inflation rate do not have significant impact on trade balance in the country. Sugema (2005) investigates the effects of real exchange rate depreciation and supply side shocks on exports and imports in Indonesia. The result shows that trade balance improves as a result of devaluation through an increase in exports and a collapse in imports.

Methodology

Model Specification

In order to determine the effect of exchange rate misalignment on trade balance, this study adapts the models of the studies by Sharif and Ali (2016) and Effiong et al. (2022) and hence, specifies the model as in Equation (1).

$$TB_t = f(EXRM_t, RGDP_t, GFCF_t, INFR_t, INTR_t, GOVE_t, MS_t) \quad (1)$$

Where TB_t denotes trade balance at time t, $EXRM_t$ denotes exchange rate misalignment at time t, $RGDP_t$ denotes Nigeria's real gross domestic product at time t, $GFCF_t$ denotes gross fixed capital formation at time t, $INFR_t$ denotes inflation rate at time t, $INTR_t$ denotes interest rate at time t, $GOVE_t$ denotes government expenditure at time t, MS_t denotes money supply at time t. While $EXRM_t$ is the main exogenous variable, all other exogenous variables in the model are used as control variables. Taking the logarithmic form of Equation (1) and expressing it in econometric form, it yields Equation (2).

$$lnTB_t = \alpha_0 + \alpha_1 lnEXRM_t + \alpha_2 lnRGDP_t + \alpha_3 lnGFCF_t + \alpha_4 lnINFR_t + \alpha_5 lnINTR_t + \alpha_6 lnGOVE_t + \alpha_7 lnMS_t + \mu_t \quad (2)$$

Where all variables are as earlier stated, μ_t is the stochastic term and α_i (i = 0, 1, 2, …, 7) are parameters to be estimated. In order to account for the asymmetric effects of exchange rate misalignment on trade balance, Equation (2) is re-specified as Equation (3).

$$lnTB_t = \alpha_0 + \alpha_1 lnEXRM_t^+ + \alpha_2 lnEXRM_t^- + \alpha_3 lnRGDP_t + \alpha_4 lnGFCF_t + \alpha_5 lnINFR_t + \alpha_6 lnINTR_t + \alpha_7 lnGOVE_t + \alpha_8 lnMS_t + \mu_t \quad (3)$$

Where $lnEXRM_t^+$ and $lnEXRM_t^-$ represent positive and negative exchange rate misalignments respectively. In

order to cater for the effect of structural break that occur during the study period, this study introduces a dummy variable (DUM) which takes value 0 in periods before the break and 1 from the period of the break. Hence, Equation (3) is re-specified as Equation (4).

$$lnTB_t = \alpha_0 + \alpha_1 lnEXRM_t^+ + \alpha_2 lnEXRM_t^- + \alpha_3 lnRGDP_t + \alpha_4 lnGFCF_t + \alpha_5 lnINFR_t + \alpha_6 lnINTR_t + \alpha_7 lnGOVE_t + \alpha_8 lnMS_t + \alpha_9 DUM_t + \mu_t \quad (4)$$

The Non-linear Autoregressive Distributed Lag (NARDL)model form of Equation (4) is specified in Equation (5).

$$\Delta \ln TB_t = \beta_0 + \sum_{i=1}^{p} \tau_i \Delta \ln TB_{t-i} + \sum_{i=0}^{q_1} \delta_i \Delta \ln EXRM^{+}_{t-i} + \sum_{i=0}^{q_2} \theta_i \Delta \ln EXRM^{-}_{t-i} + \sum_{i=0}^{q_3} \lambda_i \Delta OEV_{t-i} + \beta_1 \ln TB_{t-1} + \beta_2 \ln EXRM^{+}_{t-1} + \beta_3 \ln EXRM^{-}_{t-1} + \beta_4 OEV_{t-1} + \upsilon_t \quad (5)$$

Where Δ is the differenced operator, $\beta_i, \tau_i, \delta_i$ and λ_i are parameters to be estimated, p is the number of lags of the dependent variable and q_i is the number of lags of the explanatory variables. Also, OEV represents other exogenous variables in the model apart from positive and negative exchange rate misalignments.

In an attempt to verify the existence, or otherwise, of the Marshall-Lerner condition in Nigeria, this study adapts the model by Sulaimon et al. (2017) by specifying export's and import's models as in Equations (6 and 7).

$$EXP_t = f\big((EXR_t, FRGDP_t, LFPR_t, GOVE_t, MS_t)\big) \quad (6)$$

$$IMP_t = f\big((EXR_t, RGDP_t, LFPR_t, GOVE_t, MS_t)\big) \quad (7)$$

Where EXP_t denotes export at time t, IMP_t denotes import at time t, EXR_t denotes exchange rate at time t, $RGDP_t$ denotes Nigeria's real GDP at time t, $FRGDP_t$ denotes Foreign real GDP at time t which is represented by the U. S. real GDP, $LFPR_t$ denotes labour force participation rate at time t, $GOVE_t$ denotes government expenditure at time t, MS_t denotes money supply at time t. While EXR_t is the main exogenous variable, all other exogenous variables in the model are used as control variables. Taking the logarithmic form of Equations (6 and 7) and expressing them in econometric form, the models become Equations (8 and 9).

$$lnEXP_t = \alpha_0 + \alpha_1 lnEXR_t + \alpha_2 lnFRGDP_t + \alpha_3 lnLFPR_t + \alpha_4 lnGOVE_t + \alpha_5 lnMS_t + \mu_t \quad (8)$$

$$lnIMP_t = \alpha_0 + \alpha_1 lnEXR_t + \alpha_2 lnRGDP_t + \alpha_3 lnLFPR_t + \alpha_4 lnGOVE_t + \alpha_5 lnMS_t + \mu_t \quad (9)$$

Where all variables are as earlier defined, μ_t is the error term and α_i (i = 0, 1, 2, …, 5) are parameters to be estimated.

Estimation Techniques

In order to test for the possibility of structural breaks in the specified models, this study uses Chow test. Having confirmed the existence of structural break in models in 2015, the study introduces a dummy variable to account for its effect in the estimated models. In an attempt to examine the asymmetric effects of exchange rate misalignment on trade balance, the study uses NARDL technique. In addition, to verify the existence or non-existence of Marshall-Lerner condition in Nigeria, the study utilises Scaled Coefficients obtained from the ARDL estimated results of the specified model. The Scaled Coefficients results vividly contain the elasticities of the various exogenous variables in the estimated model. This technique is considered to be more reliable than reliance on mere coefficients as elasticities.

Description and Measurement of Variables

Available on request

Scope and Sources of Data

The study covers the period between 1981 and 2021. This is because of the inadequacy and unavailability of data for the previous and the current years. The study period is, however, adjudged to be adequate for the attainment of the objectives of the study. The study makes use of the secondary data. The data are almost

sourced from the World Development Indicators (WDI) with the exception of labour force participation rate and money supply which are respectively sourced from the International Labour Organisation (ILO) data base and the Central Bank of Nigeria (CBN) Statistical Bulletin.

Results and Discussion

Derivation of Exchange Rate Misalignment

In an attempt to derive exchange rate misalignment, this study takes after Hodrick and Prescott (1997) by using the Hodrick-Prescott filter technique to obtain the trend and the cyclical components of exchange rate. Figure 1 captures the graph of actual, trend and cyclical components of exchange rate. It is the cyclical component that denotes exchange rate misalignment.

Figure 1 is available on request

Structural Break Test and Chow Breakpoint Test

Considering the possibility of structural breakpoints in the model of the study as a result of the various events that took place during the study period, the study subjects the estimated model to stability diagnostic test by carrying out CUSUM of squares test. As contained in Figure 2, the CUSUM of squares test suggests breakpoint in 2015 as the fitted line is outside the 5% critical bound. There is instability from 2015 and structural break might be an issue there. The period of sharp deviation from the 5% level of significance coincides with the year that political power in Nigeria changes from Peoples Democratic Part (PDP) to All Progressive Congress (APC). In order to validate the authenticity of the existence of structural break at the indicated period, the study embarks on Chow breakpoint test. The F-statistic result in Table 1 is significant at the 5% level and, thus, suggests that there is, indeed, structural break in the model in 2015.

Figure 2 and Table 1 are available on request

Breakpoint Unit Root Test

Having established in the literature that most time series data are not stationary at level, it is required that time series data are subjected to stationarity test before estimating the model. However, the result of the standard unit test (Augmented Dickey-Fuller or Phillips-Perron) may be misleading whenever the data series contain breakpoints. Hence, this study jettisons the use of the standard unit root test by resorting to the use of breakpoint unit root test. The breakpoint unit root result in Table 2 suggests that exchange rate misalignment (EXRM), inflation rate (INFR), government expenditure (GOVE), and labour force participation rate (LFPR) are stationary at level and, thus, integrated of order zero, that is, I(0). However, trade balance (TB), exchange rate (EXR), real GDP (RGDP), foreign real GDP (FRGDP), gross fixed capital formation (GFCF), interest rate (INTR), money supply (MS), exports (EXP), and imports (IMP) are not stationary at level but they all become stationary after first difference and thus, stationary at order one, that is, I(1). Since ARDL and NARDL techniques are suitable to handle the combination of I(0) and I(1) variables, the techniques are utilised for the estimated models.

Table 2 is available on request

Stability Diagnostic after Introducing Dummy Variable into the NARDL Estimated Model

One simple means of estimating a model with the presence of structural breakpoint is by incorporating a dummy variable into the model. In this study, the dummy variable (DUM) takes 0 from 1981 to 2014, being the period without break; while it takes 1 from 2015 to 2021, being the period with break. The result of the CUSUM of squares test reported in Figure 3 shows that the fitted line stays within the 5% significant level boundary and, indicates that the model is stable.

Figure 3 is available on request

NARDL Bounds Test

The result of the NARDL Bounds Test in Table 3 indicates that the computed F-statistic (12.18) is higher than the upper bound of the Critical Value Bound even at 1% level of significance (3.68). Hence, the null hypothesis

of no long-run relationship among the variables in the model is rejected, concluding that there is co-integration among the variables. With the confirmation of the existence of long-run relationship between the dependent variable (*LNTB*) and the regressors (*LNEXRM*, *LNRGDP*, *LNGFCF*, *LNINFR*, *LNINTR*, *LNGOVE*, *LNMS*), this study uses the NARDL to determine the asymmetric effects of exchange rate misalignment on trade balance. Based on the Akaike Information Criterion, the selected model is a NARDL(2, 2, 2, 2, 1, 1, 2, 2, 1, 2) specification, implying that all the variables are dynamic regressors since they have lagged terms in the model and, hence, there is no static or fixed regressor in the model.
Table 3 and Figure 4 are available on request

Non-Linear Autoregressive Distributed Lagged Model (NARDL)
In order to determine the effect of exchange rate misalignment on trade balance in Nigeria, this study utilises the NARDL technique. The short-run and the long-run results are reported in Table 4 and Table 5 respectively. The short-run result in Table 4 shows that positive exchange rate misalignment ($LNEXRM^{+}$) has significant positive effect on trade balance (LNTB) in both current period and the first lagged period in Nigeria. Specifically, 1% increase in exchange rate misalignment leads to corresponding 1.01% and 1.17% increase in trade balance in the current and the first lagged periods respectively ($t = 9.64, \rho < 0.01;\ t = 10.32, \rho < 0.01$). However, negative exchange rate misalignment ($LNEXRM^{-}$) has significant adverse effect on trade balance at the 5% level of significance. Specifically, 1% decrease in exchange rate misalignment leads to about 4.83% and -093% increase in trade balance in the current and the first lagged periods respectively ($t = -10.46, \rho < 0.01;\ t = -2.74, \rho < 0.05$). The long-run result in Table 5 is similar to that of the short-run in Table 4. The result reveals that 1% increase in exchange rate misalignment leads to about 0.50% increase in trade balance while 1% decrease in exchange rate misalignment leads to about 1.57% increase in trade balance in the long-run ($t = 2.49, \rho < 0.05;\ t = -1.57, \rho < 0.01$).

Thus, both positive exchange rate misalignment and negative exchange rate misalignment have the tendency of increasing the trade balance in Nigeria – even though negative exchange rate misalignment exerts greater impact than positive exchange rate misalignment in both short-run and long-run. The results imply that the domestic currency (naira) has been undervalued during the scope of the study. The result of this study is consistent with the finding of the study by Umoru and Odjegba (2013) that exchange rate misalignment exhibits a positive impact on the balance of payment in Nigeria. On the basis of the fact that negative misalignment has higher impact than positive misalignment on trade balance, the finding of this study is partially in tandem with the finding of the study by Akram and Rath (2017) which indicates that a positive misalignment hurts the economic growth while a negative misalignment promotes economic growth in Indian economy. The finding of this study is, however, at variant with the findings of the studies by Ali et al. (2015), Jehan and Irshad (2020) which portray negative relationship between exchange rate misalignment and economic growth in Nigeria and Pakistan respectively. The result is as well inconsistent with that of Mesagan et al. (2022) that both appreciation and depreciation exert negative impacts on the long-run trade balance in most African countries.

Table 4: NARDL Error Correction Regression
Dependent Variable: D(LNTB)
Selected Model: NARDL(2, 2, 2, 2, 1, 1, 2, 2, 1, 2)

ECM Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNTB(-1))	-0.221	0.066	-3.369	0.0063
D(LNEXRM_POS)	1.013	0.105	9.640	0.0000
D(LNEXRM_POS(-1))	1.169	0.113	10.315	0.0000
D(LNEXRM_NEG)	-4.825	0.461	-10.461	0.0000

D(LNEXRM_NEG(-1))	-0.931	0.340	-2.735	0.0194
D(LNRGDP)	-6.896	0.697	-9.895	0.0000
D(LNRGDP(-1))	-3.255	0.748	-4.350	0.0012
D(LNGFCF)	-3.450	0.279	-12.350	0.0000
D(LNINFR)	0.003	0.032	0.0993	0.9227
D(LNINTR)	0.202	0.151	1.335	0.2089
D(LNINTR(-1))	-0.305	0.152	-2.013	0.0693
D(LNGOVE)	-0.375	0.076	-4.957	0.0004
D(LNGOVE(-1))	-0.677	0.072	-9.451	0.0000
D(LNMS)	-0.949	0.156	-6.083	0.0001
D(DUM)	0.055	0.110	0.504	0.6245
D(DUM(-1))	-0.202	0.117	-1.723	0.1128
CointEq(-1)*	-1.260	0.079	-15.993	0.0000

Table 5: NARDL Long Run Form
Dependent Variable: D(LNTB)

Levels Equation				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNEXRM_POS	0.500	0.201	2.488	0.0301
LNEXRM_NEG	-1.573	0.435	-3.61	0.0041
LNRGDP	5.363	0.682	7.862	0.0000
LNGFCF	-3.769	0.487	-7.740	0.0000
LNINFR	0.140	0.097	1.448	0.1755
LNINTR	0.353	0.259	1.362	0.2003
LNGOVE	0.041	0.110	0.378	0.7127
LNMS	-1.452	0.229	-6.337	0.0001
DUM	-0.129	0.172	-0.748	0.4702
C	-38.824	13.870	-2.799	0.0173

The result in Table 4 further reveals that real gross domestic product (*LNRGDP*) which is used as a proxy for economic growth has significant negative effect on trade balance in the short-run while Table 5 reveals it has significant positive effect on trade balance in the long-run ($\beta = -6.90, t = -9.90, \rho < 0.01$; $\beta = 5.36, t = 5.36, \rho < 0.01$). Also, gross fixed capital formation (*LNGFCF*) has significant negative effect on trade balance in both short-run and long-run ($\beta = -3.45, t = -12.35, \rho < 0.01$; $\beta = -3.77, t = -7.74, \rho < 0.01$). The results further show that both inflation rate (*LNINFR*) and interest rate (*LNINTR*) do not have significant impact on trade balance in both short-run and long-run ($\beta = 0.003, t = 0.099, \rho > 0.05$; $\beta = 0.14, t = 1.45, \rho > 0.05$; $\beta = 0.20, t = 1.34, \rho > 0.05$; $\beta = 0.35, t = 1.36, \rho > 0.05$). This result is line with the findings of the studies by Sharif and Ali (2016) and Ilyas et al. (2021) which reveal that inflation rate does not have significant impact on trade balance and economic activities.

Also, while government expenditure (*LNGOVE*) has significant negative effect on trade balance in the short-run, it has positive but insignificant effect in the long-run ($\beta = -0.38, t = -4.96, \rho < 0.01$; $\beta = 0.04, t = 0.38, \rho > 0.05$). In addition, money supply (*LNMS*) has significant negative effect on trade balance in both short-run and long-run run ($\beta = -0.95, t = -6.08, \rho < 0.01$; $\beta = -1.45, t = -6.34, \rho < 0.01$). This result is line with the finding of Ilyas et al. (2021) that money supply is impacting economic activities in WAMZ. The adverse effect of government expenditure and money supply on trade balance implies that both fiscal and

monetary policies in Nigeria have encouraged imports ahead of exports. Meanwhile, the dummy variable (*DUM*) has insignificant positive effect on trade balance in the current period while it has insignificant negative effect on trade balance in both first lagged period and the long-run ($\beta = 0.06, t = 0.05, \rho > 0.05; \beta = -0.20, t = -1.72, \rho > 0.05;\ \beta = -0.13, t = -0.75, \rho > 0.05$). The insignificant negative effect of the dummy variable which is used to account for the effect of structural break in the estimated model suggests that the policies put in place regarding trade balance since 2015 when Nigeria switched political power from PDP to APC have not yielded favourable result.

It is worthy of note that the result in Table 4 portrays a well-defined error correction term as the cointegrating term displays a negative sign as expected. This further confirms the earlier assertion that all the variables in the model are actually cointegrated. Also, the error correction term is observed to be statistically significant at 1% level of significance ($t = -15.99, \rho < 0.01$) with the coefficient of -1.26 which indicates that if there is any distortion in the economy in the short-run, the economy would adjust back to its equilibrium level by about 1.3% of the previous year's disequilibrium. The diagnostic tests results in the Appendix are as well satisfactory. Specifically, the Histogram-Normality Test reveals Kurtosis value of approximately 3.01 and Jarque-Bera statistic value of 0.197 with probability value that is statistically insignificant. The result suggests that the data normally distributed. The Breusch-Godfrey Serial Correlation LM Test shows that the selected model is devoid of serial correlation ($F = 3.38, \rho > 0.05$) and ($* R^2 = 26.29, \rho > 0.05$). This implies that the errors in the selected model are serially independent, and thus, the parameter estimates are consistent. Similarly, the Heteroskedasticity Test by Breusch-Pagan-Godfrey shows that the selected model does not suffer from heteroskedasticity ($F = 1.37, \rho > 0.05$) and ($* R^2 = 29.04, \rho > 0.05$). Still from the results in the Appendix, the probability values of the Correlogram Squared Residual statistic strongly suggest no evidence of autocorrelation in the model's residuals.

Verification of the Existence of Marshall-Lerner Condition in Nigeria

Extant studies that verify the existence of Marshall-Lerner condition either estimate trade balance model with exchange rate as the main exogenous variable (Nwanosike et al., 2017) or estimate export and import models with exchange rate as the main exogenous variable (Sulaiman et al., 2017). The studies base their conclusions on the mere coefficients of exchange rate in the respective models. However, mere reliance on the coefficient of a variable as its elasticity may be misleading. Since the findings of these extant studies are conflicting, this study does not just adapt both models but also uses Scaled Coefficients which explicitly provide the elasticities of variables. The Scaled Coefficients result is obtained from the ARDL estimated result. From the Scaled Coefficients results in Table 6 (export's model) and Table 7 (import's model), the elasticity of export is (-0.016) while the elasticity of import is (-0.078).

For the devaluation or depreciation of domestic currency to trade balance, the Marshall-Lerner condition requires that the addition of elasticity of export and elasticity of import should be greater than 1 in absolute term. From the results here, the sum of the two elasticities is 0.094 in absolute term. Since the sum of the elasticities is less than 1, as it is even very close to 0, implying that devaluation of naira has worsened trade balance. Hence, this study affirms that the Marshall-Lerner condition does not hold in Nigeria. A result of this nature is not surprising in the country as the productive activities that would have given room for improved exports while limiting imports in response to naira devaluation is deficient. This result supports the finding of the study by Nwanosike et al. (2017) which concludes that the Marshall-Lerner condition is not satisfied in Nigeria while it is at variant with that of Sulaiman et al. (2017) which claims that the condition holds in the country.

Table 6 and Table 7 are available on request

Conclusion and Recommendations

The study examines the asymmetric effects of exchange rate misalignment on trade balance and as well investigates the existence, or otherwise, of the Marshall-Lerner condition in Nigeria. The study uses Chow test,

NARDL and Scaled Coefficients approaches to achieve the objectives of the study. The study concludes that both positive and negative exchange rate misalignments have the tendency of increasing trade balance in Nigeria – even though negative misalignment has greater impact. The greater impact of negative misalignment portrays that the Nigerian naira has been undervalued over the years. Furthermore, the study concludes that the Marshall-Lerner condition does not hold in Nigeria. Also, the study concludes that fiscal and monetary policies have not been properly coordinated to propel the export base of the country and subsequently curb inordinate imports.

Based on the findings of this study, the study recommends that concerted efforts should be made by both government and citizens to resist further devaluation of the naira, even if revaluation is not feasible. This may be achieved by ensuring steady productive base of the country by all stakeholders. Public office holders and the entire citizens should avoid excessive desires for foreign goods and services. The government should put in place effective quality control measures for locally produced goods and services as these would serve as both imports' substitutes and exports' promotion channels. The triparty of economic policies (fiscal, monetary and trade policies) should be well coordinated to simultaneously attain internal and external balances in the economy.

References

Akosah, N. K., MIreku, P. B., & Owusu-AfrIyIe, E. (2018). Real exchange rate misalignment and macroeconomic implications: Recent evidence from Ghana. *African Review of Economics and Finance*, *10*(1), 2042-1478

Akram, V., & Rath, B. N. (2017). Exchange rate misalignment and economic growth in India. *Journal of Financial Economic Policy*, *9*(4), 414–434. https://doi.org/10.1108/JFEP-12-2016-0093

Akram, V., & Rath, B. N. (2018). Exchange rate misalignment and total factor productivity growth in case of emerging market economies. *International Economics and Economic Policy*, *15*(3), 547–564. https://doi.org/10.1007/s10368-017-0374-6

Ali, A. I., Ajibola, I. O., Omotosho, B. S., Adetoba, O. O., & Adeleke, A. O. (2015). Real exchange rate misalignment and economic growth in Nigeria. *CBN Journal of Applied Statistics*, *6*(2), 103-131.

Appleyard, D. R., & Field Jr, A. J. (1986). A note on teaching the Marshall-Lerner condition. *The Journal of Economic Education*, *17*(1), 52-56.

Berbenni, E. (2021). External devaluation and trade balance in 1930s Italy. *Structural Change and Economic Dynamics*, *57*, 93-107.

Bosupeng, M., Dzator, J., & Nadolny, A. (2019). Exchange Rate Misalignment and Capital Flight from Botswana: A Cointegration Approach with Risk Thresholds. *Journal of Risk and Financial Management*, *12*(2), 101. https://doi.org/10.3390/jrfm12020101

Edwards, S. (1989). Exchange rate misalignment in developing countries. *The World Bank Research Observer*, *4*(1), 3-21.

Effiong, U. E., Udonwa, U. E., & Udofia, M. A. (2022). Trade Balance, Exchange Rate Movements and Economic Growth in Nigeria: A Disaggregated Approach. *Scientific notes of Lviv University of Business and Law*, *32*, 107-127.

Frenkel, J., & Johnson, H. (2013). *The monetary approach to the balance of payments*. Routledge.

Helliwell, J. F. (1978). The balance of payments: a survey of Harry Johnson's contributions. *Canadian Journal of Economics*, S55-S86.

Hodrick, R. J., & Prescott, E. C. (1997). Postwar US business cycles: An empirical investigation. *Journal of Money, Credit and Banking*, *24*, 1-16.

Hyder, Z., & Mahboob, A. (2006). Equilibrium real effective exchange rate and exchange rate misalignment in Pakistan. *SBP Research Bulletin*, *2*(1).

Ikechi, K. S., & Anthony, N. (2020). Exchange Rate Volatility and International Trade-in. *The International Journal of Management Science and Business Administration*, *6*(5), 56–72. https://doi.org/10.18775/ijmsba.1849-5664-5419.2014.65.1007

Ilyas, M., Song, L., Galadima, M. D., Hussain, M. N., & Sattar, A. (2021). Shocks effects of inflation, money supply, and exchange rate on the West African Monetary Zone (WAMZ): Asymmetric SVAR modelling. In *Journal of International Trade and Economic Development*. https://doi.org/10.1080/09638199.2021.1965191

Jehan, Z., & Irshad, I. (2020). Exchange rate misalignment and economic growth in Pakistan: The role of financial development. *Pakistan Development Review*, *59*(1), 81–99. https://doi.org/10.30541/V59I1PP.81-99

Mahmud, S. F., Ullah, A., & Yucel, E. M. (2004). Testing Marshall-Lerner condition: a non-parametric approach. *Applied Economics Letters*, *11*(4), 231-236.

Mazorodze, B. T., & Tewari, D. D. (2018). Real exchange rate undervaluation and sectoral growth in South Africa. *African Journal of Economic and Management Studies*, *9*(4), 462–476. https://doi.org/10.1108/AJEMS-06-2017-0132

Mesagan, E. P., Alimi, O. Y., & Vo, X. V. (2022). The asymmetric effects of exchange rate on trade balance and output growth. *The Journal of Economic Asymmetries*, *26*, e00272.

Miles, M. A. (1979). The effects of devaluation on the trade balance and the balance of payments: some new results. *Journal of Political economy*, *87*(3), 600-620.

Nakorji, M., Agboegbulem, N. T. I., Gaiya, B. A., & Atoi, N. V. (2021). Purchasing Power Parity Approach to Exchange Rate Misalignment in Nigeria. *Central Bank of Nigeria Journal of Applied Statistics*, *12*(No. 1), 45–75. https://doi.org/10.33429/cjas.12121.3/6

Nwanosike, D. U., Uzoechina, B., Ebenyi, G. O., & Ishiwu, V. (2017). Analysis of balance of payments trend in Nigeria: A test of Marshall-Lerner hypothesis. *Saudi Journal of Business and Management Studies*, *2*(5), 468-475.

Olasubomi, A. L. (2019). Currency devaluation and trade balance nexus: A test of Marshall-Lerner condition in Nigeria. *BizEcons Quarterly*, *4*, 23-43.

Orok, A., John, J., Okon, E., & Udoka, C. (2022). Export-Import Misalignment and Gross Fixed Capital Formation in Nigeria. *Frontiers in Management Science*, *1*(3), 1-12.

Sharif, M. N., & Ali, A. Y. S. (2016). Determinants of trade balance in Somalia: Regression analysis using time series data. *Journal of economics and sustainable development*, *7*(12), 62-71.

Sugema, I. (2005). *The determinants of trade balance and adjustment to the crisis in Indonesia*. Adelaide: Centre for International Economic Studies, University of Adelaide.

Sulaimon, O. B., Omotunde, O., & Haorayah, B. B. (2017). Devaluation and Trade Balance in Nigeria: A Test of Marshall Lerner Condition. *European Journal of Business and Management*, *9*(4), 78-93.

Umoru, D., & Odjegba, O. P. (2013). Exchange rate misalignment and balance of payment adjustment in Nigeria. *European scientific journal*, *9*(13).

Zarei, S. (2020). Analyzing the Asymmetric Effects of Inflation and Exchange Rate Misalignments on Petrochemical Stock Index: The Case of Iran. *International Journal of Economics, Management and Accounting*, *28*(2), 457-482.

Appendix (The Appendix is available on request)

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