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EFFECTS OF INTEREST RATE ON PORTFOLIO INVESTMENT IN NIGERIA

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Abstract: This paper examines the effects of interest rates on portfolio investment in Nigeria, using annual time series data over the period 1986-2021. However, as it is reported by the unit root test there is a mixture of 1(0) and 1(1) order of cointegration. This implies the condition for the adoption Autoregressive Distributed Lag (ARDL) bound test developed by Pesaran, Shin, and Smith (2001) are met and the study further proceeds to conduct co-integration and error correction tests to find out the short-run and long-run effects of interest rate on portfolio investments in Nigeria. In this connection, the result of the analyses shows that interest rate has a positive and significant effect on portfolio investment in both the short and long run. This implies that an increase in the interest rate causes an increase in portfolio investment in Nigeria over the study period. Therefore, this study calls for better management of interest rates so as to increase portfolio investment across the Nigerian economy.

Keywords: Portfolio investment, Interest rate, Inflation rate, exchange rate, and Real GDP

1. INTRODUCTION

The global economy used interest rates as an important monetary policy instrument to promote economic growth and development, especially through the investment process (Obi, 2022). Interest rate is regarded as the price paid for the use of money. It can also be seen as the return paid to the provider of financial resources and it plays a vital role in the allocation of scarce financial resources from the surplus economic units to deficit units intending to achieve economic growth (Apere, & Akarara 2018). In this regard, the basic functions

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of interest rates in an economy are summarized under three aspects; namely. Interest rates as return on financial assets serve as an incentive to savers, making them defer present consumption to a future date. Besides, the behaviour of interest rates determines the investment activities and hence economic growth of a country. Investment depends upon the rate of interest, while economic growth to a large extent depends on the level of investment. If the interest rate is high, investment is at the subordinate level and when the interest rate falls, the investment will rise (Oresotu, 1992).

From another perspective, portfolio investment involves investment not only in domestic, but also in foreign securities, stocks, government bonds, corporate bonds, treasury bills, crypto currencies, and real estate investment trusts among others (Kiyentei, 2021). The benefits of international portfolio investment are many. By investing in foreign securities, investors can participate in the growth of other countries, hedge their consumption basket against exchange rate risk, realize diversification effects, and take advantage of market segmentation on a global scale. In the international context, financial investments are not only subject to currency risk and political risk, but there are many institutional constraints and barriers, significant among them a host of tax issues (Söhnke & Gunter, 2001).

In addition, portfolio investment increases the liquidity of domestic capital markets and can help develop market efficiency. As markets become more liquid, as they become deeper and broader, a wider range of investments can be financed. Indeed, new enterprises have a greater chance of receiving start-up financing. Savers have more opportunities to invest with the assurance that they will be able to manage their portfolios, and even sell their financial securities quickly if they need access to their savings. Similarly, portfolio investors may also help the domestic capital markets by introducing more sophisticated instruments and technology for managing portfolios (Kimberly, 2002).

Taking together the effects of interest rate on portfolio investment in the Nigerian context, the interest rate has implications for the level of consumption, and structure of the investment. Low-interest rates encourage borrowing and economic growth in the sense that the lower the interest rate, the higher the earnings expectations (Oliver, 2016). More so, a high-interest rate on loanable funds increases the cost of capital which invariably discourages investors from accumulating more capital, and consequently discourages foreign portfolio investment. Therefore a reasonable level of economic development could be

attained with a minimal level of interest rate which further encourages currency exchange and thus attract foreign investors (Monogbe, & Okah, 2017).

More so, another influence of interest rate on investment scale is operate as the opportunity cost of investment on total investment, Under the condition of unchanged investment income, the rising interest rates increase the cost of investment and then inevitably cause lower-income investors to withdraw from the area of investment, so that the investment demand is reduced. However, falling interest rates mean that investment costs decline, thereby stimulating investment and the total social investments increase (Wuhan & Adnan 2015).

In Nigeria, the high-interest rate in the financial system has been so alarming, which is a reflection of the extremely poor infrastructural facilities and inefficient institutional framework necessary to bring about a substantial reduction in the risk associated with financing investment in an extremely traumatized economy. The administration of low-interest rates which was intended to encourage investment during the structural adjustment programme (SAP) of 1986 brings in a dynamic interest rate regime, but subsequently, it failed to yield the desired result of stimulating investment growth in Nigeria. This was a result of the inconsistency of monetary policy and the inability to formulate interest rate policy that will be a component of the broad policy package aimed at facilitating financial intermediation and monetary management that can include investment spending through low-interest rates (World Bank, 2002). It is because of this background that this study examines the effects of interest rates on portfolio investment in Nigeria from 1986-2021. To achieve the foregoing, this study is divided into five sections. Following this introduction, Section 2 contains the empirical literature review. Section 3 deals with the methodology. Section 4 presents the results and discussion while section 5 covers the summary and conclusions.

2. CONCEPTUAL LITERATURE

2.1.1. Concept of Interest

As observed by Black (2002) interest rate is defined as the price that a borrower has to pay to have access to cash, which he or she does not own and the return that a lender enjoys for foregoing consumption or liquidity in the current period. In addition, the interest rate is seen as lending rates on different forms of loans and advances in the financial market. More so, Eregha, (2010) defined interest rate as the cost of borrowing and it demonstrates what a borrower pays

to the lender for the use of the money. Also, interest rate aids the flow of credit into the key sector of the economy and help financial entities like corporate bodies, deposit banks, and insurance companies to play their intermediary role.

2.1.2. Concept of Portfolio Investment

Portfolio investment is a cross-border investment in securities with the intention of profit-making rather than management or legal control (Nwafor, 2020). More so, portfolio investment includes shares, stocks, depository receipts, and direct purchases of shares in local stock markets by foreign investors (World Bank, 2022).

2.2. EMPIRICAL LITERATURE REVIEW

At the global level, Majed and Ahmed (2010) analyzed the impact of the real interest rate on investment in Jordan from 1990 to 2005. The study used autoregressive distributed lag (ARDL) techniques for its analysis. The study found that interest rate has a negative and significant impact on investment in Jordan.

Another study by Abramov and Radygin (2015) examined the effects of interest rates on portfolio investment in Russia. The study used econometric techniques such as the Johansen co-integration test, and the Granger causality test. The result shows that the interest rate has a positive and significant effect on stock investments in the Russian economy.

In Africa, Muntanga (2020) investigated the impact of interest rates on savings and investment in Zambia from 1980 to 2018. The study used simple linear regression estimation techniques in the analysis. The study findings show that interest rates have a negative and significant impact on aggregate investment in Zambia.

In the case of Nigeria, Inimino, Abuo, and Bosco (2018) examined the effects of interest rates on domestic private investment in Nigeria from 1980 to 2015. The study employs the autoregressive distributed lag (ARDL) bounds testing approach. The result revealed that interest rate has a negative and significant effect on domestic private investment in Nigeria.

Similarly, Apere and Akarara (2018) examined the impact of interest rates on investment in Nigeria from 1981 to 2015. The study used the Johansen Multivariate Co-integration model and Error Correction Model (ECM) to analyze the data. The results of the study revealed that interest rates have a negative and significant impact on investment in Nigeria.

More so, Modestus and Princess (2021) assessed the variation in interest rates and investment behaviour in Nigeria from 1981 to 2019. The study adopts the autoregressive distributed lag (ARDL) and the result concludes that interest rate has a negative and significant effect on investments in Nigeria during the period of study.

On the other hand, Kiyentei (2021) explored the effect of interest rates on portfolio investment in Nigeria from 1984 to 2018. The study used the technique of autoregressive distributed lag (ARDL). The finding reports that interest rate has a positive and significant effect on portfolio investment in Nigeria.

In support of the above study, Obi (2022) investigated the impact of interest rates on savings and investment in Nigeria from 1981 to 2020. The study employed autoregressive distributed lag (ARDL) to determine the long-run relationship among the chosen variables. The results show that interest rate has a positive and significant effect on investment in Nigeria.

The review of the empirical literature shows that interest rates may have either positive or negative effects on portfolio investment but depends on the time frame and econometric techniques used. Besides, this inconclusive result indicates that there is still a need for further research on this study in the Nigerian context. This study becomes imperative at this period of time following the outbreak of COVID–19 pandemic that compel the Nigerian economy to experience an economic recession in 2019/2020. The result obtained in the present study will contribute to the existing literature on the nexus between interest rates and portfolio investment in Nigeria.

2.3. THEORETICAL FRAMEWORK

2.3.1. Keynesian Theory of Interest Rate and Investment

The Keynesian theory argued that the gap between total income and consumption can be made up by investment; if the requisite volume of investment is not forthcoming the aggregate demand price will fall short of the aggregate supply price. Thus, the variation in employment and income largely depends on investment. The volume of investment depends on the marginal efficiency of capital and the rate of interest. The marginal efficiency of capital is the expected rate of returns from new capital assets. When profit expectations are high, businessmen invest more. The rate of interest, and other determinants

of investment, depending on the quantity of money supply and liquidity preference. Now investment can be raised either by raising the marginal efficiency of capital or by lowering the interest rate. More so, the Keynesian theory further argued that low-interest rates as a component of administered cost impede growth in savings and investment demand. On the other hand, an increase in the real interest rate will have strong positive effects on savings and brings an increase in investment. This is because those with excess liquidity will be encouraged to save because of the high-interest rate, deposit banks will have excess money to lend to investors for investment purposes thereby raising the volume of productive investment in the country. More so, the interest rate in a country also comes to rest in line with the play of market forces at the point where the level of investment at that rate of interest is equal to the amount of saving at the same rate (Keynes, 1936).

3. METHODOLOGY

3.1. Source of Data

This study makes use of 35 years of time series data (1986-2021) from secondary sources. As expected, the annual time series data on interest rate is drawn from Nigeria's central bank report (2021) while the exchange rate, inflation rate, GDP growth rate, and money supply are sourced from the World Bank indicator (2021).

3.2 Model Specification and Estimation

The econometric model is specified as follows:

$$PIV_t = \beta_0 + \beta_1 ITR_t + \beta_2 IFR_t + \beta_3 EXR_t + \beta_4 RGDP + \mu_t \quad (1)$$

Where:

PIV= Portfolio investments

ITR= Interest rate

IFR= Inflation rate

EXTR= Exchange rate

RGDP=Real gross domestic products

e =Error Term, t = Time Series, βo = Constant

β_1, β_2, β_3, β_4 are parameters of the variables to be estimated in the model

3.3. Estimation

This study employs the autoregressive distributed lag (ARDL) proposed by Pesaran and Shin (1999) and Pesaran *et al.* (2001), the dynamic short-run and long-run ARDL model is specified as;

$$\Delta\left[\left(\ln LPIV_t\right)\right] = \beta_0 + \beta_1 \ln(LPIV_{t-1}) + \beta_2 \ln(LITR_{t-1}) + \beta_3 (LIFR_{t-1}) + \beta_4 (LEXR_{t-1})$$
$$+\beta_5 (LRGDP_{t-1}) + \sum_{i=1}^{p} \alpha_1 \Delta \ln(LPIV_{t-1}) + \sum_{i=1}^{m} \alpha_2 \Delta \ln(LITR_{t-1})$$
$$+\sum_{i=1}^{n} \alpha_3 \Delta LIFR_{t-1} + \sum_{i=1}^{0} \alpha_4 \Delta LEXR_{t-1} + \sum_{i=1}^{0} \alpha_5 \Delta LRGDP_{t-1} + \varepsilon_t \cdots\cdots \quad (1)$$

Similarly, the error correction model is specified as:

$$\Delta\left[\left(\ln(LPIV_t)\right)\right] = \beta_0 + \sum_{i=1}^{p} \alpha_1 \Delta \ln(LPIV_{t-1}) + \sum_{i=1}^{m} \alpha_2 \Delta \ln(LITR_{t-1}) + \sum_{i=1}^{n} \alpha_3 \Delta(LINFR)_{t-1} + \sum_{i=1}^{0} \alpha_4 \Delta(LEXR)_{t-1}$$
$$+\sum_{i=1}^{0} \alpha_5 \Delta(LRGDP_{t-1} ecm_{t-1} \quad (2)$$

Where Δ is the first difference operator, ln(LPIV) is the natural log of the portfolio investment, ln(LITR) is the natural log of the interest rate, ln(LIFR) is the natural log of the inflation rate, ln(LEXR) is the natural log of the exchange rate, ln(LRGDP) is the natural log of real GDP, the p denote the lag Length, the the α_0, α_1, α_2, α_3, and α_4, β_0, β_1, β_2, β_3 and β_4 are parameters to be estimated in the model while the et stand for white-noise error term respectively.

3.3. Estimation Tests

The estimation tests carried out to determine whether the residuals are distributed normally in the model are as follows;

3.3.1. Serial Correlation Test

The Breush-Godfry (1978) Lm test was conducted to correct the autocorrelation problems that may arise due to the impact of past events on the current situation in the Nigerian economy. Therefore, the auto-regression of the residuals takes the following form:

Lm= (n-p) R2 x2p

H0: P1=P2……PP= 0 (No Serial Correlation)

H1: P1+P2……PP= 0 (Presence of Serial Correlation)

3.3.2. Heteroscedasticity Test

The Breush-Pagan (1979) Lm test is used to test whether the variance of the errors from regression is dependent on the values of the independent variables. The Heteroscedasticity test has the following form:

Lm state=nr2

X2 (P-1)

H0:21=22……..2n=0 (Homoscedasticity)

H1:21=22……..2n=0 (Presence of Serial Correlation)

3.4. Stability Tests

Besides the different diagnostic tests used, the Ramsey (1969) RESET test is complemented to determine whether the error correction equation is correctly specified or not. This is because an incorrectly model-specified equation may lead to misspecification bias and wrong functioning forms that bring in spurious results. The CUSUM and CUSUM of the square test are carried out to ensure that the parameters of the models are stable.

3.5. Causality Test

To determine causality among the variables, this study makes use of the Toda and Yamamoto (1995) causality test. They developed a method based on the estimation of the augmented VAR model (k+dmax) where k is the optimal time lag on the first VAR model and dmax is the maximum integrated order on the system's variables (VAR model). The VAR model of Toda and Yamamoto causality is presented as follows:

$$y_t = \mu_0 + \left(\sum_{i=l}^{k} \alpha_{lt} y_{t-i} + \sum_{i=k+l}^{d_{\max}} \alpha_{2t} y_{t-i} \right) + \left(\sum_{i=l}^{k} \beta_{lt} X_{t-i} + \sum_{i=k+l}^{d_{\max}} \beta_{2t} X_{t-i} \right) + \varepsilon_{1t} \quad (3)$$

$$X_t = \phi_0 + \left(\sum_{i=l}^{k} \gamma_{lt} X_{t-i} + \sum_{i=k+l}^{d_{\max}} \gamma_{2t} X_{t-i} \right) + \left(\sum_{i=l}^{k} \delta_{lt} y_{t-i} + \sum_{i=k+l}^{d_{\max}} \delta_{2t} y_{t-i} \right) + \varepsilon_{2t} \quad (4)$$

Where k is the optimal time lag on the initial VAR model and d_{max} is the maximum integration order on the variables system (VAR model).

4. RESULTS AND DISCUSSION

4.1. Unit Root Test Results

Table 1: Results of Unit Root Tests

Unit root tests				
Augmented Dickey-Fuller (ADF)			*Phillips-Perron (PP)*	
Level				
Variables	*Constant Without Trend*	*Constant With Trend*	*Constant Without Trend*	*Constant With Trend*
LPIV	-2.6193	-2.5247	-2.6193	-2.5247
LITR	-7.3235*	-7.2538*	-9.1363*	-9.1566*
LIFR	- 5.2218**	-4.0467**	-7.3264**	-6.7130**
LEXR	-0.9234	-0.7252	-0.0914	-0.7805
LRGDP	-1.0368	-1.8218	1.1556	-2.3676
First Difference				
LPIV	-6.7250*	-6.6660*	-6.4760*	-6.1780*
LITR	-2.8435	-2.9507	-2.7785	-2.8835
LIFR	-2.3717	-2.6618	-2.8750	-2.4251
LEXR	-4.2493**	-5.3114**	-4.7430**	-5.5048**
LRGDP	-3.3961**	-3.3676**	-3.3676**	-3.3497**
Note: ** and * denotes significance at 5% and 1% significance level, respectively.				

Source: Researcher's computations using E-Views 9 (2022).

In Table 1 the results of the unit root test using the Augmented Dickey-Fuller (ADF) and Philips Perron (PP) techniques reveal that interest rate and inflation rate were stationary at levels 1(0) while the portfolio investment, exchange rate, and real GDP are stationary at their first difference 1(1). The mixture of 1(0) and 1(1) order of integration implies the condition for the adoption of autoregressive distributed lag (ARDL) bound test developed by Pesaran, Shin, and Smith (2001) are met and the study further proceeds to conduct the co-integration test and error correction test to find out the relationship between interest rate and portfolio investments in Nigeria.

4.2. Cointegration Test

Table 2: Results of Bound Test

F-statistic	6.7263	4
Level of significance	The critical value I(0) Bound	The critical value 1(1) Bound
10%	2.20	3.09
5%	2.56	3.49
1%	3.29	4.37

Source: Researcher's computations using E-Views 9, (2022).

In Table 2, the results of the cointegration test reveal that the F-statistic value 6.7263 exceeds the upper bound and lower bound values at a 1% level of significance. As expected from the ARDL bound tests, there is enough evidence to support the assertion that the interest rate has a long-run relationship with the portfolio investment in Nigeria over the study period.

4.3. Estimation

Table 3: Short-run Coefficients- Dependent Variable is LPIV

Cointegrating Form				
Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
D(ITR)	0.0111	0.1215	0.0091	0.0928
D(IFR)	-0.0271	0.0279	-0.9728	0.0399
D(EXR)	0.0081	0.0234	0.3481	0.7307
D(RGDP)	-0.0200	0.0200	-2.8543	0.0085
CointEq(-1)	-0.3455	0.1813	-6.3197	0.0000

Source: Researchers' Computations from E-views 9, (2022).

In Table 3 the results of the short-run coefficients report that the interest rate has a positive and significant effect on portfolio investment at a 10% level of significance. It indicates that an increase in the interest rate by 1% would increase portfolio investment by 0.01%. While the inflation rate has a negative and significant impact on portfolio investment at a 5% level of significance. This implies that an increase in the inflation rate by 1% would increase portfolio investment by 0.03%. Real GDP has a negative and significant effect on the portfolio investment rate at a 10% level of significance. It implies that an increase in real GDP by 1% would increase portfolio investment by 0.02%. Again, the short-run error correction term for the model ECM (-1), has a coefficient value (-0.3455) with a negative sign, less than one, and is statistically significant at a 1% level of significance. This also implies that the speed of adjustment for correcting disequilibrium from the previous year to

Table 4: Long Run Coefficients- Dependent Variable is LPIV

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
LITR	0.0223	0.1341	0.1665	0.0691
LIFR	-0.0242	0.0260	-0.9307	0.0609
LEXR	-0.0032	0.0123	-0.2636	0.7943
LRGDP	0.0200	0.0300	0.3068	0.0615
C	4.2501	2.9080	1.4615	0.1563

Source: Researchers' Computations from E-views 9, (2022).

equilibrium in the current year is 0.35% respectively. This result supports the previous confirmation of long-term cointegration in the model.

Similarly, in Table 4 the results of the long-run coefficients report that the interest rate has a positive and significant effect on portfolio investment at a 10% level of significance. It indicates that an increase in the interest rate by 1% would increase portfolio investment by 0.02%. While the inflation rate has a negative and significant impact on portfolio investment at a 10% level of significance. This implies that an increase in the inflation rate by 1% would increase portfolio investment by 0.02%. Real GDP has a positive and significant effect on portfolio investment at a 10% level of significance. It implies that an increase in real GDP by 1% would increase portfolio investment by 0.02% respectively.

4.4. Diagnostic Tests

The results of different residual diagnostic tests conducted to determine the adequacy of the estimates are presented as follows.

Table 5: Results of ARDL Diagnostic Tests

Tests	*F-statistics*	*Prob. Value*
Normality((Jarque -Bera Test Statistics)	0.8603	0.1880
Serial Correlation(Breusch-Godfrey LM Test)	0.4028	0.6731
HeteroscedasticityTest: Breusch-Pagan-Godfrey	2.0755	0.1026
Specification Error (Ramsey RESET Test)	0.6109	0.5470

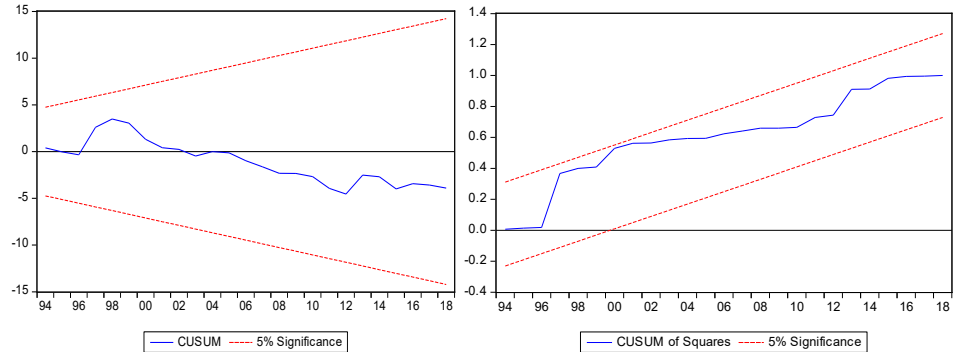
Source: Researchers' Computations from E-views 9, (2022).

In Table 5, the results of the Jarque-Bera (1987) tests for normality reports 0.8603 and it associates probability value (0.1880) passing the normal distribution test. This is because the Jarque-Bera probability values are not significant at all levels. The result of Breusch-Godfrey's (1978) Serial Correlation LM tests shows that the computed F-statistic and p-value is 0.4028 (0.6731). This also indicates that there is no serial correlation problem in the residuals since the P-value is greater than the 10% significance level. The results of the Breusch-Pagan-Godfrey (1979) Heteroskedasticity tests further report the computed F-statistic and p-value are 2.0755 (0.1026). This shows that there is an absence of a Heteroskedasticity problem in the residuals since the P-value of the test is greater than a 10% significance level. The results of the Ramsey (1969) Reset test of Misspecification shows the computed F-statistic and p-value are 0.6109 (0.5470), this implies that there is no problem of

model misspecification in the residuals as the P-value is greater than the 10% significance level. Therefore, the study concluded that the variables used in the model are stable and can be considered for economic inferences.

4.5. Stability Test Results

In this study, the Cumulative Sum of recursive residuals (CUSUM) developed by Brown, Dublin, and Evans (1975) is employed to test the stability of the parameters of the model within a 5% level of significance. The results of the tests with the portfolio investment as the dependent variable and the explanatory variables including interest rate, inflation rate, exchange rate, and the real GDP are presented in figures 1 and 2.



Source: Researcher's computations using E-Views 9 (2022).

From the above graphs, it can be seen that there are no chances of having spurious regression because the blue lines are in-between the two red lines. Therefore, the model is stable and can be used for policy formulation.

4.6. Causality Test Results

In this study, Toda and Yamamoto (1995) were employed to determine the direction of causality between the variables in Nigeria from 1986 to 2021. The results are presented as follows;

Table 6: Results of Toda and Yamamota Causality Test

Causality	*Chi-sq*	*df*	*Prob.*
LITR does not Granger cause LPIV	2.3647	2	0.3066
LPIV does not Granger cause LITR	1.3078	2	0.5201
LEXR does not Granger cause LIFR	5.3283	2	0.0697***
LRGDP does not Granger cause LIFR	5.4343	2	0.0661***

Causality	*Chi-sq*	*df*	*Prob.*
LPIV does not Granger cause LEXR	6.4843	2	0.0391**
LEXR does not Granger cause LRGDP	4.8016	2	0.0906***

** and *** represent 5% and 10% levels of significance.

Source: Researchers computations using E-Views 9 (2022).

In Table 6 the results of the causality tests reported that the hypothesis that the interest rate does not granger cause portfolio investment and the portfolio investment does not granger cause the interest rate is accepted. As shown by the non-significance of the ρ-values. Similarly, the result also revealed a unidirectional causality from the exchange rate to the inflation rate and from real GDP to the inflation rate, and on the other hand, from portfolio investment to the exchange rate, as well as from the exchange rate to real GDP during the study period.

5. SUMMARY AND CONCLUSION

In this study, the impact of the interest rate on portfolio investment is examined in Nigeria, using time series data from 1986-2021. The choice of this timeframe is remarkable as it captured major economic events such as the 2019 covid-19 induced economic recessions in Nigeria that brings disequilibrium in the key macroeconomic indices in the country. The study carried out stationarity tests using the Augmented Dickey-Fuller (ADF) and Philips Perron (PP) methods. More so, the mixture of 1(0) and 1(1) order of integration makes the study adopt the Autoregressive Distributed Lag (ARDL) bound test developed by Pesaran, Shin, and Smith (2001). In addition, different residual diagnostic tests were conducted to determine the adequacy of the estimates. From the empirical results, it is concluded that both in the short-run and long-run interest rate has a positive and significant effect on portfolio investment in Nigeria. Therefore, the negative relationship between the interest rate on portfolio investment reported in this study supported the empirical works of Abramov and Radygin (2015), Kiyentei (2021), and Obi (2022). As result; this study recommends that policymakers should adopt a monetary policy to deal with the frequent variation in interest rates in order to encourage portfolio investment across the country.

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