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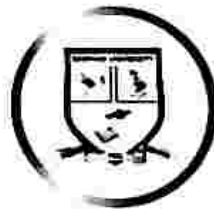
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EFFECT OF EXCHANGE RATE ON PRIVATE DOMESTIC INVESTMENT IN NIGERIA: 1990-2020.

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ABSTRACT

The economy is currently experiencing a foreign exchange shortage despite all the efforts made by the government and the market forces (CBN) to stabilize the exchange rate. The high naira-dollar exchange rate has resulted in stagflation, resulting in price for products and services, affecting industries output and private investment in Nigeria. Therefore, This paper therefore seeks to examine the effect of exchange rate on private domestic investment in Nigeria. The paper made use of descriptive statistics, unit root tests, co-integration test and ARDL-ECM in analyzing the data obtained from the central bank of Nigeria statistical bulletin for a period of 30 years starting from 1990 to 2020. According to the findings, there is a negative and significant relationship between exchange rate and private domestic investment however, the beneficial effect was shown to be statistically insignificant (p -value $0.8444 > 0.05$). The co-integration test, shows that the variables have long term connections. The paper recommended that by providing exchange rate protection, the low level of participation of domestic and foreign investors in private investment can be addressed. In addition to minimizing macroeconomic instabilities, stabilization measures like monetary, fiscal, and exchange rate controls can also encourage private investment by lowering uncertainty. However, if these policies are contractionary, they could impede the pace of the economy's expansion by limiting absorption, which would then reduce aggregate demand. Therefore, expansionary exchange rate policy is encouraged for increase in private domestic investment.

Keywords: Exchange rate, Private domestic investment, Foreign exchange, Foreign investors, Investment.

JEL Classification: F34, G39, F31, F21, E22

INTRODUCTION

Nothing can be done in today's society without an exchange of some value for value, which includes money, ideas, products, and technology. As a result, any nation's economy will be affected directly, either positively or negatively. The desire for exchange, which evolved from the barter system to the money system, is at the root of trade. However, with the arrival of colonial rule, which brought in their wares and made Nigerians their middlemen, trade in Nigeria became popular (Nicks, 2008).

The value of one currency in respect to another is known as the exchange rate. It is the exchange rate of one country's currency against another. Every economy strives for a stable exchange rate with the countries with which it does business. Because no country is self-sufficient or independent due to variations in numerous endowments, the exchange rate of a country is critical to its international trade and investment (Enekwe, Ordu, and Nwoha, 2013). Exchange rate plays an increasingly significant role in any economy as it directly affects domestic price level, profitability of traded goods and services, allocation of resources and investment decision.

According to Alabi (2015), variations in the actual exchange rate may be connected to Africa's poor economic development. It is therefore critical to emphasize the importance of an effective exchange rate policy in enhancing economic performance in any country. Asher (2012) stated that the exchange rate of a country is used as a yard stick to determine the growth of the country. Despite the devaluation of the naira to boost export, exchange rate stability was not attained in Nigeria. Enekwe, Ordu, and Nwoha (2013) discovered that exchange rate management in developing countries is frequently unstable due to structural reforms such as reducing goods importation and increasing products and service exports. According to Ikpefan, Isibor, and Okafor (2016), the exchange rate was relatively stable from 1973 to 1979 during the oil boom period because agricultural products accounted for 70% of the nation's GDP, but after the introduction of Structural Adjustment Programme in 1986, the country switched from a fixed exchange rate determined by market forces to a flexible exchange rate. This contradictory exchange rate policy contributed to the naira's volatile and unstable nature, putting numerous industrial sectors of the economy at risk of exchange rate fluctuations (Enekwe, Ordu, and Nwoha, 2013).

According to Oladipupo and Onotaniyohowo (2011), fluctuations in the rate of exchange have a major impact on macroeconomic variables such as inflation, unemployment, interest rates, and the money supply. Exchange rate variations have an impact on the economy's products production, investment prospects, job levels, and income and wealth distribution. The exchange rate of the Naira against the US dollar was very stable in the early 1980s, especially between 1981 and 1985. The Naira was stronger than the US dollar at the time. In 1981, 1982, 1983, 1984, and 1985, 1 US dollar was exchanged into ₦0.64, ₦0.67, ₦0.75, ₦0.80, and ₦0.99, respectively. The Naira began to depreciate against the US dollar after the 1986 Structural Adjustment Programme. The year SAP was introduced, ₦3.32 was exchanged for 1 US dollar in 1986. The Naira has never recovered since then, instead weakening year after year. Based on the official exchange rate, from ₦3.32 in 1986 to ₦305 on January 30, 2017 to ₦414.10 as at 22nd Oct 2021 and ₦415.42 as at 12th May 2022.

The exchange rate declined following SAP and this has significantly hindered economic growth.

Manufacturers and other Nigerian businesses are complaining about dollar scarcity despite the central bank's devaluation of the local currency in 2015 to try to encourage investment from abroad. Manufacturers in Nigeria only receive foreign cash needed for equipment and raw materials from the secondary market, where dollars are more expensive than the official exchange rate, according to Frank Jacobs, president of the Manufacturers Association of Nigeria stated on August 2016. Aliko Dangote, Africa's richest man, shut down his tomato paste business on January 16, 2017 due to a lack of dollars, implying that despite the secondary market rate, foreign exchange is not available for manufacturing. The exchange rate is one of the economic indicators that has a direct impact on investment, hence its importance in a country's overall economic goals cannot be overstated. This explains why the government, foreign investors, and ordinary individuals pay close attention to exchange rate fluctuations.

Investment is an important component of aggregate demand and a vital resource for economic growth as it helps to expand the production capacity of the economy. Meanwhile, investment plans are important to meet the future demands as well as ensuring financial goals. By and large, a strong investment potential could guarantee an efficient and sustainable economic development. Investments in banks and financial institutions help to promote the circulation of funds in serving the operation of the economy. Financial independence, economic prosperity and personal goals could be achieved through investments.

Specifically, investment could, directly or indirectly, raise capital for the economy through promoting technological development. Besides, they also stressed the importance of investment climate in the capital movement process, especially regarding private investment. According to the World Bank (2003), a favourable investment climate may create opportunities and incentives for investors to conduct large-scale operation, create employment and increase output, thus sustaining private domestic investment and economic growth. As noted by Agrawal and Khan (2011), in the context of fierce competition in the attraction of investment, the majority of countries would focus their best efforts on improving environment and institutions for investment. Among important aspects of investment, is the efficiency of the state's macroeconomic policies, namely fiscal policy and monetary policy. Contrary to fiscal policy, monetary policy aims to address issues arising from economic instability by employing its variables to tackle the issues. In this regard, Khan (2011) argues that the objectives of monetary policy also interact back and forth with other important macroeconomic goals, including economic growth, employment creation, price stability, prevention of financial crisis and stabilization of long-term interest rates and real exchange rates. Exchange rate can affect private domestic investment either positively or negatively by employing the expansionary and contractionary method. An increase(inflation) in exchange rate will discourage investors from investing more and borrowing. While a decrease(deflation) in exchange rate will encourage investors to invest more.

The economy is currently experiencing a foreign exchange shortage as a result of the high naira-to-dollar exchange rate, despite all the efforts made by the government and the market forces (CBN) to stabilize the exchange rate, which has resulted in stagflation, resulting in price increase for products and services, affecting industry output and private investments in Nigeria. The economy is currently in a recession, which has resulted in significant losses in various sectors. Although many research studies have been conducted to demonstrate the impact of exchange rate fluctuations on developing countries economic growth, very few studies have been conducted to demonstrate the effect on specific sector of the economy. As a result, this research focuses on the effect of exchange rate on private domestic investment in Nigeria and to determine if exchange rate has a significant long run and short run effect on private domestic investment in Nigeria between 1990-2020. The paper then proposes a null hypothesis (Exchange rate has no effect on private domestic investment in Nigeria), to be tested in section four.

The rest of this paper was organized in the following manner: The next is section two and it analyses the literature review as well as the review of empirical findings and theoretical framework regarding exchange rate and private sector investment. Section three is the methodology, and the regression results as well as the interpretation of the results are presented in section four. Section five concludes the paper and offers some policy recommendations.

CONCEPTUALIZATION AND THEORETICAL UNDERPINNING

Conceptual Clarifications

The price of one currency in terms of another is what an exchange rate is. It is the rate of exchange of one currency for another. There are two types of exchange rates: real and nominal. The real exchange rate is the rate at which one country's currency may be exchanged for another's currency while the nominal exchange rate is the number of local currency units that must be exchanged for one foreign currency unit. To put it in another way, the nominal exchange rate is the price of a home currency expressed in terms of a foreign currency. We also have flexible and fixed exchange rates. The rate is determined by market forces in a flexible exchange rate system, and the rate fluctuates freely in response to changes in market conditions with no government intervention in the foreign exchange market, whereas in a fixed exchange rate system, the government chooses a specific exchange rate and offers to buy and sell at that price. According to Ngereboa and Ibe (2013), the exchange rate is the ratio between a unit of one currency and the amount of another currency that may be exchanged for that unit at any given time. The relationship between domestic and overseas prices of products and services is the currency exchange rate. Furthermore, the exchange rate might appreciate or depreciate. When less domestic currency is exchanged for a unit of foreign currency, the exchange rate appreciates, while when more domestic currency is exchanged for a unit of foreign currency, the exchange rate depreciates.

Ibenta (2012) defined exchange rate as the price of the unit of one country's currency quoted in terms of another country's currency; it is the mathematical, quantitative or qualitative expression of one country's currency in term of another. Uddin, Rahman &

Quaosa (2014) defined exchange rate as the domestic price of a unit of foreign currency and exchange rate can be called the conversion factor that determines the rate of change of currencies. According to Danladi and Uba (2016), they viewed exchange rate as the price of one country's currency in relation to another country, or the required amount of units of another currency that can buy an amount of units of another currency. A favourable exchange rate is expected to lower cost of living, especially for developing countries who rely heavily on imports for consumption like Nigeria, for instance, the exchange rate of the Nigeria Naira against the US dollar affects and sharpens the production activities in Nigeria. Any fluctuation in the value of the US dollar would transfer such shock to Nigeria due to our reliance on dollar for importations. Therefore, exchange rate is the price at which a unit of country's currency is exchanged for another country's currency at any point in time. The price at which the Nigerian ₦1 is exchanged for \$1 is exchange rate.

The private sector is the part of the economy that is run by individuals and companies for profit and is not state controlled. Therefore, it encompasses all for-profit businesses that are not owned or operated by the government. Companies and corporations that are run by government are part of what is known as the public sector, while charities and other nonprofit organizations are part of the voluntary sector (Thomas, 2019). The private sector refers to the portion of a country's economy that is controlled, managed, and owned by private persons or businesses. The private sector has a profit motive and employs more people than the government. Private Domestic Investment is the amount of money that domestic enterprises invest within their own country. It is measured by gross private domestic investment. GPDI is a component of GDP that politicians and economists use to determine a country's overall economic activity. There are three basic characteristics of GPDI: (i) It is a gross investment figure for total investment. This means that the creation of all commodities is included, even if they are replacing a depreciated item. Depreciation (formally called as capital consumption adjustment) is subtracted from GPDI to compute net investment. (ii) Only private investment is included. Government consumption expenditures and gross investment, which are both components of GDP, comprise public investment. (iii) Only domestic costs are included. GPD does not include foreign investment.

The private investment is a varied sector that contributes significantly to many economies. It is made up of many distinct people, partnerships, and organizations. The private sector consists of the following entities: sole proprietorship, partnerships, small and mid-sized businesses, multinational corporations and large corporations, professionals and trade association and trade unions. Although the government does not control the private sector, it does regulate it legally. Any company or corporation doing business in that country must follow the laws. The main feature of the private investment is its management by private individuals without government involvement, but there are more features of the private sector: profit motive, private ownership and control, no state participation, independent management, private finance and work culture of employees.

THEORETICAL FRAMEWORK

The Purchasing Power Parity Theory: The Purchasing Power Parity Theory was proposed by Gustav Cassel in 1916. The purchasing power parity theory was proposed in response to calls for an alternative exchange rate determination mechanism following the collapse of the fixed exchange rate system. According to this idea, the movement of demand and supply factors determines the exchange rate between two countries. The idea states that if any pair of currencies is placed at par, the exchange rate differential should represent variations in the respective currency's buying power in comparison to the Base Exchange rates (Ibenta, 2012). Following the lead of Ibenta (2012), the price of semolina in Nigeria and Ghana should be the same (after exchange rate adjustments). If the price of semolina in Nigeria is lower, buyers will buy wheat in Ghana because it is cheaper (after taking into account transportation costs). As a result, demand in Nigeria would decrease while demand in Ghana will increase. According to the argument, a favorable/appreciative exchange rate (local currency vs foreign currency) will stimulate economic growth by increasing production, which will eventually lead to an increase in gross domestic product. The purchasing power parity theory has been revised over time and is now widely accepted by international financial market participants for determining the exchange rate between two currencies.

Empirical Review

Nazar and Bashri (2012) Using quarterly data and the bivariate generalized autoregressive conditional heteroscedasticity (Bivariate GARCH) model examined the link between real exchange rate uncertainty and private investment in Iran from 1988 to 2008. The findings show that real exchange rate uncertainty has a negative impact on private investment and that private investment uncertainty has a negative impact on the volume of private investment.

Oyedele (2013), using data from the World Development Indicators 2012, examined the impact of the exchange rate on the level of private investment in Nigeria from 1980 to 2010. A cointegration test and an error correction model were part of the analysis technique. It establishes a negative association between the exchange rate and private investment, attributing the low level of private investment since 1980 to the devaluation trend, which has a negative influence on investment because much of investment trade has been dominated by capital goods imports.

Adelowokan Adesoye & Balogun (2015) From 1986 to 2014, looked at the impact of exchange rate fluctuation on investment and growth in Nigeria. To capture the interactions between the variables, the vector error correction approach, impulse responses function, co-integration, and the Augmented Dickey Fuller (ADF) test for stationarity were used. The findings showed that the exchange rate, investment, interest rate, inflation, and growth all have a long-term link. Finally, the findings reveal that in Nigeria, exchange rate volatility has a negative impact on investment and GDP, but it has a beneficial impact on inflation and interest rates.

Aisien (2018) investigated the impact of currency rates on foreign private investment was using quarterly time series data from Nigeria from 2007 to 2017. The empirical analysis

was based on the VAR estimation process, which was used to estimate three lagged periods using various lag order selection parameters. Depreciation of the naira has a negative impact on foreign direct investment and foreign portfolio investment in Nigeria, according to the empirical findings. Increased domestic market size and financial sector growth have been found to boost foreign private investment, whilst high domestic inflation rates have been found to hinder foreign private investment in Nigeria. The study concluded that, in order to attract more foreign private investment in Nigeria, the Central Bank of Nigeria should continue to implement more proactive policy intervention policies to stabilize the naira exchange rate.

METHODOLOGY

Ex-facto research design was used in this paper. This paper approach was chosen since the data for the analysis already existed and could not be changed because they could be cross-referenced and it also describes the statistical association between two or more variables.

This research paper uses secondary data which were obtained from the central bank of Nigeria Statistical Bulletin. The data which were obtained from the central bank of Nigeria Statistical Bulletin includes value of exchange rate and Private domestic investment in Nigerian economy. The data will be collected for the period of 30years between (1990 to 2020).

This paper uses time series analysis to show the impacts of a planned or unplanned intervention on a real-world process, changes in pattern, and/or consequences of a planned or unplanned intervention. This paper will perform unit root tests as part of the pre-estimation diagnostics tests to ensure that the underlying data is stationary. After conducting the stationarity test on the time series, the use of cointegration technique will be employed to ascertain if there is a long run or short run relationship between the variable(s) and also to capture the equilibrium relationship between non-stationary series within a stationary model. The study employed the ARDL (Autoregressive distributed lag) correction model ARDL-Error correction model tools of analysis in the investigation of the effect and relationship amongst the variables.

This study adopts and estimates the following connection, employing additional endogenous variable impacting Private domestic investment, based on theoretical background and accessible data.

As proxy, the implicit function is

$$PDI = F(ER) \quad (1)$$

Where;

PDI= Private Domestic Investment

ER= Exchange Rate

It is expressed explicitly as

$$PDI_t = \alpha + \beta_1 \ln ER_t + u_{1t} \quad (2)$$

α = intercept

β_1 = parameter estimates of the regressors

u_1 = stochastic error terms.

\ln = natural log notation

$$\Delta Z_t = m_0 + m_1(Y_{t-1}) + \sum_{i=1}^q \beta_i \Delta(Z_{t-i}) + E_t \quad (3)$$

Specifying the equation in ARDL_ECM will be as follows:

$$\Delta PSI_t = \alpha + \sum_{i=1}^q \beta_1 PDI_t + \sum_{i=1}^q \beta_2 ER_{t-1} + \beta_3 \Delta PDI_{t-1} + \beta_4 \Delta ER_{t-1} + \mu_t \text{-----}$$

(4)

Where:

- Δ = First difference operator
- Ect = Error correction term

RESULTS AND DISCUSSIONS

Descriptive Statistics

Measurements of central tendency and measures of variability, or speed, are separated from the description statistic. The mean, median, maximum, minimum, standard deviation, kurtosis, and jarque bera statistics are shown in the table below. The standard deviation measures the deviation of the data from the mean, which demonstrates a high level of variance in this work. The mean describes the average value of the series, while the standard deviation describes the deviation of the data from the mean. The kurtosis measures the peakedness and flatness of the distribution of the series, PDI and EXR kurtosis of 2.013807 and 2.971529 respectively indicate that the distribution is platykurtic relative to the distribution. The jarque bera test is a statistical test to see if the variables are normally distributed. From the table below the probability value of PDI and EXR are all above 0.05 which means we are going with the null hypothesis which says they variables are normally distributed.

Table 1 Descriptive Statistics

	PDI	EXR
Mean	7147.102	145.1403
Median	1838.390	129.2200
Maximum	23108.44	410.4000
Minimum	33.55000	8.040000
Std. Dev.	8446.526	121.8424
Kurtosis	2.013807	2.971529
Jarque-Bera	4.437311	4.631916
Probability	0.108755	0.098672
Observations	31	31

Source: Authors Computation, 2022 (Eviews-10)

Unit Root Test

The unit root test is used to check whether the variables in the model are stationary, which ensures that the data for the variables did not change unnecessarily. In the ADF test, the absence of a unit root demonstrates trend-stationarity rather than stationarity. In other words, in the event of a shock, trend-stationary processes mean-revert, but unit-root processes have a long-term influence on the mean. The unit root tests yielded the following results:

Table 2: Summary of Unit Root Test Results

VARIABLES	ADF TEST STATISTICS	CRITICAL VALUES	PROB	ORDER OF INTEGRATION
Private Domestic Investment (PDI)	-3.859130	-2.998064	0.0079	I(0)
Exchange Rate (EXR)	-4.251350	-3.574244	0.0114	I(1)

Note: The test includes both Trend and Intercepts and all at 5% level of significance.

Source: Authors Computation, 2022 (Eviews-10)

The result above shows that Private domestic investment is integrated at level and Exchange rate at order one, all at 5% level of significance.

Cointegration Test Result

It's critical to determine if the time series has a long-run connection after passing the stationarity test. This test, also known as the cointegration test, can aid in the computation of error correction. Only proven cointegrated variables are regarded appropriate for inclusion in the Error Correction Model since they help to reconcile short run variance and achieve convergence. The sequence of cointegration of the unit root test of the variables determines the sort of cointegration test to apply.

Table 3 Summary of Cointegration Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	23.45520	10%	5.59	6.26
K	1	5%	6.56	7.3
		2.5%	7.46	8.27
		1%	8.74	9.63

Source: Authors Computation, 2022 (Eviews-10)

The F-statistic value of 23.45520 is greater than the upper and lower bounds of 6.56 and 7.3 at 5%, according to the bound test shown in Table 2 above. This suggests that the variables have a long-term connection. As a result, the hypothesis of no co-integration among the variables was rejected; hence, the long term (or equilibrium) connection between Private domestic investment factors and Exchange rate in Nigeria.

Table 4: Summary of ARDL Short run, Longrun- ECM Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5181.122	1244.506	4.163196	0.0005
@TREND	987.2258	159.1878	6.201642	0
D(EXR)	-2.344285	11.78298	0.198955	0.8444
D(EXR(-1))	54.93133	14.91905	3.681958	0.0016
D(EXR(-2))	69.00015	13.10569	5.264899	0
D(EXR(-3))	62.16346	16.28926	3.816223	0.0012
CointEq(-1)*	-0.248112	0.035308	7.027046	0
R-squared	0.741902			
Adjusted R-squared	0.664472			
F-statistic	9.581643			
Prob(F-statistic)	0.000051			
Durbin-Watson stat	1.489188			
Long Run Coefficient				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXR	-317.0477	167.1615	1.896655	0.0732
SEC = PDI - (-317.0477*EXR)				

Source: Authors Computation, 2022 (Eviews-10)

As expected, the lagged error correction term (ECT) is negative, less than unity, and statistically significant at 5%. The ECT coefficient of -0.248112 indicates that once the system is out of balance, restoring a long-run asymmetry connection between Private domestic investment variables and the Exchange rate takes an average (annual) speed of 24.8 percent. As a result, once the system is out of balance, restoring long-run equilibrium

requires an average speed of 24.8 percent, as indicated in Table 4. With a value of 0.664472, the adjusted R-squared, which was used to evaluate the estimated model's goodness of fit, implies that the model is reasonably fit in terms of prediction (66.44). Private domestic investment accounted for 66.44 percent of exchange rate swings, whereas the error term caught 33.56 percent of unexplained variations, according to the study. Furthermore, the F-statistics, which examine the regression model's overall significance, verified that the overall result is statistically significant. The F-statistic value of 9.581643, with a p-value of 0.000051, was less than 0.05, demonstrating this. And finally the Durbin-Watson stat of 1.489188 explain that the result has a positive correlation problem.

From the result, the null hypothesis which says exchange rate has no effect on private domestic investment in Nigeria will be rejected and the alternative hypothesis will be taken. This is proven with the negative impact of -2.344285 shown in the result.

Post Estimation Tests

The serial correlation test indicates that serial correlation is not a problem; however, a test for variance in the mean of the residuals of the model reveals no white noise, indicating heteroskedasticity, because the F-statistics p-value for the Heteroskedasticity Test and Breusch-Godfrey Serial Correlation test is greater than 5% level of significance. As a result, the residuals of the model stay constant, indicating that Heteroskedasticity and serial correlation are not present.

Table 5. Post Estimation Tests

Test type	F-Statistic
Heteroskedasticity Test	0.999170
Breusch-Godfrey Serial Correlation LM	0.296906

Source: Author's computation using EViews 10.0, 2022.

Discussion of Findings

The result of the analyses of the co-integration test indicated that there is a long term connection/ relationship among the variables in the model. Exchange rate has a negative and significant relationship with Private domestic investment (PDI) both in the short run and long run of the ARDL-ECM according to the findings of the study. The positive influence, however, was found to be statistically insignificant (p-value $0.8444 > 0.05$). According to the coefficient, every 1% fall in the exchange rate results in an increase of 2,344,285 in private domestic investment.

Oyedele (2013), research work establishes a negative association between the exchange rate and private investment, attributing the low level of private investment since 1980 to the devaluation trend, which has a negative influence on investment because much of investment trade has been dominated by capital goods imports. Till date, Nigerian exchange rate has continued to worsen and this effect has also attributed to the decline of private domestic investment in the country.

CONCLUSION AND RECOMMENDATION(S)

The findings of the study reveal that the exchange rate has a considerable impact on the performance of private domestic investment in Nigeria's economy. The government has undertaken attempts to increase productivity in the industry in order to increase private domestic investment.

The study recommends that a fall or a decrease in exchange rate will lead to an increase in private domestic investment and it would go a long way to encourage domestic and foreign private investment in Nigeria. By offering exchange rate protection, the low level of participation of domestic and foreign investors in private investment can also be addressed. In addition to minimizing macroeconomic instabilities, stabilization measures like monetary, fiscal, and exchange rate controls can also encourage private investment by lowering uncertainty. However, if these policies are contractionary, they could impede the pace of the economy's expansion by limiting absorption, which would then reduce aggregate demand. Therefore, expansionary exchange rate policy is encouraged for increase in private domestic investment.

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APPENDIX 1
RAW DAY FOR ANALYSIS

YEAR	EXR	PDI (N' Billion)	INFS (N' Billion)
1990	8.04	33.55	24.05
1991	9.91	41.35	28.34
1992	17.3	58.12	39.76
1993	22.07	127.12	54.5
1994	22	143.42	70.92
1995	21.9	180	121.14
1996	21.88	238.6	212.93
1997	21.89	316.21	269.65
1998	21.89	351.96	309.02
1999	92.34	431.17	498.03
2000	101.7	530.37	239.45
2001	111.23	764.96	438.7
2002	120.58	930.49	321.38
2003	129.22	1096.54	241.69
2004	140.85	1421.66	351.3
2005	142.56	1838.39	519.5
2006	137.1	2290.62	552.39
2007	127.41	3680.09	759.32
2008	120.71	6941.38	1123.46
2009	161.64	9147.42	1152.8
2010	153.06	9830.34	883.87
2011	159.31	14183.59	918.55
2012	160.86	15151.76	874.83
2013	162.45	16191.47	1108.39
2014	171.45	18126.05	783.12
2015	222.72	18720.51	818.37
2016	372.86	21982.15	634.8
2017	395.7	22290.66	979.5
2018	365.72	22350.54	998.7
2019	372.6	23108.44	960.2
2020	410.4	9061.24	502.7

Source: Central bank of Nigeria Statistical Bulletin and Annual Reports (2020)

**APPENDIX II
DATA RESULT**

DESCRIPTIVE RESULT

	EXR	INFS	PDI
Mean	145.1403	541.6568	7147.102
Median	129.2200	502.7000	1838.390
Maximum	410.4000	1152.800	23108.44
Minimum	8.040000	24.05000	33.55000
Std. Dev.	121.8424	369.9534	8446.526
Skewness	0.946730	0.134264	0.784659
Kurtosis	2.971529	1.669196	2.013807
Jarque-Bera	4.631916	2.380730	4.437311
Probability	0.098672	0.304110	0.108755
Sum	4499.350	16791.36	221560.2
Sum Sq. Dev.	445367.4	4105965.	2.14E+09
Observations	31	31	31

ADF UNIT ROOT TEST**EXCHANGE RATE UNIT ROOT AT ORDER 1**

Null Hypothesis: D(EXR) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.251350	0.0114
Test critical values:		
1% level	-4.309824	
5% level	-3.574244	
10% level	-3.221728	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(EXR,2)

Method: Least Squares

Date: 02/03/11 Time: 21:02

Sample (adjusted): 1992 2020

Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXR(-1))	-0.822831	0.193546	-4.251350	0.0002
C	-0.446447	13.05408	-0.034200	0.9730

@TREND("1990")	0.751828	0.739323	1.016915	0.3186
R-squared	0.410313	Mean dependent var		1.238966
Adjusted R-squared	0.364953	S.D. dependent var		40.87715
S.E. of regression	32.57494	Akaike info criterion		9.902661
Sum squared resid	27589.29	Schwarz criterion		10.04411
Log likelihood	-140.5886	Hannan-Quinn criter.		9.946959
F-statistic	9.045607	Durbin-Watson stat		1.868927
Prob(F-statistic)	0.001043			

INFT UNIT ROOT AT ORDER 1

Null Hypothesis: D(INFS) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.629793	0.0001
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(INFS,2)

Method: Least Squares

Date: 02/03/11 Time: 21:04

Sample (adjusted): 1992 2020

Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INFS(-1))	-1.215842	0.215966	-5.629793	0.0000
C	23.32484	35.59578	0.655270	0.5178
R-squared	0.539992	Mean dependent var		-15.92379
Adjusted R-squared	0.522954	S.D. dependent var		272.1598
S.E. of regression	187.9767	Akaike info criterion		13.37699
Sum squared resid	954051.6	Schwarz criterion		13.47128
Log likelihood	-191.9663	Hannan-Quinn criter.		13.40652
F-statistic	31.69457	Durbin-Watson stat		1.738237
Prob(F-statistic)	0.000006			

PDI UNIT ROOT AT LEVEL

Null Hypothesis: PDI has a unit root

Exogenous: Constant

Lag Length: 7 (Automatic - based on SIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.859130	0.0079
Test critical values:		
1% level	-3.752946	
5% level	-2.998064	
10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(PDI)

Method: Least Squares

Date: 02/03/11 Time: 21:09

Sample (adjusted): 1998 2020

Included observations: 23 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PDI(-1)	-0.497580	0.128936	-3.859130	0.0017
D(PDI(-1))	1.306145	0.456932	2.858510	0.0126
D(PDI(-2))	0.562155	0.446188	1.259907	0.2283
D(PDI(-3))	1.623427	0.469638	3.456762	0.0039
D(PDI(-4))	-1.095708	0.561661	-1.950834	0.0714
D(PDI(-5))	1.239814	0.557980	2.221967	0.0433
D(PDI(-6))	-0.142822	0.599614	-0.238189	0.8152
D(PDI(-7))	2.132864	0.619863	3.440863	0.0040
C	204.8339	673.8360	0.303982	0.7656
R-squared	0.772319	Mean dependent var		380.2187
Adjusted R-squared	0.642215	S.D. dependent var		3363.482
S.E. of regression	2011.870	Akaike info criterion		18.33769
Sum squared resid	56666697	Schwarz criterion		18.78201
Log likelihood	-201.8834	Hannan-Quinn criter.		18.44943
F-statistic	5.936190	Durbin-Watson stat		2.803497
Prob(F-statistic)	0.001960			

CO-INTEGRATION RESULT

ARDL Long Run Form and Bounds Test
 Dependent Variable: D(PDI)
 Selected Model: ARDL(1, 4)
 Case 5: Unrestricted Constant and Unrestricted Trend
 Date: 02/03/11 Time: 22:00
 Sample: 1990 2020
 Included observations: 27

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5181.122	1523.719	-3.400314	0.0030
@TREND	987.2258	174.9172	5.643962	0.0000
PDI(-1)*	-0.248112	0.122395	-2.027141	0.0569
EXR(-1)	-78.66336	12.30214	-6.394283	0.0000
D(EXR)	-2.344285	12.53402	-0.187034	0.8536
D(EXR(-1))	54.93133	15.31771	3.586133	0.0020
D(EXR(-2))	69.00015	13.45010	5.130085	0.0001
D(EXR(-3))	62.16346	16.73002	3.715684	0.0015

* p-value incompatible with t-Bounds distribution.

Levels Equation

Case 5: Unrestricted Constant and Unrestricted Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXR	-317.0477	167.1615	-1.896655	0.0732

$EC = PDI - (-317.0477 * EXR)$

F-Bounds Test

Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	23.45520	10%	5.59	6.26
k	1	5%	6.56	7.3
		2.5%	7.46	8.27
		1%	8.74	9.63
Finite Sample: n=35				
Actual Sample Size	27	10%	5.95	6.68

5%	7.21	8.055
1%	10.365	11.295

Finite Sample:
n=30

10%	6.01	6.78
5%	7.36	8.265
1%	10.605	11.65

t-Bounds Test

Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-2.027141	10%	-3.13	-3.4
		5%	-3.41	-3.69
		2.5%	-3.65	-3.96
		1%	-3.96	-4.26

ECM

ARDL Error Correction Regression

Dependent Variable: D(PDI)

Selected Model: ARDL(1, 4)

Case 5: Unrestricted Constant and Unrestricted Trend

Date: 02/03/11 Time: 22:05

Sample: 1990 2020

Included observations: 27

ECM Regression
Case 5: Unrestricted Constant and Unrestricted Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5181.122	1244.506	-4.163196	0.0005
@TREND	987.2258	159.1878	6.201642	0.0000
D(EXR)	-2.344285	11.78298	-0.198955	0.8444
D(EXR(-1))	54.93133	14.91905	3.681958	0.0016
D(EXR(-2))	69.00015	13.10569	5.264899	0.0000
D(EXR(-3))	62.16346	16.28926	3.816223	0.0012
CointEq(-1)*	-0.248112	0.035308	-7.027046	0.0000
R-squared	0.741902	Mean dependent var		330.8933
Adjusted R-squared	0.664472	S.D. dependent var		3096.314
S.E. of regression	1793.532	Akaike info criterion		18.04018
Sum squared resid	64335169	Schwarz criterion		18.37613
Log likelihood	-236.5424	Hannan-Quinn criter.		18.14007
F-statistic	9.581643	Durbin-Watson stat		1.489188
Prob(F-statistic)	0.000051			

* p-value incompatible with t-Bounds distribution.

F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	23.45520	10%	5.59	6.26
k	1	5%	6.56	7.3
		2.5%	7.46	8.27
		1%	8.74	9.63

t-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-7.027046	10%	-3.13	-3.4
		5%	-3.41	-3.69
		2.5%	-3.65	-3.96
		1%	-3.96	-4.26