Research Paper

Assessing the moderating effect of COVID-19 on the influence of Dollar/Naira exchange rate towards inflation in Nigeria.

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Abstract
This paper examined the moderating effect of COVID-19 on the relationship between Naira/Dollar Exchange rate and Inflation in Nigeria. In order to achieve this objective, monthly data for Naira/Dollar exchange rate and inflation in Nigeria were obtained for both COVID-19 and non COVID-19 periods. The research also employed moderated regression equation to determine moderating (interaction) effect of COVID-19 on the exchange rate. The results of the moderated regression equation indicated that the COVID-19 can significantly moderate the relationship between Naira/Dollar exchange rate and Inflation in Nigeria.

I.   INTRODUCTION

Since the first appearance of COVID-19 in Nigeria on 27th February 2020, the Nigerian economy appeared to have been inversely affected. The World Health Organisation (WHO) declared COVID-19 a global pandemic thirteen days after on 11th March, 2020. According to Suleiman and Sani (2021), daily cumulative confirmed Covid-19 cases in Nigeria is significantly trending upward.

The COVID-19 pandemic significantly affects the stock market and exchange rate in emerging nations because investors withdrew their capital from emerging-market securities, leading to an increase in stock market volatility and depreciation of the currencies of these economies. Nigeria was no exception and the nominal exchange rate of the Nigerian Naira to the US dollar (USD) averagely reached 500 per one Dollar —the highest rate ever. Suleiman et al., (2018) reported that Naira/Dollar exchange rate shows significant increase from 2015 to 2017 due to economic recession Nigerian experienced during the period. The inadequate supply of foreign exchange by the CBN promoted the parallel market for foreign exchange and created uncertainty in foreign exchange rates (Suleiman et al., 2016)

Exchange rate volatility refers to the erratic fluctuations in exchange rates.Exchange rate volatility can also be defined as appreciation or depreciation of domestic currency over a period of time. Exchange rate is the rate at which a country's currency is exchanged with another country's currency (Musa, 2021).

Inflation on the other hand, refers a persistent rise in the general price level of goods and services over a period of time. Inflation has serious implication for the function of money as a medium of exchange and store of value. Chukwuemeka (2018) defined inflation as a sustained rise in the general level of prices. Inflation refers to a condition of general and persistent rise in the general price level in an economy. Inflation may be defined as a persistent or intermittent rise in the general price level in an economy. A price increase by itself is not necessarily inflationary. The price increase must be general and wide-spread throughout the economy and the process must be continuous, for it to be called inflation (Musa, 2021).

Prior to 1980, Nigeria experienced a single digit low inflation rate but the situation changed dramatically especially as from 1986 when inflation rate in the country rose to double digits. Statistics from Central Bank of Nigeria (2019) have shown that inflation rate which stood at 13.7% in 1986 moved up to 48.8% in 1992 and rose further to 76.8% in 1994. In 2001, it fell to 16.5% and increased to 23.8% in 2003 with a further decline to an average of 11%-13% through 2004-2015 but moved up to 18.55% in 2016 and declined to 12.09% in 2018 and dropped further to 11.4% in 2019. However, according to Musa (2021) inflation rate in Nigeria rose to 13.39% in 2020 due to COVID -19 pandemic.

The inflation and exchange rate relationship has always been one of the attractive topics for economists (Svensson, 2000) because it is vital, especially in emerging economies. In these economies, exchange rate fluctuations can significantly affect the general level of the prices (Monfared and Akin, 2017).In countries where exchange rate volatility tends to have adverse effects on inflationary pressure, more stable exchange rate through central bank intervention in the foreign exchange market is required in order to stabilize the economy (Ubi, Effiom, and Eyo2012).Babatunde and Kehinde (2016) opined that, during periods of volatility in the exchange rate, inflation rate, would be high. This means that exchange rate volatility engender inflation in an economy.Yakub, Sani, Obiezue, and Aliyu (2019) viewed that the Nigerian exchange rate is highly volatile and have fluctuated widely over the years, virtually in all the segments of the foreign exchange markets; official, bureau de change and parallel markets

Gül and Ekinci (2006) established significant causal relationship of the exchange rate toward inflation in Turkey during the period between 1984 and 2003.

A moderator is a variable that specifies the conditions under which a given a predictor is related to the outcome. Moderation implied an interaction effect, where introducing a moderating variable changes the direction or magnitude of the relationship between the dependent and independent variables.In statistical terms, moderation is where a relationship between an independent variable and a dependent variable changes according to the value of a moderator variable (Dawson, 2014). Additionally, moderating variables are essential to assess whether two variables have the same relation across groups. On the whole, a moderating model addresses "when" or "for whom" a variable strongly explains or causes an outcome variable (Frazier et al., 2004).According to Saunders (1954), moderator variables have been studied for many yearsin economics and agriculture.

This paper therefore assesses the extent, to which COVID-19 significantly moderates the relationship between exchange rate depreciation and inflation in Nigeria.

II. METHODOLOGY

The data for this research was generated from the website of the central bank of Nigeria. It covers the period between January, 2017 and May, 2021. The data is thus categorized in to two groups. The first group is non-COVID 19 period which covers the period between January,2017 and November,2019 and the other group is COVID-19 period which covers period between December,2019 and May,2021.

The model illustrated in figure 1 used COVID-19 as moderator variable(COVID-19 period= 1 and non-COVID-19 period= 0) and Naira/Dollar exchange rate to predict inflation in Nigeria
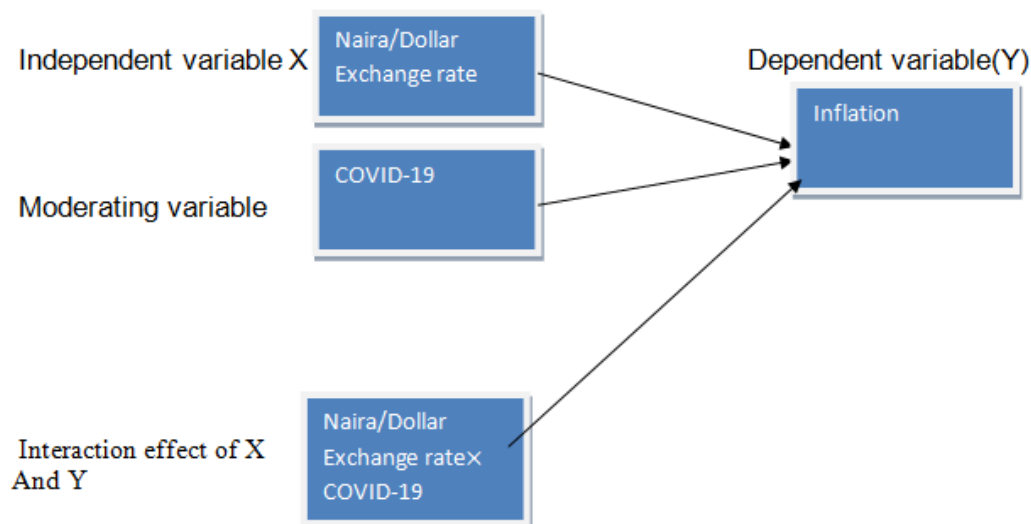

Figure 1: Illustration of moderator effect

A regression analysis in equation (1) was done to predict inflationfrom COVID-19, Naira/Dollar Exchange rate, and a new variable that was obtained by forming the product of COVID-19 × Naira/Dollar Exchange rate; this product represents the interaction between COVID-19 and Naira/Dollar Exchange rate as predictors of inflation.

$$inflation = \beta_0 + \beta_1 EXR + \beta_2 COVID - 19 + \beta_3 EXR \times COVID - 19 + \varepsilon \quad (1)$$

Where β_1 is the coefficient of the independent variable $exchange\ rate$ in predicting the inflation. while β_2 is the coefficient of the COVID-19 in predicting the inflation, β_0 the intercept coefficient in the equation. Finally, β_3 represents the coefficient of the interaction between COVID-19 and Naira/Dollar Exchange rate. This β_3 represents the strength of the moderation activity. The inclusion of a COVID-19 × Naira/Dollar Exchange rate

product term makes it possible to assess whether the monthly increase in inflation for each 1 unit increase in Naira/Dollar exchange rate differs significantly between the COVID-19 periods versus non COVID-19 periods.

III.   RESULTS AND DISCUSSION

The regression equation without moderation effect of table 1 can be represented as:

$$inflation = 239.132 + 0.073EXR + 85.473COVID - 19 \quad (2)$$

The sign of a regression coefficient tells you whether there is a positive or negative correlation between each dependent variable and independent variable in the relationship. Equation 2 indicates that a unit change Naira/Dollar Exchange rate will increase inflation by0.073 units but is not significant since $p > 0.05$. Similarly, equation 2 indicates that COVID-19 significantly ($p < 0.05$) increases inflation in Nigeria by 85.473 units. The model in equation (2) explained up to 70% variation in inflation as indicated by R-square value in table 1.

The moderated regression equation of table 2 can be represented as:

$$inflation = 20.351 + 0.176EXR + 68.397COVID - 19 + 21.8(EXR * COVID - 19) \quad (3)$$ Since there is a significant interaction, the slope to predict inflation from Naira/Dollar exchange rate is not the same for the COVID-19 and Non COVID-19 Months. This therefore indicates the COVID-19 significantly moderates the relationship between inflation and exchange rate in Nigeria. Similarly, the inclusion of interaction term to serve as the moderating effect has improved ability of the exchange rate to predict inflation in Nigeria. This is evident from table 2, where R-squared value increased from 0.7 in model 1 to 0.8 model 2. This means that model 2 explained much more variation in inflation than model 1. From table 2, it is also clear that the inclusion of the interaction term made exchange rate to be significant predictor of the inflation in Nigeria ($p < 0.05$).

Table 1: Regression coefficient without moderation effect

Variable	Coefficient	Standard error	t-value	Sign-value
Constant	239.132	36.936	7.828	0.000
Naira/Dollar Exchange rate	0.073	0.099	0.737	0.465
COVID-19	85.473	10.476	8.159	0.000
R-squared	*0.699*			
Adjusted R-Squared	*0.687*			
Standard error of the estimate	*25.27696*			

Table 2: Moderated Regression coefficient

Variable	Coefficient	Standard error	t-value	Sign-value
Constant	320.351	28.606	11.199	0.000
Naira/Dollar Exchange rate	0.176	0.077	2.281	0.027
COVID-19	68.397	8.460	8.085	0.000
Moderator (interaction)	21.800	3.578	6.093	0.000
R-squared	*0.829*			
Adjusted R-Squared	*0.818*			
Standard error of the estimate	*19.25973*			

IV.   Conclusion

This paper accessed the extent, to which COVID-19 significantly moderates the relationship between exchange rate depreciation and inflation in Nigeria. The results from the moderated regression model indicated that the inclusion of the moderating (interaction) term can significantly improve the ability of the Naira/Dollar exchange rate to predict inflation in Nigeria. This means that the effect of COVID-19 on Nigerian economy should be well monitored by the authorities concerned so that its adverse effect can be well tackled if not avoided completely.

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