ANALYSIS OF THE IMPACT OF EXCHANGE RATE ON PRICE LEVEL IN NIGERIA

ABSTRACT

The study focused on Analysis of the Impact of Exchange Rate on Price Level in Nigeria from 2017 to 2022 with variables ~~of interest~~ as Inflation, exchange rate, tariff rate, import and interest rate. The research employed the Ordinary Least Square (OLS) regression method with the pre-test of Augmented Dickey Fuller (ADF) unit root test. The regression result showed a negative and significant relationship between exchange rate and inflation, tariff rate was positive and significant in relationship with inflation. While import was negatively and insignificantly related to inflation, interest rate was having a positive but not significant relationship with inflation. We recommend that moderate or realistic tariff rate be negotiated among trading nations. Also local production of goods for export that will counter the negative impact of import to avoid imported inflation and strict monitoring of the activity of CBN and commercial banks in exchange rate dealing to avoid unnecessary and unproductive use of dollars.

Key Words; Impact, Analysis, Price level, Exchange rate, Tariff, import, interest rate

1.0 Introduction

Price is a vital indicator in the market. It is a strong instrument in economics for the firm as producer, the individuals as potential buyers, the government and the society at large. It is affected by many factors as they relate to factor prices and market related policies of government. The exchange rate has been discovered as one important factor that affects value of currencies of many countries like Nigeria. It is also a price that is of utmost concern to the government because it impact on the national currency. According to Eze and Dumani (2020), inflation and exchange rate have dual effect on nations' currencies attacking the local value of national currency and the international value of the national currency at the same time posing serious problem for policy makers.

Obadan (2006) wrote on overview of exchange rate management in Nigeria and stated that the naira exchange rate for $1 was N.85 in 1985 a year to the introduction of the Second tier Foreign

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Comment [MF2]: In economics we cannot state 'variables of interest' because the selection of explanatory variables is related to the believe of their effects on the dependent variable based on theoretical background and empirical reviews. The author should emphasize on how the dynamics of the variables are important to the research problem in Nigeria based on the objective of the study!

Comment [MF3]: Instead state 'trading partners with Nigeria'

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Exchange Market (SFEM). The exchange rate for the naira became $1 to N2.02 in 1986 after SFEM and later rose to N117.30 to $1 in 1992. The exchange rate has been on the rise up to 2002 and 2004 as reported by Obadan (2006) to be N121.00 to $1 and N133.5 to $1 respectively. According to him the naira has depreciated up to about 99.3% between 1985 and 2004 and has appreciated by 1.8% and fairly stable in 2005 as a result of the phenomenal increase in oil price at the international oil market.

The exchange rate serves as a financial tool for measuring the value of goods and services at the international market and its instability has significant influence on domestic consumption through prices of goods and services. Babangida *et al* (2021). There has been the problem of exchange rate volatility (non-stability of rate of exchange of Naira to the Dollar) from the late 80s. The major reason could be the mono-cultural nature of Nigerian economy that is solely dependent on crude oil for export and lack of the country's preparedness to diversify its economy to be able to produce other goods for export. As the exchange rate of naira to dollar continues to dwindle it resultant effects on price of imports is inestimable. Nigeria is one of the African countries that are known for massive importation of raw materials and finished goods so, for this reason domestic price is bound to be affected by the non-stable exchange rate.

When exchange rate is fairly stable for a reasonable period of time the price of imports will also be fairly stable and this will extend to domestic prices. A stable economy with manageable and acceptable rate of inflation will induce employment, saving ability of workers, private investment and growth and development. Right from when oil was discovered in large quantity in Nigeria attention has been shifted to oil production leading to neglect of other sectors that have sustained the economy. Agriculture, industrialization and other relevant sectors like education and health have not been given proper attention from government. As a result of this, the nation's exports have become extinct with importation becoming the order of the day. The

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Comment [MF9]: The discovery of oil is an important note for Nigeria. Therefore, the paragraph will be more valuable to scholars andreaders if the author can state the year(s) that oil was discovered and extracted in Nigeria.

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massive importation that visited the country from the late 80s is one of the factors that led to the crash of the naira in the foreign exchange market and unfavorable balance of payment in the nation's budget.

This article seeks to investigate the trend in the naira exchange rate and it impact on price level in Nigeria from 2017 to 2022 by considering inflation,exchange rate, tariff rate andinterest rate

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1.2 Objectives of the Study

The broad objective of the study is to research into the impact of exchange rate on price level in Nigeria while the specific objectives are to;

1. Find out the relationship between exchange rate and price level
2. Investigate the impact of import on price level in Nigeria
3. Study the influence of tariff rate on price level
4. Show the response of price level to interest rate.

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2.0 Review of Literature

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2.1 Exchange Rate

Foreign exchange is a standard currency of a nation that change hand with the local currencies of other countries approved for payment at the international market. Obadan2006 said that the exchange rate is an important price that the government picks active interest in and has the real and nominal exchange rate. It could be seen as the price a foreign currency exchange for a unit of local currency or the price a foreign currency sells in exchange for a local currency. He further explained Nominal Exchange Rate (NER) as a concept that measures the relative price of two currencies for instance the naira in relation to dollar while the Real Exchange Rate (RER)

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measure the relativeness of the price imports and exports tradable at the international market and that of goods and services produced and consumed locally.

CBN (2021) defined foreign exchange as the price of one currency in terms of another currency. It further stated that it is one out of numerous macroeconomic indicators that determines the overall performance all nations of the world. According to Mordi in CBN (2021), it is an important price variable and plays double roles of giving countries the vigor to compete with others nations at the international market and as a major determinant of local prices. Foreign exchange could be expressed directly in terms of price at which the home currency sells for a unit of the foreign currency for example N925 = $1 or indirectly as the price at which the foreign currency exchange with one unit of the local currency for example $1 = 0.0011.

The fixed and floating exchange rates were introduced as measures to create a stable exchange rate. The fixed exchange rate system was introduced in 1994 which has to do with pegging of the naira to a unit of dollar. At that time the naira was pegged at N22 = $1 with foreign exchange earnings domiciled in the CBN. The Autonomous Foreign Exchange Market (AFEM) was reintroduced with a dual exchange rate. This was meant to achieve a stable exchange rate for the naira but the CBN could intervene at its discretion. Obadan in CBN, (2021)

From July 1986 when Structural Adjustment Programme (SAP) was introduced, the Second-tier Foreign Exchange Market was established to manage foreign exchange with the aim of to provide an effective mechanism for allocating foreign exchange to guarantee it stability in the short run and balance of payment equilibrium in the long run. The naira was made to flow and its value was left to be determined by the market force of demand and supply while the CBN established an institutional framework it trading in that market determined environment. Obadanin CBN, (2021).

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2.2 The Price Level

The level of Inflation or Deflation is adjudged by the extent of price in an economy. The average of all prices of goods and services collected in a country is manipulated through mathematical calculation by comparing a base year price and current year price to come out with a price index that will determine the level of inflation in the economy. According to Mankiw (2016), the price level is measured by the Consumer Price Index.

Dornbusch et al (2011) defined the price level as the accumulation of past inflation. The present price level is the previous price level adjusted for inflation. Prices may be higher at some certain periods and lower at some other times, the price level is presently a reflection of these past prices in the economy. The price level falls or rises depending on the direction of inflation and it fall and rise when inflation is negative and positive respectively.

Oseni in Eze and Dumni (2020) opined that exchange rate volatility brings about fluctuation in the host country's currency. When the standard currencies like the dollar rise, it affects macroeconomic variables such as manufacturing outputs, price of non-durable goods and services, general consumption, investment and balance of payment. When the exchange rate continues to rise, the effect on developing countries like Nigeria is enormous. In the first instance, we depend on massive importation of goods and so high exchange rate increase prices within.

Price level is the current prices of all goods and services produced in the country averagely measured considering previous prices in the economy. The price level is not limited to goods and services only but also to the price of security. (https://www.investopedia.com/terms/p/price_level.asp). The price level is an important economic indicator that play vital role both at the home or world market. It influences the

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purchasing power of consumers for goods and services and also a signal for the suppliers of goods and services. Price levels in the economy means the value of money. That is the purchasing power of money; described by how much can equivalent dollar buy compared to before. In Nigeria the Consumer's Price Index (CPI) is used to measure the price level.

According to Martin (2011) price level is viewed from the point of Purchasing Power Parity (PPP) and defined it in terms of the price level index as the ratio of GDP to the exchange rate which he named the reciprocal of this ratio as the real exchange rate. The reason for this is that the GDP andused here is already adjusted to inflation. With this explanation, the price level has to do with the present purchasing power of currencies compared to the purchasing power of their equivalence some year back.

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2.3 Foreign Exchange and the Price Level: A link

Dornbusch et al (2011) in his explanation of balance of trade affirmed that in order to allow for inflow of capital into the host country, the government should maintain a high interest rate. They went further to say that if domestic price is high it will make the locally produced goods more expensive for foreigners to buy and this will make our goods less competitive at the international market. In the first instance, more foreign currency (i.edollars) will flow in which might allow the dollar to crash and Naira appreciating. In the second instance, because of the high domestic prices foreigner will not patronize our goods therefore our export will decline and more foreign goods will be imported. There will be more pressure on dollar as a result of high demands for foreign good over domestic goods and this will cause Naira to depreciate with resultant balance of trade deficit.

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Devaluation or depreciation of domestic currency may stimulate economic activity because it is believed that it causes the prices of foreign goods to increase relative to the prices of domestic or

home goods. Depreciation means increase in the domestic currency price of foreign exchange. Considering nominal price home and abroad, depreciation increases the relative price of goods imported into the home country and reduces the relative price of export goods from home country whose currency is being devalued (Dornbusch et al, 2011). The reason for devaluation is to boost economic activity in the country whose currency is devalued. When this is done imports reduce due to increase in its relative price and exports rise.

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2.4 Theoretical Framework

The foundation of this study is built on the Purchasing Power Parity (PPP) theory. The theory takes cognizance of the difference in price-level behaviours between two nations in a way to ensure constancy in the trade balance. According to Dornbusch et al (2011), "Purchasing power parity of the exchange argues that exchange rate movement primarily reflects differences in inflation rates between countries". PPP is an apparent explanation of the trend in exchange rate movement mostly when there is large inflation difference between two countries. Expansionary monetary policy leading to increased money stock, if price level movement is induced by change in money supply as may likely be if there is high inflation PPP relationship should be expected to hold in the long run.

Given $R = \frac{eP_f}{P}$

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Where e = nominal exchange rate

P_f = foreign price

P = local price

The aim of PPP is to maintain a constant trade balance represented by the right hand side of the equation above

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2.5 Empirical Reviews

Eze and Dumani (2020) studied foreign exchange rate and consumer price change in the Nigerian economy and their study anchored on the purchasing power parity theory. They used time series data covering 1990 to 2018. They adopted the ex-post facto research design and modeled the OLS for data analysis. Their results showed a positive but insignificant relationship between foreign exchange and the level of inflation in Nigeria while interest rate negatively and significantly impact on inflation in Nigeria. The concluded that rising trend in the exchange rate causes a resultant rise in the general price level while increase in the lending interest rate has no positive influence on the general price level in Nigeria. Their study recommended the monetary authority to ensure foreign exchange rate stability to avoid imported inflation and also to maintain a fairly stable and attractive lending interest rate to ensure equilibrium between aggregate demand and supply. It finally suggested a stable exchange rate for the Naira that gives it appreciable value internally and across the border.

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Adekule (2010) did a research on exchange rate and consumer price index (CPI) in Nigeria: a causality approach and his major objective were to ascertain the significant relationships between the official and parallel exchange rates and the consumer price index in the country. He analyzed data from 1986 to 2007 using correlation technique and causality approach. His variables are consumer price index, official exchange rate, parallel exchange rate and inflation. His results showed a strong and positive relationship between imports and price index than it exists between official and parallel exchange rates and the consumer price index. According him, the coefficient between autonomous exchange rate and consumer price index (CPI) is less than significant than the official and the import ratio in the economy showed that imports and price index have causal effect on each other. His study recommended a realistic and more liberalized exchange rate system to check the activity of the parallel market and implementation of policies that will increase output of domestically to reduce importation.

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Oriawote and Eshenake (2012) wrote on real exchange rate and inflation: an empirical analysis of the Nigerian experience. The data for the study covered 1970 to 2010 and the OLS was used to analyze it with the co-integration as major tool. The variable used are; real effective exchange rate, consumer price index, import, and money supply. The result of co-integration showed a long run relationship between inflation and exchange rate and error model was satisfactory as a support to the long run relationship. The result also showed that both domestic and imported inflation caused the exchange rate to appreciate and persistence volatility between the rate of inflation and real exchange rate. They recommended that inflation targeting should not be the only option to stabilize the real exchange rate but to formulate policies that will ensure increased production of export goods to surmount imports to avoid imported inflation.

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Bakare (2014) researched into exchange rate volatility, devaluation and price level dynamics in Nigeria. He analyzed time series data from 1984 to 2013 using OLS with the necessary pretest of unit root. He involved the exchange rate, real GDP, inflation, and money supply. The results showed a significant and negative relationship between exchange rate volatility, general price level and devaluation in Nigeria. According to him the past value of the exchange rate volatility could be used to predict the present behavior of general price level and the value of naira in Nigeria going by the results of analysis. The study concluded that exchange rate volatility cause devaluation of currency and is responsible for inflation in Nigeria.

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Omosewaru and Taofeek (2008) investigated exchange rate variation and inflation in Nigeria. The collected secondary data covering 1970 t0 2007 and use the OLS for data analysis with co-integration to find out the long-run relationship among the variables. The variables used are inflation, exchange rate, money supply, government expenditure, and oil revenue. The results showed that inflation rate, exchange rate, oil revenue, government spending and money supply

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are co-integrated while inflation and exchange rate showed no long term relationship but short term relationship. The study concluded there is short-run relationship between inflation and exchange rate and recommended appropriate policy to manage the exchange rate so that it volatility would not cause inflation despite they do not move together in the long-run.

Nwokoye et al (2023) studied effect of exchange rate on domestic price level in Nigeria from 2015 to 2023. Their variables of interest are domestic consumer price, nominal exchange rate, import price index, international crude oil price and real GDP.They used the OLS regression with emphasis on the autoregressive distributive lag (ARDL) as tool of analysis. Their variables of interest are consumer price inflation, nominal exchange rate, import prices, international crude oil prices and real output growth.Their result showed a significant and positive connection between nominal exchange rate and consumer price inflation in Nigeria and import also impacted significantly on consumer price inflation and recommended that government at all level should encourage and support innovative ideas of business firms and individuals by supporting local production to substitute imports.

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Aabdulhamid et al (2022) carried out a research on inflation and exchange rate in Nigeria. They used time series data spanning from 1980 to 2021 and OLS regression with emphasis on Granger causalityand co-integration test. They chose the variables inflation, exchange rate, import and GDP. The findings revealed that inflation, exchange rate, import and GDP are co-integrated while exchange rate is found to impact positively and significantly on inflation. The study recommended a tight monetary policy to reduce volatility of exchange rate in order to achieve stability in both exchange rate and in the domestic price.

Comment [MF40]: The variables of the study are

Bada et al (2016) conducted a research on exchange rate pass-through in Nigeria covering 1995 to 2015. They used the nominal effective exchange rate, US price index, crude oil price and real

GDP. They employed the OLS regression using Johansen co-integration test and error correction model as major tools of analysis. The study found out that the exchange pass-through into Nigeria's CPI's inflation is complete. The impact on import was higher than on consumer price meaning that the pass through effect decline along the pricing chain. They recommended appropriate monetary policies by the CBN that could help maintain a stable exchange rate in order to ensure a stable price.

2.6: The Gap

This research used variables that are real indicators as they affect both international and domestic transactions and are variablesthat have direct link with inflation. When we discuss the issue of exchange rate, we are talking of foreign currencies especially the dollar and the naira. Since we study the impact on the price level in the country it is not necessary to use the dollar exchange as was done by Bada et al (2016). Also, looking through the empirical reviews it was discovered that some control variables such as GDP and other variables not connected with foreign transactions or have no link with price level or inflation as incorporated in the work of Bada et al (2016), Nwokoye et al (2023) and Abdulhamid et al (2022).

3.0 Model Specification and Method

The model for this study is the Ordinary Least Square (OLS) in the functional form;

INF = f(EXR, IMP, TRR, INTR). More explicitly the model is given as;

$INF = \square_0 + \square_1 EXR + \square_2 IMP + \square_3 TRR + \square_4 INTR + E$

Where;

INF = inflation

EXR= exchange rate

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Comment [MF42]: The sentence is general and weak. At this stage, the author should re-phrase the sentence to be specifically to Nigeria. For example, the author can state "This research involves variables that are real indicators to the stability of Nigeria's economy as they affect both international and… "

Comment [MF43]: In section 3.0, the author should state the source of data and specify the period and the intervals of the time series chosen for econometric testing; for example, the author can state "the time series for all variables in the econometric model are annual, quarterly, or monthly, etc. for the period from 2017 to 2022. It's important in econometric testing to know the period, the intervals of the observations and therefore the number of observations to be included in the testing. Different econometric techniques require different minimum of number of observations to obtain reliable results. The author should revert back to the assumptions of the econometric technique before conducting any test.

IMP = import

TRR = tariff rate

INTR = interest rate

E = error term

3.1 Variable justification

Exchange rate (EXR) as the price of one currency in terms of another has a close link with inflation. The volatility of exchange rate which causes the standard currency (dollar) to appreciate makes the domestic currency's purchasing power to depreciate especially when the country is import dependent like Nigeria.

Import also has direct link to inflation as it could be imported when prices of imported goods are high due to rising exchange rate. Nigeria is presently facing this problem because of exchange rate volatility. Price of foreign goods brought to the country continues to rise. For example, the price of phones have sky rocketed since 2016.

Tariff rate is another variable that can cause the price level to rise. Despite the fact that the trading countries charge a common tariff, if it is kept high could cause inflation if not checked by output growth.It is a form of tax which could affect firms and even the consumers. Finally, interest rate is one indicator that can influence capital flow across borders. If the domestic interest rate is highit attracts foreign capital which means more investment and more output. This will bring the price down. On the other hand, if the lending interest rate is high, business will be discouraged to borrow for investment leading to decreased output and more demand over supply means rising prices.

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"however, if tariff is kept at high levels would cause inflation if the tariff rate is not measured relative to output growth." Or
"however, if tariff rate is not measured relative to output growth and kept at high levels it will cause inflation."

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3.2 Data Analysis and Discussion

Table 1: Dickey Fuller Unit Root test at 1st difference with Trend and Intercept

Variable	ADF test statistic	Test critical value@5%	Prob.
INF	-4.5887	-3.6736	0.0090
EXR	-6.8059	-3.6449	0.0001
TRR	-4.1442	-3.6449	0.0191
IMP	-4.7141	-3.6763	0.0071

Source: Author's computation 2023

Table 1 is the result of Dickey Fuller unit root test. Looking through the ADF test values and the 5 percent critical values for all variables we could see that the absolute values of the first are greater than the absolute values of the later. This signifies that all the variables are stationery at first difference.

Table 2: OLS result

variable	Coefficient	Std. Error	t-Statistic	Prob.
EXR	-0.2359	0.1094	-2.1561	0.0441
TRR	0.0134	0.0017	7.7114	0.0000
IMP	-0.0003	0.0003	-1.0754	0.2957
INTR	0.0005	0.0053	0.0953	0.9250

R-Square = 0.7872 Adjusted R = 0.7537

Source: Author's computation, 2023

Table 1 shows the output of regression with EXR having a negative but significant relationship with INF. This negative sign means that they do not move in the same direction. It implies that as exchange rate rises, inflation falls. TRR showed a positive and significant relationship with INF meaning that they move in the same direction. INF rises with the TRR connoting that as tariff

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Comment [MF52]: the author need to show also the results of DF test at the level I(0) even if the time series for one variable or more are nonstationary at the level.

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One of the assumptions of OLS that the mean, variance, and covariances of the series are constant over time then the series are stationary at the level I(0), if the results of DF test at I(0) are not significant for one variable or more then the series have a unit root and are nonstationary at the level I(0); other econometric models should be considered.

Comment [MF54]: The regression results of OLS are biasedbecause the OLS regression has been conducted with time series at first difference … my advice to the author is to re-run the regression using the ARDL or DOLS econometric techniques to get reliable estimates for the problem of his article. ARDL and DLS are strong econometric techniques to measure the relationship of time series whether the time series are stationary at the level I(0) or at first difference I(1).

Comment [MF55]: I will provide my comments on the regression results (as well on the remaining sections of conclusion and recommendation) after the author runs the regression using Autoregressive Distributed Lag (ARDL) or Dynamic Ordinary Least Square (DOLS).

rate moves up, inflation follow suit. IMP is negatively and insignificantly related with INF. They move in opposite direction at an insignificant rate. Lastly, INTR is positively and insignificantly connected to INF. They move in the same direction but not significant. The value of the R-square 0.7872 is high indicating that about 78% of the change in the price level is accounted for by the explanatory variables. The model is well fit and the right model for the study.

Comment [MF56]: While analyzing and discussing the results of the regression, the author should also reflect on the theoretical and literature review discussed in section two.
Is the regression output in line with the literature relative to the explanatory and dependent variable relationships? In other words, is the sign of the coefficient of each explanatory variable represent the correct relationship with inflation as discussed in the theoretical and literature review of section two?

Table 3: Breusch-Godfrey Serial Correlation LM test

F-statistic	2.4511	Prob. F(2,1)	0.1161
Obs*R-squared	5.1479	Prob. Chi-square(2)	0.0762

Source: Authors computation, 2023

Table 3 is the output of one of the error tests for the model. The serial correlation showed the observed R-squared value to be 5.1479 with probability value of 0.0762. The probability value is greater than 5% which led to the rejection of null hypothesis that the residuals are serially correlated and accept the alternative that the residuals are not serially correlated.

Table 4: Breusch-Pagan-Godfrey Heteroskedasticity test

F-statistic	1.0757	Prob. F(4,18)	0.3975
Obs*R-squared	4.4375	Prob. Chi-square(4)	0.3500
Scaled Explained SS	1.3694	Prob. Chi-square(4)	0.8495

Source: Author's computation, 2023

The heteroskedasticity test in table four showed in the row of the observed R-square value of 4.4375 that it is not significant with a chi-square probability value of 0.3500 which is more than 5%. For this reason we reject the null hypothesis that heteroskedsticity exist in the residual and accept the alternative that there is no heteroskedasticity among the residuals.

Table 5: Jarque-Bera Normality Test

Jarque-Bera Statistic	1.2803
Prob.	0.5272

Source: Author's computation 2023

Table 5 shows the output of Jarque-Bera normality test. The jarque-Bera statistic 1.2803 is having a probability of 0.5272 which is greater than 5%. Therefore we reject the null hypothesis that the residuals are not normally distributed and accept the alternative that the residuals are normally distributed.

4.0: Conclusions

EXR and TRR are the variables that significantly affect INF. The coefficient of exchange rate has a negative sign which showed that it negatively and significantlyimpact on inflation and tariff rate positively and significantly contribute to price level in Nigeria.

IMP coefficient is negative but not significant implying that it contributeto INF in the opposite direction while INTR positively and meagerly but not significantly contribute to INF. This means that interest rate contribute to inflation but in a small amount while Import contribute in the opposite direction to price level.

The model for this study was considered fit with R-square equals 0.7872. This was backed by the various error correction tests such as serial correlation, heteroskedasticity and normality test.

4.1: Recommendations

Despite exchange rate was shown not to cause price level to rise when it rise, tariff rate is one of the foreign trade indicators that impacted positively and significantly on inflation in Nigeria. The

nation in the community of trading nations should advocate for a more realistic and fairly low tariff.

The government should keep lending interest rate moderate or very low to encourage investment. Despite import is seen as not positively impacting on the price level, local production of export goods should be encouraged to balance imports to avoid future imported inflation.

The exchange rate might not positively impact on the price level at present but in the long run it may. So, exchange rate policy of the CBN should focus on the activity of CBN itself and those of the commercial banks. Foreign currencies should be strictly sold to importers and exporters and those going for studies abroad and not for politicians who want to go for leisure and medical checkup abroad. This will go a long way in keeping the exchange rate checked and stable.

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Comment [MF57]: The need to correct the year of publication.

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