



(RESEARCH ARTICLE)



The effect of exchange rate fluctuation on households' purchasing power in Nigeria (2000 – 2022)

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Abstract

The study investigated the effect of exchange rate fluctuation on household's purchasing power in Nigeria between 2000 and 2022. While E-views student version 12 statistical software was employed in computing the result, time series data used in this study was sourced from the World Development Indicators Database (WDI). The econometric techniques used in the analysis were: The Unit Root Test, Johansen Co-Integration Test, Vector Error Correction Model. The Johansen cointegration results confirm that the variables are cointegrated, highlighting a long-run relationship among the variables. Furthermore, the result revealed that the exchange rate has a negative and statistically significant impact on GDP per capita at a 5 percent significance level. Based on the findings, the study recommended that the government adopt policies and strategies that would enable them to strengthen the value of Nigerian currency (naira) in the foreign exchange market and ensure exchange rate stability is maintained with other foreign currencies. However, a stable exchange rate can positively impact households' purchasing capacity by reducing inflationary pressures and ensuring that imported products remain affordable.

Keywords: Exchange rate; Inflation rate; Interest rate; VECM; Nigeria

1. Introduction

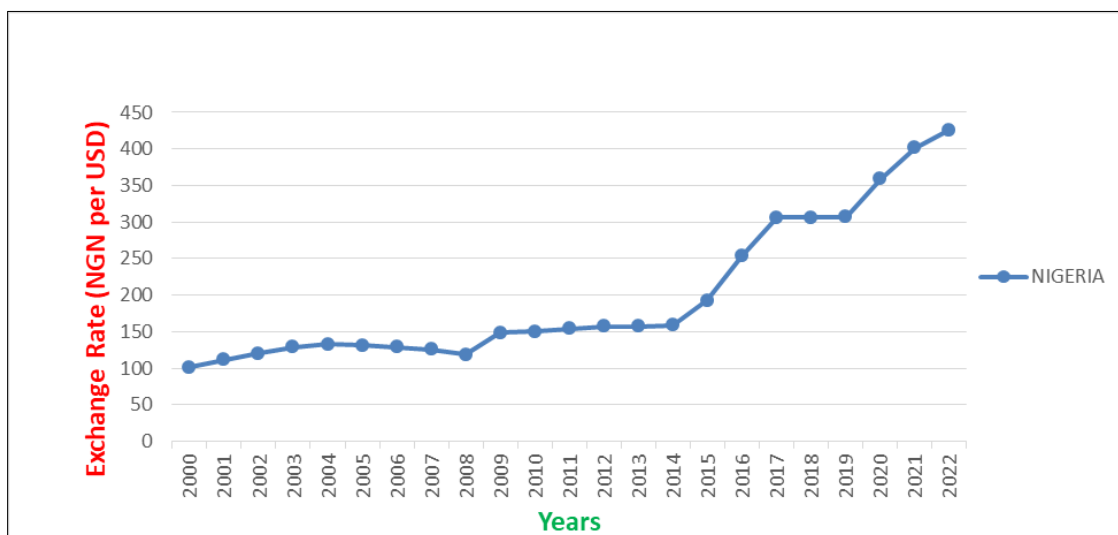
The exchange rate is one of the major macroeconomic indicators that measure a country's economic performance in international competitiveness over time. Stable exchange rates have a powerful impact on influencing households' purchasing power. The most important responsibility assigned by the government to monetary agencies or policies is to maintain exchange rate stability with the trading partner's countries. In Nigeria, the issue of exchange rate fluctuation has a long-term history traced back to the 1960s the country maintained a stable rate of exchange against other foreign currencies until 2001 when the exchange rate between the Naira and the US dollar hit ₦111.85 per \$1 and afterward it tends to fluctuate. In recent years, the Nigerian economy has been affected by the exchange rate fluctuation, which led to the depreciation of the naira in the foreign exchange market and these in turn increase the price of imported products and weaken household purchasing capacities. (Ahiabor, G., & Amoah, A. (2019).

Thus, the exchange rate is the price of one currency expressed in terms of another currency (Mordi 2006). More so, the exchange rate is an important macroeconomic variable that determines the global position of the economy of a country.

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in international trade, a country’s exchange rate could be used as the barometer of its international competitiveness. It is the weight of a country’s currency on an international scale. Many other factors affect it. Bergen (2017) argues that the exchange rate of a country may be affected by numerous factors such as inflation rate, interest rate, current account deficits, external debts, import dependence, political stability, and market speculation driven by traders and investors.

The exchange rate is up of two types namely, the nominal exchange rate and the real exchange rate (Zoramawa, Ezekiel & Kiru, 2020). Zoramawa et al (2020) posit that the nominal exchange rate simply is the rate at which the currency of a country can be exchanged for another. On the other hand, the real exchange rate is the exchange rate between countries that takes into account the price level difference between them, and mostly they are useful in international trade. Therefore, when domestic currency is appreciating in the foreign exchange market can cause the prices of domestic goods to rise when sold abroad, resulting in reduced demand for exports. This, combined with inflation and other macroeconomic factors, has impacted household purchasing power in Nigeria throughout the year (Uchechi & Iheukwumere, 2022) these factors have influenced the prices of imported products (Uddin, Rahman & Quaosar, 2020). Additionally, the exchange rate fluctuations have impacted the prices of imported goods and services, which have a significant impact on the cost of living in Nigeria.



Note: This chart displays the Exchange Rate (vs USD) for Nigeria from 2000-2022 Source: The researcher plots the graph using Excel

Figure 1 Nigeria Exchange Rate Chart

Figure 1 illustrates the trends between the naira and the USD from 2000-2022. The graph plot above shows that the rate of exchange at the official investors and exporters (I&E) window between the naira and the US dollar is ₦ 425.9791581 per \$1 as of 6th September 2022 respectively. Thus, the situation tends to exacerbate and now the rate of exchange is ₦ 903.9254 per \$1 at the official Investors and Exporters (I&E) window as of 24th December 2023, an increase of 0.53% from September 2022 to December 2023. Hence, as the value of the Naira tends to rapidly depreciate against the US dollar, there has been an increase in demand for the US dollar, and this raise the price of imported products. Akinlo & Onatunji, (2020).

Nigeria has adopted a floating exchange rate system, where the currency's value (naira) is determined by market forces of demand and supply. This has resulted in significant fluctuations in the value of the naira against major currencies such as the US dollar, and the British pound (Anyanwu, et al., (2018).

The impact of exchange rate fluctuations on households purchasing power in Nigeria has been a subject of significant interest among researchers, academicians, investors, and policymakers. Exchange rate fluctuations affect the price of imported goods, which is vital for a developing country like Nigeria which heavily relies on imports for essential items such as food, clothing, and electronics. When the value of the naira depreciates against foreign currencies, the cost of importing these goods rises. Consequently, local market prices increase, compelling households to allocate more part of their incomes to the same quantity of goods, thereby reducing household purchasing power Alugbuo, Eze, and Osuji (2020). Another way in which exchange rate fluctuations affect household purchasing power is through inflation. Inflation refers to the rate at which the overall price level of goods and services in an economy rises. When the naira depreciates, it leads to higher inflation rates. The increased cost of producing goods and services in Nigeria exacerbates this effect. As a result, household incomes lose real value as Nigerian currencies tend to depreciate, making it more

challenging for households to maintain their purchasing capabilities and living standards. (Anidiobu et al., 2018). Fluctuations in exchange rates have powerful effects on the imports and exports of the countries in question through relative prices of products and other services.

He further contributes to this understanding by emphasizing the relationship between exchange rate fluctuations and inflation, elucidating how the depreciation of the naira leads to higher inflation rates and diminishes the real value of household incomes.

However, there are a couple of studies on the effect of exchange rates on different macroeconomic variables including, inflation, economic growth, interest rate, and foreign direct investment; this study took a different approach by using a VECM model. This study examines the long-run effect of the exchange rate fluctuation on household purchasing power. The remaining parts of the paper are as follows; review of related literature presented in Section 2, the methodology used in the study discussed in Section 3, the results of the analysis carried out presented in Section 4, and lastly, Section 5, which provides the conclusion and policy recommendation.

2. Review of related literature

Similar research has been carried – out by various researchers both in the home country Nigeria and across foreign countries. These researchers all have come up with interesting but different results and findings using different methodologies.

Sajad Ahmad Bhat and Javed Ahmad Bhat (2020) conducted a study on the impact of exchange rate changes on the trade balance in India. The study indicates that no evidence of J-curve in the case of India. The findings demonstrated that, in the long run only the impact of currency depreciation is statistically significant. However, in the short-run currency appreciation deteriorates the trade balance and currency depreciation improves.

In their study, Seher Mumtaz, and Muhammad Ali (2020) investigated the Impact of the exchange rate and its volatility on domestic consumption in India and Pakistan using the time series data covering from 1980-2018. The study uses empirical models to differentiate between the nominal and real variables to isolate the impact of inflation pass-through. The short run and long run are identified using the ARDL model cointegration method. The findings indicate that there is no significant relationship between nominal and real exchange rates with consumption in Pakistan. However, in India, an increase in the real exchange rate increases consumption whilst an increase in the nominal exchange rate reduces consumption, indicating inflation pass-through. The volatility of the real exchange rate in Pakistan has a positive relationship with consumption. Whereas, in India, the volatility of the nominal exchange rate has a negative relationship with consumption; indicating the effect of inflation pass-through in India. Their results demonstrate that there is a presence of a long-run relationship between exchange rate volatility and consumption in Pakistan and India, and the exchange rate stabilization can improve the sustainability of consumption in both countries.

Zoramawa, Ezekiel & Kiru, (2020) also investigated the impact of the exchange rate, as an important determinant of economic growth in Nigeria between 1980 and 2019. The study employed multiple regression analysis; Unit Root Test, Johansen Cointegration Test, and Error Correction Model (ECM). The result showed that exchange has a positive and statistically significant impact on economic growth at a 5% level of significance. However, the result further revealed that economic openness was found to have impacted negatively on economic growth.

Thomas Habanabakize (2021) study employed the time series data spanning from 2002 to 2020 to determine the Household Consumption Expenditure's Resilience towards Petrol Price, Disposable Income, and Exchange Rate Volatilities. The results showed that a long-run relationship exists between the dependent variable and the independent. Furthermore, the level of consumption expenditure in South Africa was found to be determined by exchange rate volatility and income level whilst changes in petrol price had no significant effect on short-term consumption expenditure.

Valogo et al., (2023) studied the effect of exchange rate on inflation in the inflation targeting framework. The study employed the threshold autoregressive (TAR) method. The results of the ERPT model revealed that exchange rate depreciation has a significant positive pass-through effect on inflation. The results of the monetary policy rule model also showed that regardless of the threshold level of 0.51%, the exchange rate significantly influences the monetary policy rate positively.

Amanda, Akhyar, Ilham, and Adnan, (2023) investigated the effect of inflation, exchange, and interest rates on stock price in the transportation sub-sector, 2018-2020. The sample in this study was 11 transportation companies listed on

the IDX for the 2018-2020 period. The method of data analysis used in this study is the panel data regression analysis method. The results of the study prove that partially, the inflation variable (X1) has a positive and significant effect on stock prices (Y), exchange rates (X2) has no significant negative effect on stock prices (Y), interest rates (X3), no significant positive effect on stock prices.

Erkan Ozata (2020) also examined the effect of exchange rate volatility on economic growth in Turkey between 1998:Q1 and 2019:Q3. ARDL model was used to analyze the effect of exchange rate volatility on economic growth in Turkey. The GARCH model is also used to calculate the volatility of the real effective exchange rate. Based on the findings, the results of the ARDL model show that real effective exchange rate volatility has a negative and statistically significant effect on economic growth in Turkey. The long-run coefficients of export and investment have a significant positive effect on real GDP, and import and exchange rate volatility have a significant negative effect on real GDP.

3. Methodology

The data to be used for this study are annual time series data spanning from 2000 to 2022. The data used for both dependent and independent variables were obtained from the World Development Indicators Database (WDI). The model used in this study is the multiple regression analysis.

Table 1 Description of the variables and sources

Sign	Variables	Source
GDPPC	GDP Per Capita	WDI, World Bank
EXCR	Exchange Rate	WDI, World Bank
INF	Inflation Rate	WDI, World Bank
INF	Inflation Rate	WDI, World Bank

3.1. Model specification

The study employed multiple regression analysis as specified as follows:

$$GDPPC = f (EXCR, INFR, INTR) \dots\dots\dots Eq. 1$$

The above model can be expressed in a linear form as thus:

$$GDPPC = \beta_0 + \beta_1EXCR_t + \beta_2INFR_t + \beta_3INTR_t + \varepsilon_t \dots\dots\dots Eq. 2$$

Here, GDPPC implies gross domestic product per capita, EXCR implies exchange rate, INFR implies inflation rate, and INTR implies interest rate

Eq. (1) Shows that GDPPC depends on EXCR, INFR, and INTR at time t while ε_t indicates the error term that accounts for determinants outside the model.

3.2. Method of data analysis

The statistical techniques of analysis that will be used in this study are unit root test to ascertain the order of integration and Johansen co-integration test. The following techniques of estimation will be employed in carrying out this analysis.

3.2.1. Unit root test (ADF/PP TEST)

The unit root tests are carried out using the Augmented Dickey-Fuller (ADF) and Phillips-Perron tests to determine the stationarity of the variables available for the study. This helps to determine the order of integration of the variables. The decision rule states that; if the ADF/PP test statistic is greater than the critical value at a 5 percent level of significance, we accept the null hypothesis and reject the alternative hypothesis i.e the variable is stationary, but if the ADF/PP test statistic is less than the critical value at 5 percent level of significance i.e the variable is non-stationary, then we reject the null hypothesis and accept the alternative hypothesis. If the variables in the study are not stationary at a level however it is expected that the variable becomes stationary at first difference, Dickey and Fuller, (1979). The essence of the unit root test is to resolve the problems of spurious regression results.

3.2.2. Co-integration test

After the test for the order of integration, all the variables are stationary after the first difference. Therefore, the next step is to perform the Johansen co-integration test. This test is used to check if a long-run relationship exists among the variables in our models.

4. Results and discussion

The results of the analysis are presented in subsections below; starting with the unit root test result in subsection 4.1. The Johansen co-integration test and VECM result are in subsection 4.2. The ordinary least square in subsection 4.3

4.1. Unit root tests

Using the Augmented Dickey-Fuller and Phillips-Perron tests the variables are checked for unit root and found that all are stationary after the first difference i.e. integrated of order I(1). The result of the unit root tests is presented in Table 1, below.

Table 1 ADF test

Variable	ADF Statistic	Critical Values	Significance Level	Order of Difference
GDPPC	-5.888701	-3.020686	5%	I (1)
EXCR	-4.522022	-3.658446	5%	I (1)
INFR	-4.796255	-3.710482	5%	I (1)
INTR	-4.067482	-3.710482	5%	I (1)

Source: author's compilation from Eviews 12 software Regression output (2023).

Table 2 Phillips-Perron test

Variable	PP t-Statistic	Critical Values	Significance Level	Order of Difference
GDPPC	-8.366407	-3.644963	5%	I (1)
EXCR	-3.728330	-3.644963	5%	I (1)
INFR	-7.394438	-3.012363	5%	I (1)
INTR	-8.701174	-3.012363	5%	I (1)

Source: author's compilation from Eviews 12 software Regression output (2023).

The results of the ADF and PP unit root tests presented above suggest that all the variables of the test indicate non-stationary at levels. However, these variables were stationary after the first difference, which implies that they are integrated of order I(1) series. Given the unit root properties of the variables.

4.2. Co-integration test

The results of the co-integration test, based on the Johansen co-integration approach are presented in Table 2. Co-integration is tested on the long-run relationship between the dependent variable and independent variables. The Table indicates that the test failed to accept the null hypothesis of no co-integration at a 5% level of significance. Both the trace and maximum Eigenvalues suggest that the GDPPC and independent variables have at least one common stochastic trend driving the relationship between them. The Johansen co-integration test shows that there is a none* co-integrating equation in the model with both trace and maximum eigenvalue suggesting a 5% significance level. This implies that there is a long-run relationship between dependent and independent variables.

Table 3 Cointegration test results

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.801406	62.32941	47.85613	0.0013
At most 1	0.611004	28.38304	29.79707	0.0721
At most 2	0.305050	8.555136	15.49471	0.4081
At most 3	0.042540	0.912899	3.841466	0.3393

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level; * denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values; **Source:** author’s compilation from Eviews 12 software Regression output (2023).

4.3. Error correction model results

The null hypothesis of the study is tested using the vector error correction model (VECM). The null hypothesis is rejected since the trace and maximum Eigen value is greater than the critical value at the 0.05 level of significance and accepted if the trace and maximum Eigen value are less than the critical value at the 0.05 level of significance. The R-square of 0.644 explains that the explanatory variables cause 0.36 percent of the total variation in GDPPC. This implies that the overall regression is significant.

4.4. Ordinary least square (ols)

Dependent Variable: D(GDPPC)

Method: Least Squares

Date: 03/03/24 Time: 10:45

Sample (adjusted): 2001 2022

Included observations: 22 after adjustments

Table 4. The ordinary least square method of analysis is used to estimate the relationship between a dependent variable and one or more independent variables. It is mostly used in linear regression analysis and is considered to be one of the most important techniques in econometrics.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXCR	-0.025119	0.006546	-3.837277	0.0011
INFR	0.136575	0.173529	0.787041	0.4410
INTR	-0.077102	0.105434	-0.731282	0.4735
C	6.129679	2.295364	2.670461	0.0151
R2 = 0.45%,				
Durbin-Watson stat = 1.749830				
F-statistic = 5.197005				
Prob(F-statistic) = 0.008632				

Source: author’s compilation from Eviews 12 software Regression output (2023).

The pre-test in the table above shows that the coefficient of correlation (R^2) with a value of 0.45 implies that approximately 45% of the total variation in GDP per capita is explained by EXCR, INFR, INTR, while the remaining 55% is accounted for by factors not specified in the model. The F-statistics value is 5.197005 with the F-Prob value of 0.008632 showing that the model is significant to the study. This is because the probability value of 0.008 is less than

0.05 i.e. at a 5% level of significance which led to the rejection of the null hypothesis which states that there exists no significant relationship between the explanatory variables and the dependent variable; hence, the acceptance of alternative hypothesis which states otherwise. The coefficient of exchange rate indicates a negative sign and is statistically significant. This implies that a negative exchange rate indicates that the Nigerian currency (naira) has weakened relative to foreign currencies. When the exchange rate of a country is weak or depreciated can lead to higher import prices, which can increase inflationary pressures. Higher inflation can inversely impact GDP per capita by reducing household purchasing power and potentially slowing down economic growth. The coefficient of INFR indicates a positive sign and the coefficient of INTR is negative and both are statistically insignificant, this implies that the change in INFR and INTR does not have any significant impact on GDP per capita and household purchasing power.

4.5. Result of diagnostic test

Table 5 Diagnostic test results

Test	Test Statistic	P-Value	Decision
LM Serial Correlation Test	0.544634	0.5898	Accept
Heteroskedasticity Test	0.271233	0.8453	Accept
Normality Test	5.523787	0.0631	Accept

Source: author's compilation from Eviews 12 software (2023).

The diagnostics tests have been carried out to ensure the robustness and reliability of the results. The results of the test indicate that the p-value of the Breusch-Godfrey Lagrange Multiplier Test for Serial Correlation shows that we cannot reject the null hypothesis signifying the model is free from the serial correlation. More so, the Breusch-Pagan Godfrey Test for Heteroskedasticity reveals that the model estimated does not suffer from Heteroskedasticity for the given sample period., as the p-value of the f- statistics is greater than 5 percent. Additionally, the p-value 0.0631 for the Jacque-Bera statistics in the model is higher than the 5 percent. Therefore, the model is normally distributed. The diagnostic test results above ensure the study is more valid and reliable.

5. Conclusion

This paper examined the effect of exchange rate fluctuation on households' purchasing power using GDP per capita as the dependent variable and exchange rate, inflation rate, and interest rate as independent variables covering from 2000 – 2022. This study applies the Johansen co-integration test and VECM technique, the results indicate that there is a long-run relationship between GDP per capita and explanatory variable. Likewise, an ordinary least square is also employed to check the significance of the model to the study.

Recommendations

The following recommendations by the researcher were proffered:

- The government should adopt a policy to prevent the surge of exchange rate and to maintain its stability in the foreign exchange market. This will help reform households' purchasing power and avoid price fluctuations that could negatively affect the households'.
- The monetary agencies and policy makers have to employ strong policies that would favor domestic currency to regain its strength.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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