Exchange Rate Pass-Through and Inflation on Unemployment in Nigeria

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ABSTRACT

This study investigates the dynamic relationship between exchange rate fluctuations, inflation, and unemployment in Nigeria from 1986 to 2022. The study used annual data obtained from the Central Bank of Nigeria data bank and the World Bank Development Indicator. The analysis employed Nonlinear ARDL models and Structural Vector Auto-Regression (SVAR) techniques with E-views version 10. Comprehensive diagnostic tests confirmed the adequacy of the chosen model. The estimations from both SVAR and ARDL reveal significant effects of exchange rate fluctuations on unemployment in Nigeria. Furthermore, our results demonstrate that inflation exerts a substantial influence on unemployment in Nigeria, both in the short run and long run. Additionally, the SVAR framework highlights a significant impact of exchange rate movements on inflation in Nigeria. The findings collectively support the applicability of the Phillips Curve hypothesis in the Nigerian context. The findings have implications for the timing of current account adjustments and the choice of exchange rate policies. It proposes the development of a threshold model by the CBN that captures not only the direction but also the magnitude of changes in the real exchange rate. Therefore, policymakers, including the Central Bank of Nigeria, should tailor monetary policies to address rising unemployment rates stemming from real exchange rate fluctuations. Furthermore, policymakers should expedite structural reforms aimed at economic diversification.

Keywords: Exchange rate pass-through, Phillip's curve, Structural VAR, Nonlinear ARDL, Inflation, unemployment

JEL Classification: C22, C24, E12, E24, E31, E52

INTRODUCTION

There is no doubt that exchange rates, inflation, and unemployment are key pointers to the health of any economy (Olanrewaju, 2019). Changes in exchange rates usually have a pass-through to inflation as there is a simultaneous change in the price at which goods and services are traded. This has certain implications for an economy and is worsened if it is an import-dependent nation, as higher domestic prices increase preference for imported goods, which increases demand for the international currency for purchases and lowers demand for domestic goods, hence causing layoff off workers and increased unemployment (Ani, Joel, and Baajon, 2019). Thus, a country having simultaneous high unemployment and inflation rates (stagflation) usually has the inclination of exchange rate issues, particularly if it is a highly import-consuming nation.

Currently, in Nigeria, there is a growing interest in the relationship between the real exchange rate, unemployment and economic growth (Anin et al., 2019). The reason is not far-fetched, as the country currently grapples with rising levels of unemployment, domestic prices and exchange rate pressures. A high level of unemployment in any country will harm the country's economy, where unemployment can be a burden in itself for the government, family and the environment. The problems due to unemployment are obvious, as the country has a young population, otherwise known as the Youth. Similarly, inflation at higher levels is inimical to growth as the purchasing power of money is drastically reduced and would also continue to be a burden for policymakers, as it causes uncertainties and distorts economic planning.

Looking at it from another perspective, exchange rate volatility causes widespread changes in the economy of the country. Though exchange rate volatility is needed for stability in macroeconomics in the long run, instability of the exchange rate is known to have negative effects on an economy in the short run and should be studied more carefully and closely, as these fluctuations can lead to risk-averse investors that have less investment, and consequently a reduction in the employment rate (Anin et al., 2019).

Theoretically, the Philip curve hypothesis suggests an inverse relationship or trade-off between inflation and unemployment. There are arguments that the trade-off curve between two variables exists in the short run and that in the long run, the Philip curve becomes vertical, indicating that the trade-off does not exist (Phelps, 1967; Friedman, 1968; Lucas and Rapping, 1969). Another argument is that a trade-off between inflation and unemployment exists in the long run because money supply and productivity growth lead to a decrease in unemployment, while supply shock like oil prices leads to an increase in unemployment, and that increase in productivity growth causes a decrease in inflation as well as a fall in unemployment (Tang and Lean, 2009; Karanassou & Sala, 2010, Olanrewaju, 2019).

The relationship between exchange rate and unemployment is controversial. Literature establishes that changes in real exchange rates have a tendency to impact the reallocation of resources between sectors of the economy, as they reflect changes in relative prices of domestic and foreign goods, which influence employment in an economy. Trade theory suggests that a depreciation of the real exchange rate increases the competitiveness of the country's exports, and hence, the demand for labour increases. On the other hand, a depreciation of the real exchange rate increases the cost of intermediate inputs, which might offset the first effect, which affects the production level adversely and tends to reduce the competitiveness of the country's export and, hence, demand for labour decreases (Demir, 2010; Feldmann, 2011).

Some other studies have also been done on the linkage between exchange rate, inflation and unemployment. The majority of the studies centred on exchange rate pass-through to inflation [see Olamide et al. (2021), Hoa and Idir (2020), Colicev et al. (2019)], to mention a few recent studies. Also, there are studies that analyse the exchange rate pass-through unemployment [see Usman and Elsalih (2021), Mahendra and Parulian (2021), Semosa, Kanayo (2021), Akiri et al. (2020)], to mention some literature. In terms of case studies, studies such as Akiri et al. (2020), Olanrewaju (2019), and Anin et al. (2019) are among recent studies that examined exchange rate pass-through to unemployment in Nigeria using several methodologies. Likewise, with respect to exchange rate passes through inflation in Nigeria, Bello and Sanusi (2019), Mohammed and Bashir (2018), Maxwell (2017), Bidemi and Idowu (2017), Bada et al (2016), amongst others, employed the

Smooth Transition Regression model, threshold Autoregressive model (SETAR), Q-test, BDS and ARCH, Bivariate GARCH, VAR Model, and VECM respectively.

With respect to the exchange pass-through to unemployment in Nigeria, the most recent published article reviewed so far is that of Akiri et al. (2020), Geerolf (2020), and Olanrewaju (2019). However, all data spans stopped in 2018, with Akiri et al. (2020) making use of a panel data analysis, hence the need to span quarterly data to capture 2019-2022. It was also observed that not all the studies made in Nigeria came to a definite conclusion, as different methods gave different results, and as such, the theoretical support (Philip curve and purchasing power parity) for the findings are mixed and need to be investigated.

EMPIRICAL LITERATURE

The literature reviewed for this study is divided into two strands; the first is the strands of literature that focus on the exchange rate movement in relation to inflation, while the second strand is based on exchange rate movement and unemployment.

Olamide et al. (2022) investigated the impact of currency rate instability on the inflation-growth relationship for 13 Southern African Development Community (SADC) nations from 2000 to 2018. The Pooled Mean Group (PMG), Generalised Moments (GM), and Dynamic Fixed Effect (DFE) estimation approaches were used to meet the study’s goal. According to the findings, exchange rate instability and inflation have a negative link with regional economic growth. Furthermore, it was demonstrated that the region’s economic growth is negatively impacted by the resultant effect of exchange rate instability on inflation. Yilmazkuday (2022) investigates the drivers of Turkish inflation by using a structural vector auto-regression model, where monthly data on global oil prices, unemployment rates, inflation rates, policy rates and exchange rates are used. The empirical results show that Turkish inflation increases following a negative policy rate shock, a positive exchange rate shock, or a positive global oil price shock. The volatility of Turkish inflation is mostly explained by global oil prices and exchange rate movements in the long run, while the contribution of exchange rate shocks to Turkish inflation has continuously increased over time. As additional empirical results show that exchange rate depreciation can be reduced by positive policy rate shocks, it is implied that a conventional monetary policy increasing policy rates following an increase in inflation or a depreciation of Turkish lira would be optimal to achieve and maintain price stability in Turkey. Osbat et al. (2021) examine the impact of exchange rate movements on inflation, focusing on import prices in the euro area at a sectoral disaggregated level. The study applied the VAR-X models, thus incorporating both endogenous and exogenous explanatory variables on monthly data between 2000 and 2005. The findings revealed that higher market concentration and higher backward integration in global value chains decrease pass-through to inflation, in line with previous findings in the literature. Semosa and Kanayo (2021) examine the nexus between exchange rate, unemployment and inflation in South Africa. The study used the Johansen cointegration test and the vector error correction model (VECM) on monthly data series for the period 1994 to 2018. Findings confirm the association between exchange rate and inflation in addition to the end result that unemployment is negatively related to inflation.

Mahendra and Parulian (2021) investigated the influence of exchange rate, economic growth, and minimum wage on inflation in Indonesia. Estimates were conducted by the multiple regression analysis, based on the partial test (t-test), using data between 2000 and 2019. The result shows that the Minimum Wage has no significant effect on inflation in Indonesia. In contrast, the Exchange Rate and Economic Growth variables have a significant effect on inflation. Furthermore, the simultaneous test (F test), exchange rate, economic growth, and minimum wage have a significant effect on unemployment variables.

In a similar vein, Akiri et al. (2020) evaluate the exchange rate pass-through to unemployment in Africa using evidence from Nigeria and South Africa. The pass-through was analysed using two different transmission channels: first, through exports to unemployment, and second, through imports to unemployment. Panel Structural Vector Auto-Regressive (SVAR) was employed to analyse the impact of the transmission on the unemployment rate using quarterly data spanning the period of 2007-2018. The findings of the study revealed that the exchange rate does not exert the desired impact on unemployment in Sub-Saharan Africa through the export and import channels, implying that depreciation in the exchange rate exacerbates the problem of unemployment in SSA. The study concludes that the pass-through channels of export and import possess the potential to lower unemployment in Nigeria and South Africa; however, the latent effect through other intermediate variables is contrary, thereby inhibiting the pass-through. Geerolf (2020) tried to analyse the Philips curve by studying the relationship between Real Exchange Rate Growth and Unemployment using data from multiple sources. The findings showed that in fixed exchange rate regimes, inflation is negatively correlated with unemployment, but this relationship does not hold in flexible regimes. By contrast, there is a negative correlation between real exchange rate appreciation and unemployment, which remains consistent in both fixed and flexible regimes. The paper suggests that the Phillips curve, in fact, reflects a relationship between relative prices and unemployment. Goshit and Iorember (2020) investigated the asymmetric pass-through of the monetary policy rate to unemployment in Nigeria using the asymmetric ARDL model over the period 2000Q1-2018Q4. The study found dissimilar long-run effects of tightening and easing the MPR on unemployment. While tightening the MPR had a positive, elastic and statistically significant effect on unemployment, implying complete pass-through, easing the MPR had a negative, inelastic and statistically insignificant effect on unemployment, suggesting incomplete pass-through. Similarly, the short-run effects of tightening or easing the MPR were dissimilar. Furthermore, the result of the cumulative multiplier indicated that the cumulative effects of tightening the MPR on unemployment dominated the cumulative effects of easing the MPR on unemployment in Nigeria.

MATERIALS AND METHODS

Data used for this study consist of secondary annual time series sourced from the World Bank development indicator database and the Central Bank of Nigeria (CBN) Statistical Bulletin Website. A total of five (5) variables, namely Real Exchange Rates (RERt), Inflation rates (INFRt), unemployment rate (UNEt), real gross domestic product (rGDP; demand side of the economy), and Trade openness (TOt), covering the period of 1986 to 2022 were used. The 1980s marked a turning point in Nigeria's economic decline following the oil boom era documented in the country's history. This was the period when Nigeria experienced its arguably first economic recession and consequently began to experience an exchange rate crisis and a fall in the value of the domestic currency (Olanrewaju (2019). It is also a period of structural adjustment programs (SAP) implementation, which has a significant history in Nigeria's exchange rate policies. Furthermore, these are the times when the country appears to have begun to see rising unemployment rates and consistent increases in inflation rates. In addition, the country has experienced several economic recessions and disruptions in the oil sector during this time period.

The model used for the study followed the work of Olanrewaju (2019), who examines the issues regarding the effects of inflation and the real exchange rate on unemployment. This study adapted the empirical specification and modified it to suit its objectives. The model specified by Olanrewaju (2019) is as follows:

$$unemp_t = \emptyset_o + \beta_1 INF_t + \beta_2 REX_t + \beta_3 lgdp_t + + \alpha_1 open_t + \alpha_2\, productivity + \alpha_3 interIR + \mu_t \qquad (1)$$

Where = inflation rate is the interaction term between the inflation rate and real exchange rate; hence, the interaction term enables us to ascertain whether the impact of the real exchange rate on the unemployment rate varies with the levels of inflation rates, and μ = Error term (or stochastic term).

For this study, the general form of the model was derived within the context of the theoretical link between exchange rates, inflation and unemployment as captured in the theoretical framework. The study formulates a multiple linear regression model to assess the effect of exchange rate inflation on unemployment in Nigeria. In addition, the objectives of this study included oil prices, trade openness and real gross domestic product (RGDP), which are used based on their strong link to Nigeria's economic revenue through foreign exchange earnings.

The model is expanded to include the stated variables above:

$$UNE_t = f(RER_t, INFR_t, TO_t, RGDP_t) \qquad (2)$$

The mathematical form for the model can be expressed as;

$$UNE_t = \beta_o + \beta_1 RER_t + \beta_2 INFR_t + \beta_3 TO_t + \beta_4\, RGDP_t \qquad (3)$$

However, the above equation is precise or deterministic in character. The stochastic error term is used to account for the imperfect relationship between the variables, which is typical of most economic variables. "μ_t" and a natural logarithm are added to the variables in the above equation respectively. Thus, the study expresses the econometric form of the model as follows:

$$lnUNE_t = \beta_o + \beta_1 RER_t + \beta_2 INFR_t + \beta_3 TO_t + \beta_4\, lnRGDP_t + \mu_t \qquad (4)$$

Where, Real Exchange Rates (RER_t), Inflation rates ($INFR_t$), unemployment rate (UNE_t), real gross domestic product (rGDP; demand side of the economy), and Trade openness (TO_t), In = Natural logarithm, β_o = the intercept or autonomous parameter estimate, β_1 to β_5 = Parameter estimate representing the coefficient of independent variables respectively, and μ = Error term (or stochastic term).

The study used the Nonlinear Autoregressive Distributed Lag (NARDL) model proposed by Shin et al. (2014) under the conditional error correction version and given the advantages of the ARDL model.

The ARDL approach enables a joint analysis of the unemployment rate's long- and short-run responses to changes in the real exchange rate, as well as a cointegration check, prior to determining the NARDL. The unconstrained linear error correction model is generally given in the manner described below.

$$\Delta(UNE_t) = \beta_0 + \beta_1(UNE_{t-1}) + \beta_2(RER_{t-1}) + \beta_3(INFR_{t-1}) + \beta_4(TO_{t-1}) + \beta_5 ln(RGDP_{t-1}) + \sum_{i-1}^{p} \vartheta_6 \Delta(UNE_{t-1}) + \sum_{i-1}^{q} \vartheta_7 \Delta(RER_{t-1}) + \sum_{i-1}^{r} \vartheta_8 \Delta(INFR_{t-1}) + \sum_{i-1}^{t} \vartheta_9 \Delta(TO_{t-1}) + \sum_{i-1}^{u} \vartheta_{10} \Delta ln(RGDP_{t-1}) + \delta ecm_{t-1} + \varepsilon_{t-1} \quad (5)$$

The null hypothesis must be tested to see if there is a long-term link between the variables by cointegration. For the combined significance of the lagged levels of the variables in the hypothesis, the Wald test (F-statistics) is used:

H_0: $\vartheta_1 = \vartheta_2 = \vartheta_3 = \vartheta_4 = \vartheta_5 = 0$ Absence of co-integration

H_1: $\vartheta_1 \neq \vartheta_2 \neq \vartheta_3 \neq \vartheta_4 \neq \vartheta_5 \neq 0$. Presence of cointegration

If the F statistic is greater than the upper bound critical value at the standard significance level, the null hypothesis is rejected. H_0 cannot be rejected if the F statistic is less than the lower bound critical value. If the F statistic falls between the two critical values, no conclusion can be drawn about H_0.

Following the identification of variable cointegration, we must ensure that the ARDL model is stable and reliable by performing the following tests: The Wald test, Ramsey's RESET test using the square of the fitted values, the Lagrange multiplier (LM) test, CUSUM (Cumulative Sum of Recursive Residuals) and CUSUMSQ (Cumulative Sum of Square of Recursive Residuals) tests, and CUSUMSQ (Cumulative Sum of Square of Recursive Residuals) test, which allow for some important examinations such as serial correlation, heteroscedasticity. After the ARDL model's stability and dependability have been validated, short-run and long-run estimations can be implemented.

Aside from the ability to include both I(0) and I(1) in the model, the ARDL approach to cointegration has several advantages over other approaches (Phong, Bao & Van, 2017). To begin, ARDL can produce statistically significant results with a small sample size, whereas the Johansen cointegration method requires a larger sample size to achieve significance (Pesaran et al., 2001). Second, unlike other cointegration techniques, ARDL allows for variable lag ordering to be changed.

In contrast to other strategies, the ARDL technique employs the OLS method to estimate a single equation rather than a set of equations (Srinivasana & Kalaivanib, 2013). Finally, if any of the model's variables are endogenous, the ARDL technique yields unbiased long-run estimates (Pesaran & Pesaran, 1997).

Theoretically, a wide range of other macroeconomic factors can affect unemployment. Inflation and unemployment are predicted to have a positive association, while increases in the production gap, trade openness, and energy prices, for instance, are predicted to lower unemployment. On the other hand, incorporating these factors into our models enhances model fit while reducing degrees of freedom, which is crucial for the validity of the findings (Wooldridge 2009; Usman et al. 2016). We assume, like Apergis (2015), that the effects of excluded control variables are accounted for in stochastic terms. The expected range of the true ERPT coefficients in the long and short runs is 0 and 1 ($0 < \beta_i < 1$) and ($0 < \vartheta_i < 1$).

If $\beta_i = 0$ and $\vartheta_i = 0$, then there is no pass-through, indicating that exporting firms do not alter their export prices in the domestic currency based on the local currency pricing (LCP) strategy or market share aim. In this way, their markups take into account the impact of genuine currency rate variations. If only a portion of the pass-through was made, that is, $\beta_i < 1$ and $\vartheta_i < 1$, It shows that exporting companies modify their export pricing in local currency, but not in a way that is proportional to changes in the real exchange rate. Finally, if $\beta_i = 1$ and $\vartheta_i = 1$, Because the export prices are established in foreign currency, it means that the pass-through is unitary and that the exporters' markups do not alter in response to changes in the real exchange rate (Usman & Elsalih 2021).

Usman and Elsalih (2021) and Apergis (2015) both support the idea that the real exchange rate pass-through may include asymmetries. As a result, the current NARDL model put forth by Shin et al. (2014), which divides the real exchange rate into its positive (RER+) and negative (RER) partial sums, is used to examine the asymmetric impacts of the real RER on unemployment. The nonlinear ARDL model is presented in more detail as follows:

$$(RER_t^+) = \sum_{i-1}^{t} \Delta\ln\,(RER_t^+) = \sum_{i-1}^{t} MAX(\Delta\, RER_i),0) \quad (6)$$

$$(RER_t^-) = \sum_{i-1}^{t} \Delta\ln\,(RER_t^-) = \sum_{i-1}^{t} MIN(\Delta\, RER_i),0)$$

where RER_t^+ and RER_t^- represent the cumulative sum of positive (i.e., increases) and negative (i.e., decreases) shocks to the real exchange rate, respectively. The following modification to Equation (3.9) can be made to accommodate for an asymmetric level relationship:

$$\Delta(UNE_t) = \beta_0 + \beta_1(UNE_{t-1}) + \beta_2(RER_{t-1}^+) + \beta_3(RER_t^-) + \beta_4(INFR_{t-1}) + \beta_5(TO_{t-1}) + \beta_6 ln(RGDP_{t-1}) + \sum_{i-1}^{p} \vartheta_7\, \Delta(UNE_{t-1}) + \sum_{i-1}^{q} \vartheta_8\, \Delta(RER_{t-1}^+) + \sum_{i-1}^{q} \vartheta_9\, \Delta(RER_{t-1}^+) + \sum_{i-1}^{r} \vartheta_{10}\, \Delta(INFR_{t-1}) + \sum_{i-1}^{t} \vartheta_{11}\, \Delta(TO_{t-1}) + \sum_{i-1}^{u} \vartheta_{12}\, \Delta ln(RGDP_{t-1}) + \delta ecm_{t-1} + \psi_{t-1} \quad (7)$$

where (UNE_t) and Δ remain as previously defined in Equation (5). (RER_{t-1}), which is made of the partial sums of the positive and negative shocks, is the lag of the real exchange rate. $\psi_t \sim IN(0, \sigma^2)$. The variables' lag orders are indicated by the letters p and q, respectively. The lag order of exogenous variables is represented by p, and the lag order of endogenous variables is represented by q. Real ERPT and unemployment have a long-run relationship that is depicted in Equations (5) and (7), and a short-run relationship is also shown.

Theoretically, when RER rises, export prices will rise, and import prices will fall, making local currencies less competitive internationally. As a result, a rise in RER signals an increase in the value of the domestic currency, while a decline in RER signals a decrease in the value of the domestic currency. A limits testing strategy suggested by Pesaran et al. (2001) is used to test for the long-run link (cointegration) between RER and unemployment. Using either the F-statistic or this cointegration test (F_{PSS}) or t-statistic (t_{BDM}). The null hypothesis for an FPSS is $H_0: RER_t^+ = RER_t^- = 0$ against alternative hypothesis$H_1: RER_t^+ \neq RER_t^- \neq 0$. The null hypothesis for a t-BDM on the lagged level dependent variable $H_0 \Phi = 0$ and the alternative hypothesis is $H_1 \Phi \neq 0$.

Based on empirical studies by Delatte and López-Villavicencio (2012), Apergis (2015), Olanrewaju (2019), and Usman and Elsalih (2021), this study estimates the long-run multipliers, that is, the coefficients of positive and negative changes in the real exchange rate. $L^+_{(RER)}. = {-\beta_2^+}/{\beta_1}$ and $L^+_{(RER)}. = {-\beta_3^-}/{\beta_1}$. To estimate the long-run symmetric effect of real ERPT, a Wald test is used with the null hypothesis ${-\beta_2^+}/{\beta_1} = {-\beta_3^-}/{\beta_1}$ The short-run symmetric effect of genuine ERPT is further tested using a conventional Wald test. The test's null hypothesis is that $\sum_{i=0}^{q} \vartheta_8 = \sum_{i=0}^{q} \vartheta_9$ for the dynamic coefficients of changes in the real effective exchange rate that are both positive and negative. The asymmetric real ERPT short-run estimations are provided by $\sum_{i-1}^{q} \vartheta_8 \, \Delta(RER_{t-1}^+) = \sum_{i-1}^{q} \vartheta_9 \, \Delta(RER_{t-1}^+)$.

Furthermore, the study also adopts the Structural Vector AutoRegressive (SVAR) method in estimating the exchange rate pass-through to Unemployment in Nigeria. The study will evaluate the channels through which the exchange rate can impact unemployment in Nigeria. The choice of model and variables are based on the theoretical relationship between variables of interest, which are Real Exchange Rates (RER_t), inflation rate ($INFR_t$), unemployment (UNE_t), and Trade Openness (TO_t).

The proposed model is presented here to describe the contemporaneous impact of exchange rates, inflation rates and unemployment in Nigeria. According to Kilian (2009), the model for this study is a vector autoregressive model (VAR). Sims (1980) introduced VAR, which is based on the idea that many macroeconomic variables and their movements are interrelated, modelling every endogenous variable in the system as a function of all the endogenous variables in the system's lagged values. As a result, our unrestricted VAR can be expressed as:

$$a_t = \sum_{i=1}^{k} A_i \, a_{t-i} + e_t \tag{8}$$

Where

a_t = is a column vector of observation at 't' of all the variables in the model, i.e.

$$a = (UNE_t \; RER_t, \; INFR_t, \; TO_t) \tag{9}$$

The model can be specified as:

$$\Delta UNE_t = \sum_{i=1}^{L} \alpha_{11}^{i} \Delta UNE_{t-i} + \alpha_{12}^{0} \Delta RER_t + \sum_{i=1}^{L} \alpha_{12}^{i} \Delta RER_{t-i} + \alpha_{13}^{0} \Delta INFR_t + \sum_{i=1}^{L} \alpha_{13}^{i} \Delta INFR_{t-1} + \sum_{i=1}^{L} + \alpha_{15}^{0} \Delta TO_t + \sum_{i=1}^{L} \alpha_{15}^{i} \Delta TO_{t-i} + \varepsilon_{1t} \tag{10}$$

$$\Delta RER_t = \sum_{i=1}^{L} \alpha_{21}^{i} \Delta RER_{t-i} + \alpha_{22}^{0} \Delta UNE_t + \sum_{i=1}^{L} \alpha_{22}^{i} \Delta UNE_{t-i} + \alpha_{23}^{0} \Delta INFR_t + \sum_{i=1}^{L} \alpha_{23}^{i} \Delta INFR_{t-i} + \alpha_{25}^{0} TO_t \sum_{i=1}^{L} \alpha_{25}^{i} \Delta TO_{t-i} + \varepsilon_{2t} \quad (11)$$

$$\Delta INFR_t = \sum_{i=1}^{L} \alpha_{31}^{i} \Delta INFR_{t-i} + \alpha_{32}^{0} \Delta UNE_t + \sum_{i=1}^{L} \alpha_{32}^{i} \Delta UNE_{t-i} + \alpha_{33}^{0} \Delta RER_t + \sum_{i=1}^{L} \alpha_{33}^{i} \Delta RER_{t-i} + \sum_{i}^{L} + \alpha_{35}^{0} \Delta TO_t + \sum_{i=1}^{L} \alpha_{35}^{i} \Delta TO_{t-i} + \varepsilon_{3t} \quad (12)$$

$$\Delta TO_t = \sum_{i=1}^{L} \alpha_{51}^{i} \Delta TO_{t-i} + \alpha_{52}^{0} \Delta UNE_t + \sum_{i=1}^{L} \alpha_{52}^{0} \Delta UNE_{t-i} + \alpha_{53}^{0} \Delta RER_t + \sum_{i=1}^{L} \alpha_{53}^{i} \Delta RER_{t-i} + \alpha_{54}^{0} \Delta INFR_t + \sum_{i=1}^{L} \alpha_{54}^{i} \Delta INFR_{t-i} + \varepsilon_{4t} \quad (13)$$

Where:

UNE = Unemployment rate, RER = Real Exchange Rate, INFR = inflation rate, TO= trade openness.

The SVAR model has been chosen for this study due to its theoretical nature and its capacity to analyse economic theory. Empirical macroeconomists have criticised other types of restrictions for being overly sensitive to ordering and for seldom aligning with economic theory.

To solve the identification problem, the SVAR is estimated. Aside from dealing with the problem of contemporaneous correlation, the VAR's recursive structure is concerned with variable ordering. Previous empirical findings, as well as economic theory, will be used to determine the constraints. The precise identification given by Bernanke (1980), as improved by Amisano and Gianni (1997/1998), is $n(n-1)/_2$ identification scheme.

n = number of variables. Hence, we have:

$$\frac{4(4-1)}{2} = \frac{4(3)}{2} = \frac{12}{2} = 6$$

This implies we should have at least six (6) restrictions. These restrictions are going to be imposed based on economic and theoretical meanings.

$$Vt\begin{bmatrix} e_t^{\Delta UNE_t} \\ e_t^{\Delta RER_t} \\ e_t^{\Delta INFR_t} \\ e_t^{\Delta TO} \end{bmatrix} = \begin{bmatrix} 1 & 0 & a_{13} & 0 \\ 0 & 1 & 0 & a_{24} \\ 0 & a_{34} & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} B = \begin{bmatrix} b_{11} & & & \\ & b_{22} & & \\ & & b_{33} & \\ & & & b_{44} \end{bmatrix} \begin{bmatrix} e_t \mathrm{UNE}_t \\ e_t \mathrm{RER}_t \\ e_t \mathrm{INFR}_t \\ e_t TO_t \end{bmatrix} \quad (14)$$

Once the structural VAR model has been identified, the interrelationships between the variables can be investigated using impulse response functions and forecast error variance decompositions, which demonstrate the nature of economic shocks as they pass through the system. Variance decomposition (VD) is frequently used to determine the relative contribution of given shocks to the forecast error variance of an interest variable over different time horizons. These statistics quantify the quantitative impact of the shocks on the variables. The impulse response functions are derived and used to investigate the dynamic responses of the variables in the SVAR system to various shocks. After identifying the structural shocks, it is simple to calculate the impulse response of a given variable to a one-time shock to any other variable in the system.

RESULTS AND DISCUSSIONS

Trend Analysis

One of the first steps in economic analysis is to visually inspect some important features in the data being used for estimation. These features can influence the behaviour of the series and equally give an insight into the appropriate technique for the analysis. The variables used for the estimations include UNE_t = Unemployment Rate, RER_t = Real exchange rate, TO_t = Trade openness, $INFR_t$ = Inflation Rate and RGDP= Real Gross Domestic Product.

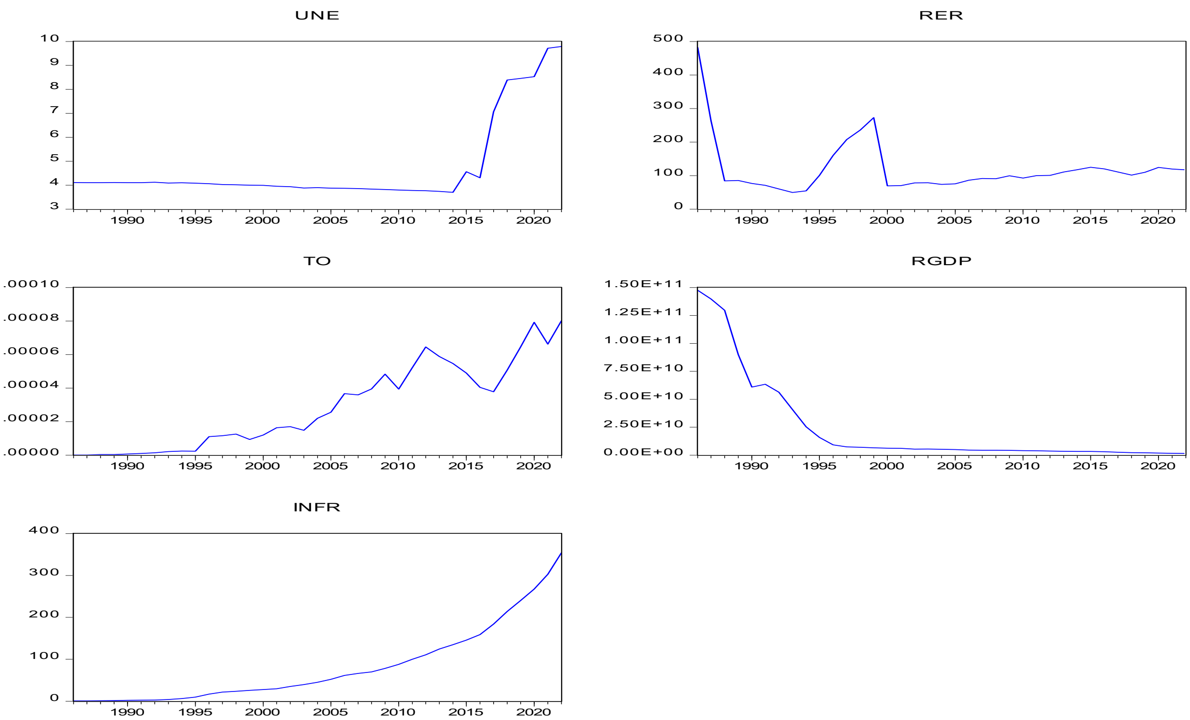


Figure 1: Trend Analysis

Source: Generated by the author using E-views version 10 (2023)

In Figure 1 above, the unemployment rate data showed that UNE has been rising since the 1980s, and it has not trended downwards, showing that the series is not stationary. Also, the data shows that real exchange rates are fluctuating. The trends show an upward and downward movement from the 1980s to 2020. In the same way, the data for Trade openness is also upward trending with little fluctuations. In addition, the trend of Real GDP and Inflation rates shows that RGDP has been trending downward, showing slow growth in the economy for the period of study as the inflation rate has been rising upward over the period of study. This is evidence that the majority of macroeconomic variables are not stationary. To further prove this assertion, a unit root test was conducted to examine the stationarity of the series.

Unit Root Tests

The unit root test was used to determine the series' stationary conditions as well as the order of integration. The ADF and PP unit root sets were run to determine the exact order of integration and the variables' stationary process.

Table 1 Unit Root Tests

Level					
Test/Variables	UNE	RER	INFR	TO	RGDP
ADF	1.462787 (0.9989)	-6.710023 (0.0000)	4.225563 (1.0000)	0.088213 (0.9604)	-5.079998 (0.0003)
PP	1.292334 (0.9981)	-6.058694 (0.0000)	16.40644 (1.0000)	0.389377 (0.9797)	-13.54179 (0.0000)
First Difference					
Test/Variables	UNE	INFR	TO		
ADF	-4.717962 (0.0005)	5.233813 (1.0000)	-5.814408 (0.0000)		
PP	-4.780477 (0.0005)	7.618111 (1.0000)	-5.816311 (0.0000)		

Source: computed by the author using E-views. Version 10 (2023)

Based on the ADF and PP tests presented in the table above, UNE, TO, and INFR are not stationary at their respective levels. Meanwhile, RER and RGDP exhibit stationary behaviour at their levels. It is plausible that RGDP's stationarity arises from its being a deflated version of RDP. As seen in Table 1, it appeared necessary to test the stationarity of variables that are not stationary at level at their first difference as they were not stationary at levels. This implies that the former was stationary after the first difference, which are UNE, TO, and INFR. After differencing the series, the results indicate that the null hypothesis of non-stationarity in each of the series can be rejected at the 1% level of significance. As a result, the series is now integrated of order one, i.e. I(1) of different orders, a mixture of I(1) and I(0). These findings support the use of the ARDL bound test and cointegration test. The ARDL can be used whether the variables are a mixture of I(1) and 1(0) or the same level as long as none of them is I(2).

The results of the Zivot-Andrews unit root test with endogenously determined structural breaks in the intercept, trend, intercept and trend are presented in Table 2 below. The timing of the structural break for each of the variables is determined based on the most significant t-ratio for the respective parameter in equations. The results show that UNE is significant with Trend, Intercept and both with break dates of 2016, 2015 and 2013. Also, the break dates of RER are significant at intercept and both intercept and trend with a break date of 2000, while INFR break dates are not significant at all levels. Likewise, the TO break date is significant at both intercept and trend in 2016. In the same vein, RGDP has break dates at intercept only, trend only and both intercept and trend in 1993, 1997 and 1997, respectively.

Table 2: Zivot-Andrews Unit Root Test

Variables

	Break in Intercept		Break in Trend		Break in Intercept and Trend	
	T-statistic	Time Break	T-statistic	Time Break	T-statistic	Time Break
UNE	-2.713474**	2016	-5.598905***	2015	-4.948101**	2013
RER	-7.864862***	2000	-6.018462	2016	-9.075517**	2000
INFR	4.469009	2017	1.706252	2015	-5.774283	1992
TO	-2.991156	2006	1.706252	2015	-3.645823**	2016
RGDP	-5.178710**	1993	-15.56349**	1997	-20.14457**	1997

*Critical values - Intercept break: -5.43 (1%), -4.80 (5%); trend break: -4.93(1%), -4.42 (5%); intercept and trend breaks: -5.57 (1%), -5.08 (5%) (Zivot and Andrews, 1992). *** indicate significance at 1% level. Source: computed by the author using E-views. Version 10 (2023)*

Presentation and Analyses of Estimated Results

The study employed ARDL, NARDL and Structural Vector Autoregression (SVAR) models to capture the specific objectives of the study.

Presentation of ARDL Regression Results

Before the estimation of the NARDL, it is required to present the ARDL results for comparative analysis of the estimation techniques and findings. The ARDL/NARDL model is aimed to capture the first and second specific objectives of the study. The NARDL gives more insight into the first specific objective of the study, given the decomposition of the exchange rate into positive and negative.

Summary of Lag Selection Criteria

Finding a suitable lag to compute the F-statistics is crucial in order to use the ARDL bounds testing method. The ARDL model is sensitive to lag order. The AIC (Akaike information criterion) specifies superior results when compared to other lag length criteria (Lütkepohl, 2006).

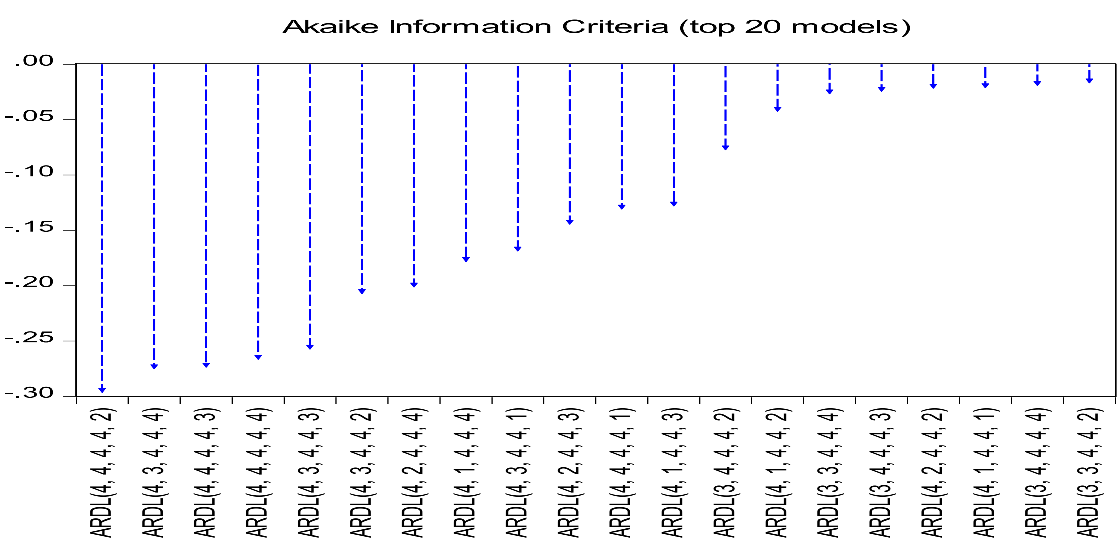


Figure 2 Akaike information criterions
Source: Generated by the author using E-views version 10 (2023)

The twenty best models identified by this method are summarised in Figure 2. Since none of the selected models can be easily approximated, we have chosen the first-best model, ARDL (4, 4, 4, 4, 2), for further analysis. Consequently, ARDL (4, 4, 4, 4, 2) serves as the foundation for determining the long-run relationships among the Unemployment Rate (UNEt), Real Exchange Rate (RERt), Trade Openness (TOt), Inflation Rate (INFRt), and Real Gross Domestic Product (RGDPt). For this purpose, we employ the bounds testing approach, utilising the critical values provided by Narayan (2005), which is particularly suitable for small sample data.

The ARDL Cointegration Analysis

The ARDL bounds testing approach to cointegration results on the effect of pension funds contribution on economic growth in Nigeria is presented in Table 3 below.

Table 3 ARDL BOUNDS TEST Results, Null Hypothesis: No Long-run Relationship

Test Statistic	Value	K
F-statistic	14.98411	4
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.2	3.09
5%	2.56	3.49
1%	3.29	4.37
N=33		

Source: computed by the author using E-views. Version 10 (2023)

The computed F-statistic of 14.98411 exceeds any of the upper critical bounds of 1%, 5%, and 10% when UNE is used as the predicted variable, according to the results of the ARDL bounds testing approach to cointegration. This confirms the presence of cointegration between the variables from 1986 to 2022. However, because we have a small sample size, we use Narayan's critical values (2005). In Narayan's table, the critical value for the upper bound is 4.088, and the critical value for the lower bound is 2.947. This bound test has an f-statistic of 14.98411, which is greater than both 4.088 and 2.947. As a result, even at the 5% level of significance, the null hypothesis of no long-run relationship is strongly rejected. As a result, this finding indicates that there is a long-run relationship between Unemployment Rate (UNE_t), Real exchange rate (RER_t), Trade openness (TO_t), Inflation Rate ($INFR_t$), and Real Gross Domestic Product ($RGDP_t$) in Nigeria from 1986 to 2022.

ARDL Regression Analysis

The ARDL regression estimates of variables are shown in Table 4. The F-statistics determine the overall significance of the regression model. The F-value tests the null hypothesis that the true slope coefficients are all zero at the same time. The F-statistics are 144.1629, and the probability value is 0.000000, implying a 5% level of significance. This indicates that the model has a good fit and is statistically significant, implying that there is a relationship between the dependent and independent variables. The R^2 metric measures the estimated model's goodness of fit. It measures the proportion of total variation explained by the regression model. The R^2 from the ARDL regression is 0.966268, while the adjusted R^2 is 0.928039. This means that the model accounts for approximately 97% of the total variation in UNE explained by the explanatory variables.

Table 4 ARDL Estimates

Dependent Variable: UNE				
ARDL Long-Run Estimates				
Variables	Coefficient	S.E	t-values	P-Value
RER	0.002736	0.000905	3.022472	0.0128
INFR	-0.056764	0.009988	-5.683399	0.0002
TO	-0.039473	0.010470	-3.770094	0.0006
LOGRGDP	0.336333	0.092461	3.637569	0.0046
C	0.249447	0.968843	0.257469	0.8020
ARDL Short-Run Estimates				
Variables	Coefficient	S.E	t-values	P-Value
Δ(RER)	0.203260	0.011372	17.87433	0.0000
Δ(INFR)	-0.068852	0.013650	-5.044146	0.0005
Δ(TO)	-0.000569	0.000178	-3.200650	0.0028
Δ(LORGDP)	-0.194376	0.697793	-0.278558	0.7863
ECT_{t-1}	-0.013205	0.001035	-12.76171	0.0000
Diagnostic Tests	Statistic	P-Values		
R-squared	0.966268			
Adjusted R-squared	0.928039			
Durbin-Watson stat	2.812679			
F-statistic	144.1629			
Prob(F-statistic)	0.000000			
X^2 Normal	3.920342	0.140834		
X^2 Serial	2.606318	0.0881		
X^2 ARCH	1.903766	0.1779		

Source: computed by the author using E-views. Version 10 (2023)
Note: *** Statistical significance at the 1 per cent levels; **Statistical significance at the 5 per cent levels. *Statistical significance at the 10 per cent levels,

Before delving into the coefficients of the regression results, it is necessary to perform a diagnostic test to determine whether the estimated short-run model met the assumptions of the Classical Linear Regression Model (CLRM). The diagnostics test is summarised in Table 4.

The normality test, serial correlation test and ARCH Heteroskedasticity test show that the normality using Jarque-Bera Statistics could not be rejected; hence, the error terms are normally distributed. In the same way, the Breusch-Godfrey Serial Correlation LM Test shows that there is no problem of autocorrelation in the model, as the ARCH Heteroskedasticity test shows that the model is Homoscedastic and that there is no problem in the variance of the error terms.

Starting with the long-run analysis, all the variables have a significant effect on unemployment in Nigeria from 1986-2022 at a 5% level of significance. The coefficient of RER is 0.002736, which implies that an appreciation of RER by 1% will lead to a 0.27% increase in labour force participation. On the contrary, the coefficient of inflation is negative and statistically significant at 5%. The coefficient value of -0.056764 implies that an increase in inflation by 1% will lead to a

5.7% decrease in labour force participation when all other variables are held constant in the long run.

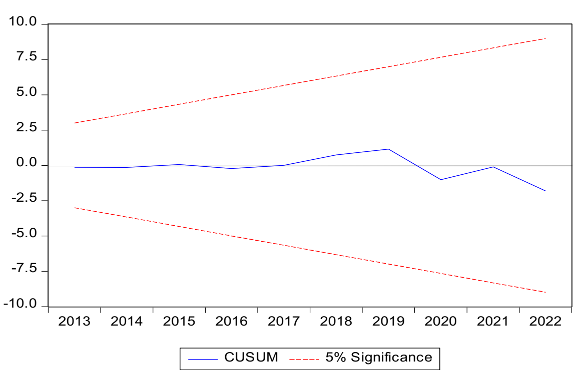
In addition, the coefficient of trade openness is negative and statistically significant in the long run, with a value of -0.039473. This implies that a 1% increase in openness will lead to a 3.9% decrease in labour force participation when all other variables are held constant in the long run. Also, the coefficient of RGDP is positive and statistically significant, with a value of 0.336333. This implies that a 1% decrease in RDGP will lead to a 33.6% increase in labour force participation when all other variables are held constant in the long run.

In the short run, however, RER, INFR and TO are statistically significant at 5%, as RGDP is statistically insignificant at 5%. The coefficient of RER suggests that an increase in RER by 1% will lead to a 20% increase in labour force participation when all other variables are held constant in the short run. Also, the result further showed that an increase in INFR is consistent with the long-run results and leads to a 6.8% decrease in labour force participation when all other variables are held constant in the short-run, while an increase in TO leads to a 19.4% decrease in labour force participation when all other variables are held constant in the short-run.

The estimate of the ECT-1 term is negative and significant at the 1% level, corroborating the long-run relationship between Unemployment Rate (UNE_t), Real exchange rate (RER_t), Trade openness (TO_t), Inflation Rate ($INFR_t$), and Real Gross Domestic Product ($RGDP_t$) in Nigeria from 1986 to 2022. The estimated ECMt1 term is -0.013205, implying that deviations from the short-run to the long-run are corrected by 1.32% per year, and it would take nearly 7 years or more in the case of Nigeria to reach the stable long-run equilibrium path. This empirically implies that after 7 years, the system will automatically adjust itself back to equilibrium for any disequilibrium.

Stability Test

A crucial measure to determine whether the stability of the ARDL model estimate, the cumulative sum of recursive residuals test and the cumulative sum of squares test were used to determine the stability of the statistic.



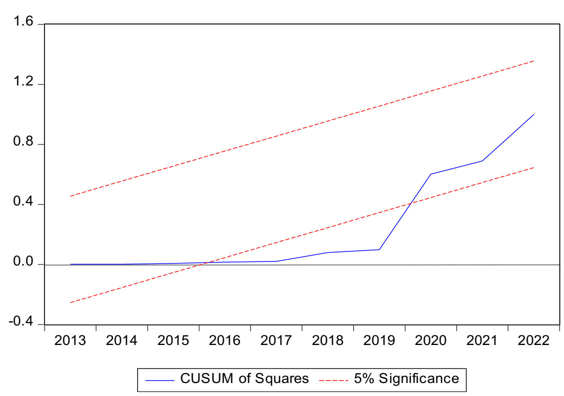


Figure 3 CUSUM **Figure 4: CUSUMsq**

The CUSUM and CUSUMsq tests were used to investigate the stability of the ARDL bounds testing estimates, and the results are shown in Figs 3 and 4. The CUSUM statistics plots were well within the critical bounds of 5%. The plots of the CUSUM of squares statistics were just inside the critical bounds at 5%. This demonstrates that the ARDL estimates were accurate and consistent. The tests show that the coefficients were stable because the cumulative sum (blue lines) does not exceed the area between the two critical bounds (red lines).

The Nonlinear ARDL Cointegration Analysis

The essence of conducting the nonlinear ARDL is to access the Asymmetric real exchange rate (RER_t) on unemployment in Nigeria. It gives the impact of the positive and negative effects of the real exchange rate (RER_t) on unemployment in Nigeria over the period of study. Table 5 below presents the NARDL bounds testing approach to cointegration results for the model to investigate the effect of the real exchange rate (RER_t) on unemployment in Nigeria.

Table 5 NARDL BOUNDS TEST Results, Null Hypothesis: No Long-run Relationship

Test Statistic	Value	K
F-statistic	15.45410	5
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.08	3
5%	2.39	3.38
1%	3.06	4.15
N=33		

Source: computed by the author using E-views. Version 10 (2023)

The results of the NARDL bounds testing approach to cointegration are the computed F-statistic of 15.45410 since we have a small sample of 33 observations, and this necessitates the use of the critical values provided by Narayan (2005). The critical value for the upper bound in Narayan's table is 4.013, and for the lower bound, 2.804 at 5%. The f-statistics for this bound test, which is 15.45410, is greater than both values of the upper bound and lower bound of 4.013 and 2.804. Thus, the null hypothesis of no long-run relationship is rejected at the 5% level of significance. Hence, this shows that there is a long-run relationship between the Unemployment Rate (UNE_t), Real exchange rate (RER_t), Trade openness (TO_t), Inflation Rate ($INFR_t$), and Real Gross Domestic Product ($RGDP_t$) in Nigeria for the study period of 1986-2022 in Nigeria.

NARDL Regression Analysis

Table 6 presents the NARDL regression estimates of variables. The F-statistic is statistically significant, showing the model is statistically significant. The R^2 value is 0.966017, which implies there is 96% total variation of the independent variable against the dependent variable. The diagnostic tests show that the model passed all required tests, just as in the symmetric ARDL model.

Our major concern here is the asymmetric impact of the real exchange rate (RER_t) on unemployment in Nigeria. From the results above, the long-run effect shows that the positive movement of RER is statistically insignificant while the negative movement is statistically significant. The results show that a depreciation of the RER will increase the labour participation rate by 0.29% when all other variables are held constant in the long run. Meanwhile, inflation and trade openness were all found to be statistically significant in the long run, just as in the case of the short run. Meanwhile, RGDP is negative but statistically insignificant.

Table 6 NARDL Estimates

Dependent Variable: UNE				
ARDL Long-Run Estimates				
Variables	Coefficient	S.E	t-values	P-Value
RER_POS	-0.000837	0.001397	-0.598876	0.5604
RER_NEG	0.002959	0.000779	3.800492	0.0025
INFR	0.055484	0.008104	6.846641	0.0000
TO	-81149.09	6740.485	-12.03906	0.0000
LOGRGDP	-0.409651	0.302331	-1.354973	0.2004
C	9.749886	3.362670	2.899448	0.0133
ARDL Short-Run Estimates				
Variables	Coefficient	S.E	t-values	P-Value
Δ(RER_POS)	-0.001523	0.000844	-1.805949	0.0961
Δ(RER_NEG)	-0.000966	0.000717	-1.346084	0.2032
Δ(INFR)	-0.063839	0.012077	-5.286024	0.0002
Δ(TO)	-6857.350	5941.940	-1.154059	0.2709
Δ(LOGRGDP)	0.485034	0.339735	1.427682	0.1789
ECT_{t-1}	-0.176291	0.014083	-12.51783	0.0000
Diagnostic Tests	Statistic	P-Values		
R-squared	0.966017			
Adjusted R-squared	0.939586			
Durbin-Watson stat	2.589541			
F-statistic	188.8829			
Prob(F-statistic)	0.000000			
X^2 Normal	3.084261	0.213925		
X^2 Serial	7.896514	0.1829		
X^2 ARCH	0.671277	0.4191		

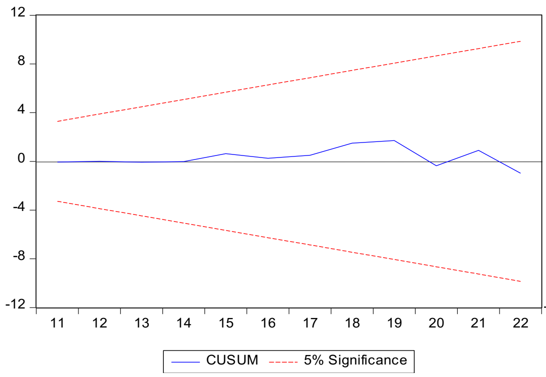
*Note: *** Statistical significance at the 1 per cent levels, **Statistical significance at the 5 per cent levels. *Statistical significance at the 10 per cent levels, Source: computed by the author using E-views. Version 10 (2023)*

In the short run, the positive and negative movement of RER was found to be statistically insignificant over the period of study. This implies that the asymmetric effect of exchange rate pass-through unemployment is effective in the long run rather than in the short run. This, by implication, means as much as the currency appreciates against the foreign currency, industrial growth will be developed, and more people will be employed in the economy in the long run. The inflation rate remains significant in the short run, indicating the effect of inflation on unemployment in Nigeria. This follows the theoretical hypothesis of Philip's curve theory, in which the inflation rate has an effect on unemployment both in the short run and long run.

The estimate of the ECT_{-1} term is negative and significant at a 1% level corroborating the proven long-run association between the Unemployment Rate (UNE_t), Real exchange rate (RER_t), Trade openness (TO_t), Inflation Rate ($INFR_t$), and Real Gross Domestic Product ($RGDP_t$) in Nigeria over the study period of 1986-2022 in the case of Nigeria. The estimate of the ECM_{t-1} term is -0.176291, which indicates that it would take nearly five years and seven months to achieve the stable long-run equilibrium path and that the short-run to long-run deviations are corrected by 17% per year. This suggests empirically that the system will naturally return to equilibrium after a year and five months for any disequilibrium.

4.3.8 Stability Test

The stability test is a crucial measure to determine whether the computed ARDL model is stable. The cumulative sum of recursive residuals test and the cumulative sum of squares were used to determine the coefficient's stability.



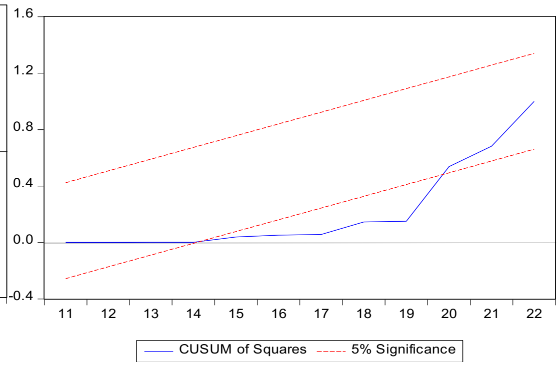


Figure 5 **Figure 6**

Results from the investigation into the stability of the NARDL bounds testing predictions using the CUSUM and CUSUMSQ tests are displayed in Figures. 5 and 6. The CUSUM statistics plots fall well within the 5% critical limits. The CUSUM of squares statistics plots are just outside the 5% critical limits. This demonstrates the accuracy and consistency of the ARDL predictions. Since the cumulative sum (blue lines) does not leave the region between the two crucial bounds, the tests find that the coefficients are stable (red lines).

Structural Vector Autoregression (SVAR) Estimate

Residual Diagnostic

To ensure robust estimation of SVAR and confirm if the lagged selected is good, we test for the residual diagnostic check conducted for the lag chosen to make sure the chosen delays are free of serial correlation and heteroskedasticity, as well as make sure the chosen lags' residuals are normally distributed.

Table 7 Serial Correlation

Lag	LRE* stat	df	Prob.	Rao F-stat	Df	Prob.
1	7.508323	16	0.9622	0.464421	(16, 312.3)	0.9622
2	10.33661	32	0.9999	0.314481	(32, 363.0)	0.9999
3	42.30327	48	0.7045	0.875945	(48, 364.1)	0.7064

Source: computed by the researcher using Eviews. Version 10.0 (2023)

The table above shows the residual serial correlation test result using the LM test, given in Table 7; we cannot reject the null hypothesis of no serial correlation in all the lags at 5% level given the LM statistics and the probability values are greater than 0.05. Hence, this model does not have a problem of serial correlation at the selected lag.

Table 8 **Heteroskedasticity Test**

	R-squared	F(48,85)	Prob.	Chi-sq(48)	Prob.
res1*res1	0.209939	0.470556	0.9974	28.13188	0.9902
res2*res2	0.429008	1.330494	0.1249	57.48705	0.1640
res3*res3	0.630354	3.019788	0.0000	84.46746	0.0009
res4*res4	0.406162	1.211179	0.2185	54.42565	0.2432
res2*res1	0.460728	1.512913	0.0480	61.73752	0.0879
res3*res1	0.401437	1.187642	0.2421	53.79259	0.2623
res3*res2	0.448009	1.437249	0.0723	60.03318	0.1141
res4*res1	0.493480	1.725248	0.0141	66.12638	0.0423
res4*res2	0.399049	1.175884	0.2545	53.47253	0.2722
res4*res3	0.598750	2.642462	0.0000	80.23254	0.0024
Joint					
Chi-sq	Df	Prob.			
597.7276	480	0.70552			

Source: computed by the researcher using Eviews. Version 10.0

Similar to Table 8, the test for heteroskedasticity shows that the residuals are homoskedastic given the chi-square values and probability values larger than 0.05. Given that the probability value is 0.70552 and the combined chi-square value is 597.7276, the null hypothesis of no-problem heteroskedasticity is accepted.

Table 9. Normality Test

Component	Jarque-Bera	Df	Prob.
1	17.42197	2	0.0002
2	123.2253	2	0.0000
3	187.0375	2	0.0000
4	3.726000	2	0.1552
Joint	331.4108	8	0.0000

Source: computed by the researcher using Eviews. Version 10.0 (2023)

From Table 9, the Jarque-Bera test for the normality of the residual indicates that there is a departure from normality. The probability numbers from all four components indicate that the null hypothesis of normality has been rejected. Additionally, the likelihood value of 0.000, which is less than the critical value of 0.05 at the 5% level of significance, is derived from the Jarque-Bera statistics for the joint test. The most significant issue with VAR models, however, is Serial Correlation rather than the normality test, which is not a major issue. Consequently, the chosen lag is appropriate for the VAR analysis because the VAR survived the serial correlation test.

Identification Scheme

The SVAR identification scheme is necessary to check if the imposed restriction is exactly identified or over-identified in conformity with the theory. Table 10 below presents the identification scheme estimated for this study.

Table 10 Identification Scheme with Short-Run Restrictions

Structural VAR Estimates			
Structural VAR is just-identified			
Model: Ae = Bu where E[uu']=I			
A =			
1	0	0	0
C(1)	1	0	0
C(2)	C(4)	1	0
C(3)	C(5)	C(6)	1
B =			
C(7)	0	0	0
0	C(8)	0	0
0	0	C(9)	0
0	0	0	C(10)
Log-likelihood	292.0395		

Source: computed by the researcher using Eviews. Version 10.0 (2023)

Table 10 above presents the identification scheme and the restrictions imposed in this study. From the estimation, the LR test shows a Chi-Square value of 292.0395, indicating the acceptance of the null hypothesis, indicating that the short-run identification scheme is just-identified, which is sufficient for policy analysis for this study. Since the identification scheme is over-just-identified, we can move to analyse the impulse response functions and forecast error variance decomposition.

Impulse Response Function (IRF)

The impulse responses graphs will give us the contemporaneous impact of the variables in the system against each other. The impulse response figures are presented below, beginning with the response of UNE to other variables in the SVAR framework.

The blue line represents UNE, the red lines represent LOGRER, the green line represents INFR, and the grey line represents TO. Starting with UNE, the response to shocks to its own shocks was significant and positive in all 10 periods. The response of UNE to shocks from RER is positive all through the 10 periods, as the response of UNE to shocks from INFR is negative from period two to period 8 and positive from periods 9 and 10 as the response of UNE to shocks from TO is negative in all the periods. The results on RER show that the response of RER to shocks from UNE falls below zero to negative in the first two periods and positive from the 3rd period to the 10th period. Meanwhile, the response of RER to own shocks is positive from the first period to the

3rd period, negative from the 4th period to the 8th period and positive from the 9th period to the 10th period.

Also, the response of own shocks and UNE and RER is positive in all periods, while the response of TO to shocks from INFR and own shocks is positive in all the periods. However, the response of shocks from UNE and RER is negative from period one to period two, and the response of TO to UNE shocks from period 3 is positive to period 10. Meanwhile, the response of TO to RER shocks has been Negative in all periods.

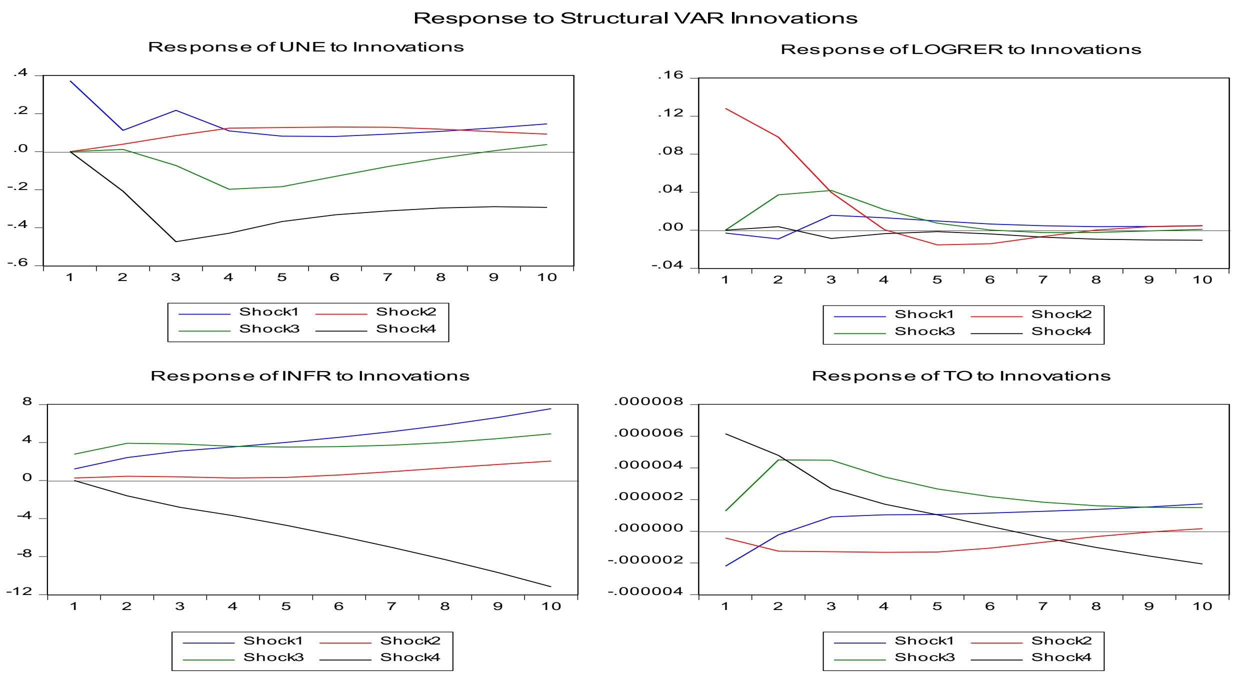


Figure 7: Structural Impulse Response Graph
Source: Generated by the author using Eviews 10(2023)

Forecast Error Variance Decomposition

Measurement of the forecast error variance for each of the variables under study to both their own shocks and shocks from other variables is the main goal of the forecast error variance decomposition technique. The appendix contains the variance decomposition results along with both the direct and indirect impacts of the shocks.

Table 11 Variance Decomposition

Variables			
Period	*P_1-P_4*	*P_5-P_7*	*P_8-P_{10}*
UNE	83.79602	79.38797	77.89627
RER	10.17201	11.42083	10.30138
INFR	3.925691	3.965014	4.063506
TO	1.432007	3.100548	3.564146

Source: computed by the researcher using Eviews. Version 10.0 (2023)

Table 11 above shows the contemporaneous relationship between UNE and other variables in the SVAR system. The result from the table above shows the UNE has a total variation of 83% in the first period and kept reducing to 77% in the 10^{th} period. Also, the response of UNE to innovation from RER increases from 10.1% to 11.2% from the 1^{st} period to the 7^{th} period, as it reduces to 10.3% in the 10^{th} period. Meanwhile, the response of innovations of UNE from innovations INFR increased from 3.92% in the 1^{st} period to 3.96% in the 7^{th} period and further increased to 4.06% in the 10^{th} period. Also, the response of UNE to innovation from TO increases from 1.43% in the 1^{st} period to 3.56% in the 10^{th} period.

CONCLUSION AND RECOMMENDATION

Conclusion

The study concludes that trade openness has a significant negative effect on unemployment in Nigeria, indicating that opening the Nigerian border to trade has adversely affected the unemployment rate. This is due to the decline in productivity and efficiency of industries, leading to increased unemployment. Also, exchange rate fluctuations have a positive impact on labour in both the short run and the long run. In addition, the depreciation of the Real Effective Exchange Rate (RER) increases the labour participation rate, particularly in the long run. The pass-through of RER to unemployment is symmetrical in the short run but asymmetrical in the long run, with depreciations having a substantial impact. Domestic currency appreciation causes a smaller increase in the unemployment rate compared to a depreciation of the same value.

Recommendations

Nigeria's government, through the Ministry of Trade and Investments, should Implement protectionist policies, such as tariffs and import quotas, to shield domestic industries from foreign competition and increase employment opportunities and industrial growth in the nation. The Central Bank of Nigeria (CBN) should develop suitable monetary policies in response to changes in the real exchange rate to address the negative impact of currency rates on unemployment in Nigeria. CBN should also be alert to exchange rate variations and implement quick monetary policy changes to reduce inflationary pressure from outside sources, prioritise foreign exchange interventions and accelerate structural reforms to increase economic diversity and reduce reliance on imports.

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