

EXCHANGE RATE, INTEREST RATE AND ECONOMIC DEVELOPMENT IN NIGERIA (1980-2020)**Olaniyan Samson Olajide,**  **ORCID ID:** <https://orcid.org/0000-0002-8525-2076>

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Abstract: *This paper investigated exchange rate, interest rate, and economic development in Nigeria between 1980 and 2020. The study employed secondary data and sourced from the Central Bank of Nigeria (CBN) and World Bank Data Indicators covering periods of 1980 to 2020. The data were analyzed using correlation analysis, Johansen Co integration, and co integration regression Fully Modified ordinalist Square methods (FMOLS) were employed to established long run influence of exchange rate and interest rate on economic development. The study showed that long run relationship existed between exchange rate, interest rate, and economic development in Nigeria. Specifically, a number of results were obtained: in the case of HDI, economic development is negatively related to exchange rate; interest rate had significant relationship with economic development in Nigeria; and the interactive relationships of exchange rate and interest rate had a significant positive relationship with economic development. Using per capita income as a measurement of economic development revealed that; exchange rate had positive relationship with economic development; the interactive effects of exchange rate and interest rate is positive and significant on economic development. Therefore, the study recommends that; proactive management of Nigeria's exchange rate and interest rate must be the top priority of the country's monetary authority. Therefore, the monetary authority through Central Bank of Nigeria should, as a matter of urgency, stabilize the nation's exchange rate and improve the nation's interest rate in a bid to attract investment and improve the nation's capital accumulation necessary for long term economic development.*

Keywords: exchange rate, interest rate, per capita income, interactive effects exchange rate and interest rate.**JEL Classification:** E100.**Received:** 24.03.2023**Accepted:** 25.05.2023**Published:** 30.06.2023**Funding:** There is no funding for this research.**Publisher:** Academic Research and Publishing UG, Germany.**Founder:** Academic Research and Publishing UG, Germany; Sumy State University, Ukraine.**Cite as:** Olajide, O.S., Aderonke, A.B., & Ajike, O.K. (2023). Exchange rate, interest rate and economic development in Nigeria (1980-2020). *SocioEconomic Challenges*, 7(2), 130-141. [https://doi.org/10.21272/sec.7\(2\).130-141.2023](https://doi.org/10.21272/sec.7(2).130-141.2023).Copyright: © 2023 by the authors. Licensee Academic Research and Publishing UG, Germany. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Economic development is a problem of both the developing and underdeveloped countries. Nigeria is one of the less developed countries yearning for economic growth and development. Economic development is multidimensional. It can be defined as economic growth plus positive change. Jhingan (2010), Oyaromade (2020). Many researchers have clearly submitted that economic development can be defined as an instance of economic growth followed by structural transformation of the whole economy, diversification of the economy away from agrarian economy to modern industrial economy. Todaro and Smith (2013) also define economic development as a multidimensional process comprises of major changes in social structures, popular attitudes, and national institutions, as well as the increase in economic growth, a reduction in inequality, and eradication of poverty”.

2. Literature Review

2.1 Theoretical Literature Review

Two-Gap Model

Chenery and many other researchers examined the relationships between exchange rate and economic development and have put forth a new approach to the namely two-gap approach to economic development. The ideology is that both savings gap and foreign exchange gap are distinct and independent constraints that affect the attainment of a target rate of growth in developing countries. They see foreign aid as a means of filling these two gaps in order to achieve the target growth rate and development of the economy. In his research, Chenery, found a savings gap when the domestic savings rate is less than the investment required to achieve the target growth. The theory provides two postulations. First, the economy can achieve the target growth rate by sourcing for savings through foreign aids to fill the gap. Secondly, a fixed relationship is proposing between the targeted foreign exchange and net export earnings. Therefore, if net export earnings are less than foreign exchange requirements, a foreign exchange gap surfaces and can be filled by foreign aid.

3. Methodology

Model Specification

Based on theoretical framework, the model for the estimation of the study’s parameters is formulated as follows:

The first model captured the influence of independent variables on dependent variable. The first model specifically modeled the relationship between HDI, EXCH, INT, and INF in Nigeria.

$$\text{HDI} = f(\text{EXCH}, \text{INT}, \text{INF}) \quad (1)$$

The econometric form of the model is specified as:

$$\text{HDI} = \beta_0 + \beta_1\text{EXCH} + \beta_2\text{INT} + \beta_3\text{INF} + \beta_4\text{EXCH*INT} + \varepsilon_1 \quad (2)$$

The second model captured, specifically, the relationship between PCI, EXCH, INT, and INF in Nigeria from 1980 to 2020.

$$\text{PCI} = f(\text{EXCH}, \text{INT}, \text{INF}, \text{EXCH*INT}) \quad (3)$$

In order to accomplish the empirical test of the Cheney’s Two-Gap Model, the general econometrics model that describe the functional relationship between the variables is specified as:

$$\text{PCI} = \beta_5 + \beta_6\text{EXCH} + \beta_7\text{INT} + \beta_8\text{INF} + \beta_9\text{EXCH*INT} + \varepsilon_2 \quad (4)$$

Where: HDI = Human Development Index; PCI = Per Capital Income; EXCH = Exchange rate; INT = Interest rate; INF = Inflation rate; β_0 and β_5 = Intercepts; $\beta_1 - \beta_4$, and $\beta_6 - \beta_9$ = Coefficients of the independent variables; ε_1 and ε_2 = Error terms.

The a-Priori expectation of the behaviour of the independent variables in terms of their parameters to be estimated as:

β_1 and $\beta_6 < 0$: There is a negative relationship between per capital income and exchange rate. β_2 and $\beta_7 < 0$: There is a negative relationship between per capital income and interest rate. β_3 and $\beta_8 < 0$: There is a negative relationship between per capital income and inflation rate. β_1 and $\beta_6 < 0$: There is a negative relationship between per capital income and interactive effect of exchange rate and interest rate.

3.4 Estimation Technique

In analyzing the data, co integration regression is employed to establish the long run relationship between dependent and independent variables. Johansen co integration test was conducted to establish co integration. After the establishment of co integration, the Fully Modified Ordinary Least Square method was employed to establish the impacts of exchange rate and interest rate on economic developments in Nigeria from 1980 to 2020.

4 Analyses and Discussion of Result

Trend and Patterns of Exchange Rate, Interest Rate and Economic Development

The trend of economic development and interactive movement of exchange rate and interest rate shown in the figure below clearly exemplified the movements of economic development and interactive movement of exchange rate and interest rate in the period under investigation.

Human Development Index in Nigeria

Human Development Index (HDI) is a statistic composite index of life expectancy, education and per capita income indicators, which is used to rank countries into four tiers of human development. A country scores a higher level of HDI when the lifespan is higher, the education level is higher, and the gross national income GNI (PPP) per capita is higher. It was developed by the United Nations Development Programme (UNDP)'s Human Development Report Office.

Figure 1 below showed the trajectory of human development (HDI) in Nigeria. Data on human development in Nigeria showed an upward trajectory from 2003 to 2020. As shown by the above graph, HDI rise from below 0.45 in 2003 to 0.54 in 2020. This increase in HDI indicated that Nigeria moved from low human development index to medium human development index in around 17 years.

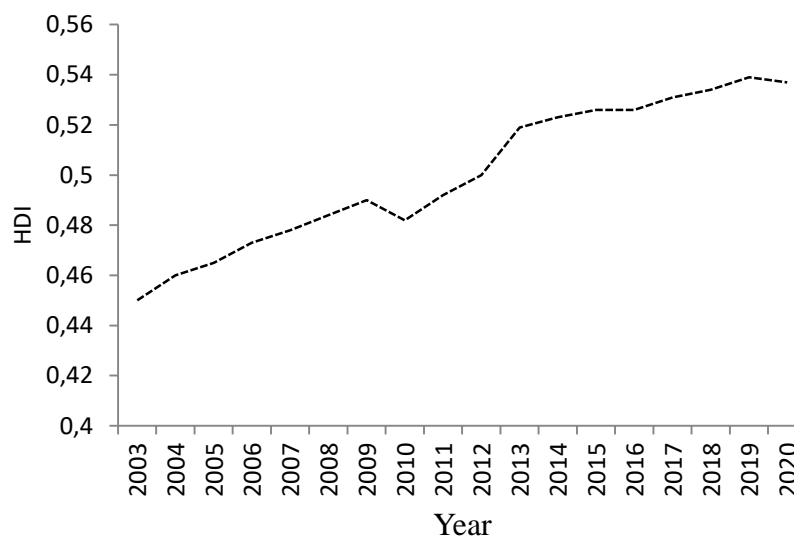


Figure 1. Human Development Index

Source: Authors Computations.

Per Capita Income and Interactive Movement of Exchange Rate and Interest Rate in Nigeria

Figure 2 below showed the trajectory of per capita income (PCI) and the interactive movement of exchange rate and interest rate in Nigeria. Throughout 1980s, exchange rate and interest rate were stable. However, this stability, per capita income fell towards the later part of 1980s, fell from height of \$2,180 in 1981 to \$474 in 1989. Further fall in interactive movement of exchange rate and interest rate in early 1990s and towards mid-90s had attendant further fall in per capita income. This time around, per capita income fell significantly to \$270 in 1993, and slightly improved till it reached considerable high level at \$498 in 1999, a position that mirrored what was obtainable in 1989. Decade following 1990 witnessed remarkable growth and development. Between 2000 and 2009, though interactive movement of exchange rate and interest rate shoot to the high level, PCI equally grew from \$498 in 1999 to \$1,891 in 2009, recording position attained in 1983. The decade following this equally recorded massive growth in PCI alongside interactive movement of exchange rate and interest rate. PCI maintained upward lift from \$1,891 in 2009 to \$3,099 in 2014 before it fell to \$2,097 in 2020.

By this, the improvement in growth and development in Nigeria is adjudged to be direct result of policies and programmes of government in recent time. Three significant policy changes and programme initiations are adjudged to be the driving forces behind the steady improvements in human development in Nigeria. The first is the adoption of the former Millennium Development Goals (MDGs) that expired in 2015. The second is the current adoption of Sustainable Development Goals (SDGs). In developmental drives of Nigeria, the two UN-sanctioned programmes are instrumental in improving three major components of human capital: health, education and skills, and migration. MDGs and SDGs specifically targeted the core of human capital and substantial efforts were exerted on these targets. The third is the increase in per capita income in Nigeria over the years. Nigeria’s gross domestic product increased significantly in the last two decades, and this has equally fuelled significant leap in the country’s per capita income.

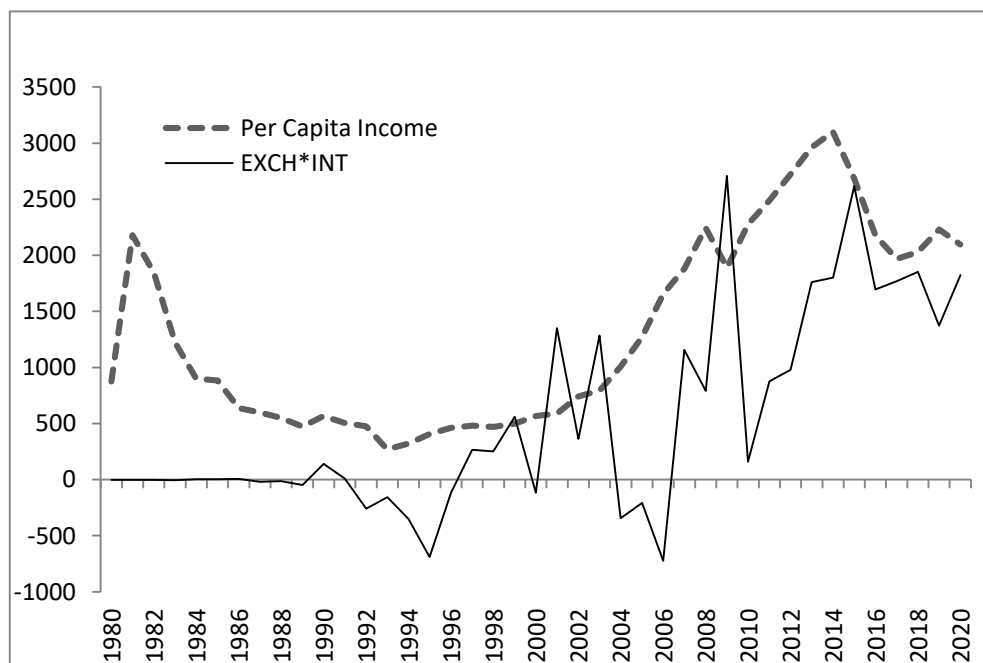


Figure 2. Per Capita Income and Interactive Movement of Exchange Rate and Interest Rate in Nigeria

Source: Authors Computations.

Exchange Rate Movement in Nigeria

An exchange rate is the units of Nigerian naira required to exchange for one United States' Dollar. Economically, it means the amount of naira needed to buy one unit of US\$. The movement of the exchange rate of US\$/Nigerian Naira is presented in the graph below.

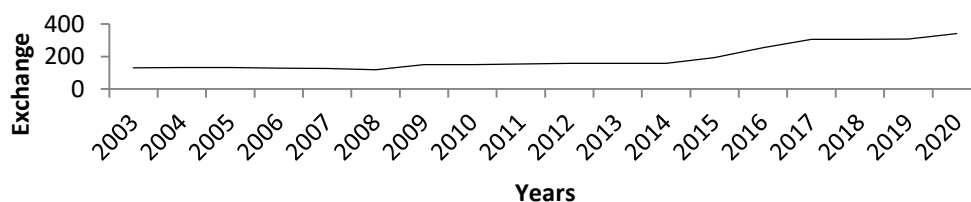


Figure 3. Exchange Rate

Source: Authors Computations.

The figure showed that in the last two decades, especially after the turn of the 21st century, there have been fluctuations in exchange rates in Nigeria. As shown in the trend, three main patterns can be observed in the trend. These patterns are exemplified by years of similar trends. For start, the first pattern of exchange rate spanned 2003 to 2008. The second pattern spanned 2009 to 2014. The last pattern is the current trend in exchange rate. The common characteristic of these patterns is the identical movements in the exchange rate. In these patterns, there is steady increase in value of US\$ against naira. This means the exchange rate fell in steady patterns through these patterns. The second striking feature of these patterns is initial leap before steady upward movement. For instance, the pattern shown in 2003 to 2008 changed with greater leap in 2009 exchange rate before it maintained steady increase through 2009 to 2014. The same behavior can be observed in 2015, with upward leap in exchange rate, before sharp rises were maintained.

The current movements in exchange rate in Nigeria, that is, exchange rate movements in recent times are turbulent and best regarded as unpredictable. In recent times, the value of naira has fallen relative to US\$ in both nominal and real term.

Interest Rate in Nigeria

Figure 4 also showed the movement of interest rates in Nigeria. The interest rate is equally fluctuating during the period. And, clearly, there are two significant routs in the trajectory of interest rate. One spanned year 2003 to 2006, and the other spanned 2007 till date. From 2003 till 2006, real interest rate fell up till negative figure, especially in years 2004, 2005, and 2006. The fall in interest rate precipitated the period of global financial crisis in 2007. The second period spanned the period after the 2007 financial crisis. During this period, interest rate rose, especially between 2007 and 2010, before falling in 2011. The trend since this has been steady rise and fall in real interest rate.

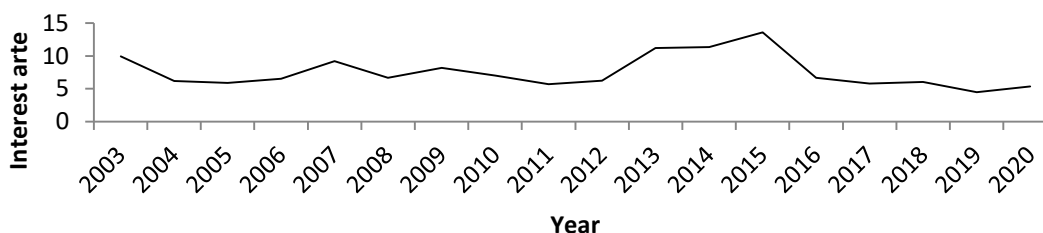


Figure 4. Interest Rate

Source: Authors Computations.

Unit Root Test

Table 1 below contains the unit root tests for variables using Augmented Dickey-Fuller test. The stationarity tests for exchange rate (EXCH), interest rate (INT), inflation rate, and interactive relationship of exchange rate and interest rate (EXCH*INT) are presented in the table below.

Table 1. Augmented Dickey-Fuller and Phillip-Perron Tests

Augmented Dickey-Fuller						
Variables	1% level	5% level	10% level	ADF	P-value	Order
EXCH	-4.2119	-3.5298	-3.1964	-3.7989	0.0272	I(1)
INF	-4.2119	-3.5298	-3.1964	-3.776	0.0287	I(0)
INT	-4.2733	-3.5578	-3.2124	-4.5003	0.0058	I(0)
HDI	-4.21	-3.53	-3.19	-7.23	0.0000	I(1)
PCI	-4.2191	-3.5331	-3.1983	-3.9529	0.0192	I(0)
EXCH*INT	-4.2733	-3.5667	-3.2421	-7.4210	0.0042	I(1)
Phillip-Perron						
EXCH	-4.2119	-3.5298	-3.1964	-3.7069	0.0337	I(1)
INF	-4.2119	-3.5298	-3.1964	-12.088	0.0000	I(1)
INT	-4.205	-3.5266	-3.1946	-5.6597	0.0002	I(0)
HDI	-4.21	-3.52	-3.19	-6.94	0.0000	I(1)
PCI	-4.2191	-3.5331	-3.1983	-3.9529	0.0192	I(0)
EXCH*INT	-4.2733	-3.5667	-3.2421	-6.4210	0.0010	I(1)

Source: Author’s computation using, E Views 12.

The summary result of the stationarity tests presented in the table above showed that: ADF test indicating that EXCH, and HDI are integrated at 1st difference while INT and INF are integrated at level; the PP test showed that EXCH, HDI, and INF are integrated at 1st difference while INT is integrated at level.

Relationship between Exchange Rate, Interest Rate on Economic Development in Nigeria

The relationship between exchange rate and economic development, interest rate and economic development, and the interactive effect of exchange rate and interest rate on economic development are captured through correlation matrix presented in the table below.

Correlation Analysis

Interpretation of Correlation Matrix

The table showed the correlation between economic development (measured by HDI and PCI), exchange rate (EXCH), interest rate (INT), and the interactive effect of exchange rate and interest rate (EXCH*INT) on economic development. As indicated in the table, there is a strong positive correlation (0.654902) between economic development (HDI) and exchange rate (EXCH). Also, economic development (HDI) has a positive weak correlation (0.162604) with interest rate (INT). Lastly, exchange rate and interest rate had strong positive interactive correlation (0.655947) with economic development.

As indicated in the table, there is a strong positive correlation (0.64902) between economic development (PCI) and exchange rate (EXCH). Also, economic development (PCI) has a positive weak correlation (0.162904) with interest rate (INT). Inflation rate (INF) had a weak negative correlation with economic development (-0.4371). Lastly, exchange rate and interest rate had a strong interactive positive interactive correlation (0.655947) with economic development.

Table 2. Correlation Matrix

VARIABLES	HDI	EXCH	INT	INF	EXCH*INT	PCI
HDI	1					
EXCH	0.654902	1				
INT	0.162604	0.372439	1			
INF	-0.437100	-0.33199	-0.508	1		
EXCH*INT	0.655947	0.7333234	0.542441	-0.395775	1	
PCI	1.00000	0.64902	0.162904	-0.4371	0.655947	1

Source: Author's computation using, E Views 12.

The correlation result indicated different results, bearing the different measures of development employed. The imports of these correlations coefficient are basically three: one, exchange rate has strong positive relationships with economic development regardless of the measured employed, in the sense that fall in one, say, exchange rate (price of naira against dollar) will lead to increase in the other, say, economic development. Two, interest rate is positively related to economic development with the two measures of development. However weak the correlation, fall in interest rate is followed by fall in variable of economic development, and vice versa. Lastly, the interactive effect of exchange rate and interest rate on economic development indicated that the same directional change in both exchange rate and interest rate will lead to the same direction of change in economic development. This indicated that strong positive correlation existed between the interactive effect of exchange rate and interest rate and economic development.

Johansen Cointegration

The relationships between dependent and independent variables are established through the Johansen co integration test conducted to ascertain the long run relationships between economic development, exchange rate, and interest rate. Therefore, the trace and maximum eigen value are presented in the table below.

Table 3. Deterministic Trend Assumption of the Johansen Cointegration Test

Information Criteria by rank and Model

Data Trend	None	None	Linear	Linear	Quadratic
Rank or No. of CEs	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Log likelihood by Rank (rows) and Model (columns)					
0	-457.5293	-457.5293	-453.2651	-453.2651	-451.4630
1	-449.5836	-448.5581	-444.6937	436.0395	-434.2878
2.	443.4035	-441.3870	-438.8238	-428.2422	-426.7450
3.	-440.4467	-438.1184	-436.6619	-422.4820	-421.0752
4	-439.6534	-436.6382	-436.6382	-420.3879	-420.3879
Akaike Information Criteria by Rank (rows) and Model (columns)					
0	52.61437	52.61437	52.58501	52.58501	52.82923
1	52.62040	52.61757	52.52152	51.67106*	51.80976
2	52.82261	52.51.8046982078	52.75820	51.80469	51.86056
3	53.38297	53.45760	53.40688	52.16467	52.11946
4	54.18371	54.29313	54.29313	52.93199	52.93199

Source: Author's Computation using E Views.

As shown above, the deterministic trend is given by intercept and trend (option 4) which allows for linear deterministic trend in the data. In the AIC's intercept and trend, column 4 is asterisk (51.67106*) and equally shown at lag 1. This indicates the suitable deterministic trend assumption of the test. Hence, the Co integration Test is based on this deterministic assumption.

Human Development Index as Measure of Economic Development

Interpretations of Trace Statistics and Maximum Eigen-value Result

The table contains trace statistics and maximum eigen value of the Johansen co integration. The two tests indicated that there are two co integrating equations among the variables. For trace statistic: at None*, the $p=.000 < 0.05$ at critical level; At most 1*, $p=.0004 < 0.05$. Therefore, the null hypothesis which state that variable is not co integrated is rejected in favour of two co integrating equations. For trace maximum Eigen value: at None*, the $p=.000 < 0.05$ at critical level; at most 1*, $p=.0001 < 0.05$. Therefore, the null hypothesis which state that variable is not co integrated is rejected in favour of two co integrating equations. Hence, there are two co integrating equations.

Table 4. Interpretation of Fully Modified Ordinary Least Squares

Unrestricted Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigen value	Trace Statistic	Critical Value	Prob.**
None*	0.9841	132.26	69.82	0.0000
At most 1*	0.9467	65.99	47.86	0.0004
Unrestricted Rank Test (Maximum Eigen value)				
Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	Critical Value	Prob.**
None*	0.9841	66.27	33.88	0.0000
At most 1*	0.9467	46.91	27.59	0.0001

Source: Author’s computation using, E Views 12.

Interpretation of Fully Modified Ordinary Least Squares

Result of the fully modified ordinary least squares is presented in the table below. Since the dependent and independent variables are co integrated, they are represented equivalently in terms of a long run Fully Modified Ordinary Least Squares. In the result presented below, there is insignificant negative relationship between exchange rate and economic development ($\beta=-.000275$, $p=.145 > 0.05$). Also, interest rate (INT) has a significant negative relationship with economic development ($\beta=-.006703$, $p=.0001 < 0.05$). Lastly, interactive relationships of exchange rate and interest rate (EXCH*INT) has a significant positive relationship with economic development ($\beta =-.00006$, $p=.0000 < .05$).

Table 5. Table of Fully Modified Ordinary Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXCH)	-0.000275	0.000175	-1.56868	0.145
INT	-0.006703	0.000109	-6.16424	0.0001
INF	-0.000763	0.000919	-0.83014	0.4241
EXCH*INT	0.00006	0.000007	8.209087	0.0000
C	0.483418	0.012002	40.27845	0.0000
R-Squared	0.853256			
Adjusted R-squared	0.799894			

Source: Author’s computation using, E Views 12.

Per Capita Income as Measure of Economic Development

Interpretations of Trace Statistics and Maximum Eigen-value Result

The table contains trace statistics and maximum eigen value of the Johansen co integration. The two tests indicated that there is one co integrating equation among the variables. For trace statistic: at None*, the $p=.000 < 0.05$ at critical level; At most 1*, $p=.0000 < 0.05$. Therefore, the null hypothesis which state that variable is not co integrated is rejected in favour of one co integrating equation. For trace maximum Eigen value: at None*, the

$p=0.0000 < 0.05$ at critical level; therefore, the null hypothesis which state that variable is not co integrated is rejected in favour of one co integrating equation. Hence, there is one co integrating equation.

Table 6. Interpretations of Trace Statistics and Maximum Eigen-value Result

Unrestricted Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Critical Value	Prob.**
None*	0.866056	125.2566	69.82	0.0000
Unrestricted Rank Test(Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	Critical Value	Prob.**
None*	0.866056	78.40	33.88	0.0000

Source: Author's computation using, EViews 12.

Interpretation of Fully Modified Ordinary Least Squares

Result of the fully modified ordinary least squares is presented in the table below. Since the dependent and independent variables are co integrated, they are represented equivalently in terms of a long run Fully Modified Ordinary Least Squares. In the result presented below, there is insignificant positive relationship between exchange rate and economic development ($\beta= 2.465149$, $p=.2385 > 0.05$). Interest rate (INT) on the other hand had significant negative relationship with economic development ($\beta= -29.21488$, $p=.0243 < 0.05$). Lastly, the interactive relationships of exchange rate and interest rate (EXCH*INT) on economic development showed a significant positive relationship with economic development ($\beta= .680020$, $p=.0100 < .05$).

Table 7. Fully Modified Ordinary Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXCH	2.465149	2.055768	1.199138	0.2385
INT	-29.21488	12.41076	-2.353996	0.0243
INF	-21.05611	9.797467	-2.149138	0.0386
EXCH*INT	0.680020	0.249640	2.724002	0.0100
C	1151.206	298.0998	3.861816	0.0005
R-Squared	0.589560			
Adjusted R-squared	0.542653			

Source: Author's computation using, E-Views 12.

5 Summary, Conclusion, and Recommendations

The study investigated the relationships between exchange rate, interest rate and economic development in Nigeria between 1980 and 2020. In analyzing the data, correlation analyses showed exchange rate with strong positive relationships with economic development. Correlation analysis further showed that interest rate had weak positive relationship with economic development. Inflation had weak negative relationship with economic development. And, lastly, the interactive relationship between exchange rate and interest rate on economic development indicted that the same directional change in both exchange rate and interest rate will lead to the same direction of change in economic development.

Johansen co integration tests showed different results based on the measure of economic development. In the case of Human Development Index, Johansen co integration Rank Test (Trace) and the Maximum Eigen value indicated two co integrating equations. Fully modified ordinary least squares (FMOLS) showed that in the long run economic development is positively related to exchange rate and interest rate. Summarily, exchange rate and interest rate had significant relationship with economic development in Nigeria. The interactive relationships of exchange rate and interest rate had a significant positive relationship with economic development. Jointly, increases in both exchange rate and interest rate induced increase in income level during the period.

In the case of Per Capita Income (PCI), Johansen co integration Rank Test (Trace) and the Maximum Eigen value indicated one co integrating equation. Fully Modified Ordinary Least Squares (FMOLS) long run indicated that there is insignificant positive relationship between exchange rate and economic development. Interest rate (INT)

on the other hand had significant negative relationship with economic development. Lastly, the interactive relationships of exchange rate and interest rate (EXCH*INT) on economic development showed a significant positive significant relationship with economic development. From the results obtained, the study therefore recommends that proactive management of Nigeria's exchange rate and interest rate must be the top priority of the country's monetary authority. Therefore, the monetary authority (Central Bank of Nigeria) should, as a matter of urgency, stabilize the nation's exchange rate and improve the nation's interest rate in a bid to attract investment and improve the nation's capital accumulation necessary for long term economic development. The monetary authority (Central Bank of Nigeria) should pay adequate attentions to the relationships existing and subsisting between exchange rate and interest rate as it influences the wellbeing in Nigeria. Specifically, adequate attention should be devoted to the management of combined effects and influences of exchange rate and interest rate.

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Appendexes

Correlation matrix

	HDI	EXCH	INT	INF	EXCH_INT	PCI
HDI	1.000000	0.654902	0.162604	-0.437100	0.655947	1.000000
EXCH	0.654902	1.000000	0.372439	-0.331992	0.733234	0.654902
INT	0.162604	0.372439	1.000000	-0.507784	0.542441	0.162604
INF	-0.437100	-0.331992	-0.507784	1.000000	-0.395775	-0.437100
EXCH_	0.655947	0.733234	0.542441	-0.395775	1.000000	0.655947
PCI	1.000000	0.654902	0.162604	-0.437100	0.655947	1.000000

Cointegration result

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob**
None*	0.984106	132.2604	69.81889	0.0000
At most 1*	0.946719	65.99138	47.85613	0.0004
At most 2	0.555511	19.07654	29.79707	0.4874
At most 3	0.281240	6.103246	15.49471	0.6833
At most 4	0.049935	0.819605	3.841465	0.3653
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob**
None*	0.984106	66.26904	33.87687	0.0000
At most 1*	0.946719	46.91484	27.58434	0.0001
At most 2	0.555511	12.97329	21.13162	0.4547
At most 3	0.281240	5.283641	14.26460	0.7057
At most 4	0.049936	0.819605	3.841465	0.3653
Co integration Test – Hansen Parameter Instability Date:07!22!22 Time: 05:46 Equation: UNTITLED Series: HDI D(EXCH) INT INF EXCH_INT Null hypothesis: Series are co integrated Co integrating equation deterministic: C				
Lc statistic	Stochastic Trends(m)	Deterministic Trends (k)	Excluded Trends(p2)	Prob*
0.659742	4	0	0	0.1716
Variable	Coefficient	Std. Error	t-Statistic	Prob
D(EXCH)	-0.000275	0.000175	-1.568676	0.1450
INT	-0.006703	0.001087	-6.164242	0.0001
INF	-0.000763	0.000919	-0.830141	0.4241
EXCH_INT	6.07E-05	7.39E-06	8.209087	0.0000
C	0.483418	0.012002	40.27845	0.0000
R.squared	0.853256	Mean dependent var	0.506188	
Adjusted R-squared	0.799894	S.D. dependent var	0.025584	
S.E. of regression	0.011445	Sum squared resid	0.001441	
Long –run variance	8.85E-05			