An Empirical Analysis of the Determinants of Interest Rate in Nigeria (1981 -2021)

[1]**Bilewu, Olukayode Abiodun**[1], **Orenuga, Babatunde**[2], **Abass, Kehinde B**[3]

[1]Department of Accounting, Olabisi Onabanjo University, Ago- Iwoye, Ogun State Nigeria.
[2]Department of Accounting, Lead City University Ibadan, Oyo State, Nigeria.
[3]Department of Finance, Babcock University, Ilishan Remo, Ogun State, Nigeria.

ABSTRACT: The aim of this study is to empirically investigate the determinants of interest rate in Nigeria. The treasury bill (TR_b) was used as a proxy for interest rate. Other variables used for the study are the real gross domestic product (RGDP), money supply (M_s), and the rate of inflation (Inf). The data were all sourced from the Central Bank of Nigeria statistical bulletin. The Augmented Dickey Fuller unit root test was used to ascertain whether or not the dataset are stationary while the Pearson correlation matrix was used to test the degree of association between the dependent and independent or explanatory variables in the specified model. Findings from the study show that there is strong negative relationship between money supply and interest rate. The real gross domestic product has inverse or negative relationship with the rate of interest which is in consonance with apriori expectation. The coefficient of inflation indicates weak positive correlation between inflation and interest rate which is at variance with economic theory. The outcome however, was attributed to the global market for capital in which the interest rate is determined via the interaction between global investment demand and desired savings. Based on the findings, the following conclusions were made; The money supply especially the (M_2) components are a veritable tool that can be used in tinkering the interest rate geared towards achieving targeted macroeconomic objectives; There should be proper cohesion in the use of monetary and fiscal policy in directing the interest rate to ensure that it positively boost the country's real gross domestic product; other trade policies such the exchange rate policy should be monitored to ensure that it captures external factors that can potentially affect the domestic interest rate.

KEY WORD: Interest Rate, Real Gross Domestic Product, Correlation, Inflation

1.0 INTRODUCTION

The rate of interest plays vital roles in the smooth operations of the financial market and the real sector of the Nigeria economy. To begin with, the rate of interest facilitates intermediation in the financial market i.e. the transfer of funds from deficit to surplus unit of the economy (Bredino et al., 2018). In addition, individuals decision as to whether or not to hold their wealth in form of money or bonds is determined by the rate of returns which is the interest rate. At high interest rates, people will increase the purchase of bonds to take advantage of the interest yield on their investment; consequently, they will have less cash at hand. Conversely, when people speculate that the interest rate will fall soon, they will sell their bonds and would rather hold the wealth as cash balances in anticipation of another window of interest rate increase. It is in consonance with the aforementioned that it was postulated that there is positive relationship between interest rate and economic growth (Chris & Ayingan, 2012). Furthermore, financial reforms and interest rate affects the trajectory of economic growth in Nigeria as such a good understanding of those factors that determines its fluctuation overtime will be invaluable to public policy formulators (Obamuyi & Olorunfemi, 2011).

The high interest rates in Nigeria has no doubt resulted to a fall in investment expenditure of firms, and high on unemployment. Between 2007 and 2023 the interest rate in Nigeria averaged 11.7. As at July 2023, the interest rate stood at 18.75 percent (CBN, 2023). It has been argued that present staggering level of unemployment in the country is partly a result of the high rate of interest (Bredino et al, 2022). Thus, given the key roles of interest rate and its far-reaching impact on the economy, it is imperative to consider those factors that determines the rate of interest in an economy.

2.0 REVIEW OF LITERATURE

In this section we shall take a cursory view of the theoretical foundations of interest rates. Thereafter we shall examine some relevant empirical studies on interest rates and it determinant with a view of identifying the gap in the study which this study intends to fill.

2.1 Theoretical Review

In this section we shall briefly highlight four(4) major theories of interest rate identified in economic literature.

An Empirical Analysis of the Determinants of Interest Rate in Nigeria (1981 -2021)

Classical Theory of Interest Rate: As the name suggests, the classical theory of interest rate was developed by the classical economists. The major tenet of this theory is that the interest rate is determined by the interaction of the demand and supply of savings. Though the classical economists had divergent views on the determinants of demand and supply, they all agree that the demand and supply of savings is interest-elastic i.e. savings are highly responsive to changes in the rate of interest. The deficit economic unit constitutes the demand side while the surplus economic unit constitutes the supply of the financial market. An increase in the rate interest is indicative of increased returns on investment or higher rewards for the postponement of present consumption, thus, an expansion of the supply of savings is positively related to the rate of interest. On the other hand, the interest rate is perceived as the cost of borrowing or gaining access to more fund by the deficit economic unit, thus, the higher the rate of interest the lower the demand for loanable funds. Accordingly, there is an inverse relationship between demand for loanable funds and interest rate.

Loanable Fund Theory of Interest Rate: The loanable fund theory of interest rate can also be referred to as the neoclassical theory of interest rate. This theory was developed by a neoclassical economist called Knut Wicksell. Other neoclassical economics like Ohlins, Robertson, Lindahl, and Viner made notable contributions and further popularized this theory. According to this theory, interest rate is determined by the interaction or interplay of supply and demand for loanable funds. This theory postulates that the demand for loanable funds are determined by three (3) main factors namely; investment, hoarding, and dissaving. To invest in any business venture, funds are required. The interest rate is the cost that individuals or firms seeking (demanding) investible funds must pay. Thus, in making decision on the amount of funds to borrow and the particular investment to make, firms compare the cost of borrowing (interest rate) and the rate of returns (expected profit). The higher the interest rate vice a vise the rate returns the lower the demand for loanable funds and vice-versa. In line with the above reasoning, one can conclude that there is inverse relationship between the rate of interest and investment. The demand for loanable funds is also affected by the degree of hoarding i.e. idle cash holdings. The higher the interest rate the lower the demand for loanable funds for hoarding. Dissaving is a phenomenon where expenditure is said to be more than proportionate to income i.e. when people spend more than their current earnings. Dissaving is said to be a decreasing function of interest rate. On other hand, the supply of loanable funds is determined by savings, dishoarding, disinvestment, and bank credit. Savings is a major source of supply of loanable funds. It the proportion of income that is not spent on consumption or the postponement of current expenditure. The interest is seen as the reward or inducement for savings. Thus, the higher the rate of interest the higher the propensity of individuals to save, thereby increasing the supply of loanable funds. As stated earlier, hoarding is the act of keeping idle cash balances to satisfy ones desire for liquidity. Dishoarding as the name implies is the opposite of hoarding. At higher rate of interest people will be discouraged to keep idle cash, thus, the supply of loanable funds will increase. If the rate of interest is low dishoarding will be negligible. Disinvestment is a major determinant of the supply of loanable funds.

Liquidity Preference Theory of Interest Rate: The liquidity preference theory for postulated by John Maynard Keynes (Keynes, 1936). According to him, equilibrium in the financial market is not as a result of the balancing of savings and investment, rather it is a result of peoples willingness or otherwise to hold liquidity (cash balances) in light of the prevailing or expected trajectory of interest rate. Contrary to previous theories, Keynes opined that at low levels of interest rate, and in anticipation of a rise in the future, people would prefer to hold liquid cash rather than invest to maximize returns on investment. Thus, he argued that savings and borrowing cannot be at par. The liquidity preference theory stipulates that interest rate is determined by the demand and supply for holding money speculations. A major assumption of this theory is that the supply of money is exogenously determined by the monetary authority, though it is also a function of the rate of interest. The money supply curve is perfectly elastic.

Modern Theory of Interest Rate: The modern theory of interest rate was developed by Hicks and Hansen. It is a more elaborate and realistic theory of interest rate compares to previous theories. The main thrust of this theory is that it attempts to combine both monetary and non-monetary factors in explaining the determination of the rate of interest. Using the Keynesian liquidity preference tool, Hicks developed what he called the "LM Curve" which can be used to ascertain the rate of interest at various income levels in the monetary sector. On the other hand, the "IS Curve" can be used to ascertain the flows of investment and savings in the product market and their interaction leading up to the establishment of equilibrium in the real sector. The combination of the IS-LM curve results to general equilibrium in both the money market and product market.

2.2 Empirical Review

In this section we shall briefly review some relevant empirical literature on the subject matter with the view of identifying literature gaps.

Abayomi, A. T, & Adebayo S. M. (2010) carried out a study on the determinant of interests rates in Nigeria. The variables used for the study are treasury bills rate, real gross domestic product, real money supply, and expected foreign return. The above secondary data were collated from the International Monetary Fund (IMF) Financial Statistics CD-ROM 2009 edition, and 2008 Central Bank of Nigeria (CBN) Statistical Bulletin. In the specification of the model, the treasury bill rate (the average market interest rate in Nigeria) was the dependent variable while real gross domestic product, real money supply, and foreign exchange returns were the independent or explanatory variables. The Augmented Dickey Fuller and Philip Peron tests were used to ascertain whether or not the dataset were stationary. The Johansen Co-integration test and Vector Error Correction Model (VEM) were used to test for co-

integration among variables and estimate the specified models respectively. Findings from the study show that there is positive and statistically significant relationship between real money supply, and expected foreign returns on the treasury bill rate and domestic output in the long-run. In addition, an increase in domestic output and previous treasury bill rate will result to an increase in present treasury bill rate. On the other hand, an increase in real money supply will result to a decline in current treasury bill rate.

Anthony, A. E., & Babatunde, O. A. (2012). carried out a study titled " determinant of interest rate spread in Nigeria". The measurement variables used in this study are; interest rate spread, cash reserve requirements, average capital employed to average total asset, loan to deposit ratio, average loan to average total asset, non-interest expense to average total assets, remuneration to total asset, Minimum rediscount rate, gross domestic product, development stocks, treasury certificate, treasury bonds, and changes in inflation. The Data used for this study was sourced from the Central Bank of Nigeria Statistical Bulletin (2007). Specifically, the dataset of 12 out of 25 banks in Nigeria that survived the consolidation exercise of 2004 were used for the study. Pearson's correlation matrix was used to ascertain the direction and degree of association among variables while the stationarity of the dataset were tested using the Levin, Lin and Chu and the ADF-Fisher Chi-square test. Findings from the study show that there is direct association between interest rate spread and variables such as; cash reserve requirement, average loan to average total deposit, remuneration to total asset, and gross domestic product. In addition, a reduction in cash reserve ratio and high banking overhead costs will result to a reduction in the high interest rate spreads in Nigeria

Adrian et al., (1995). The determinants of real interest rate of 17 OECD countries were studied using an estimated model. These countries were separated into low-frequency and high-frequency economic factor in relation to a multi-factor framework of development in each country. Using a simultaneous estimation procedure, each country were separately studied using a simultaneous equation procedure and a vector error correction model methodology. Findings from the study indicates that real-rate low-frequency fundamentals are affected by factors such as; rate of returns on business capital, portfolio risk, inflation uncertainty, and indicators of future savings and investment balance. Also, monetary policy actions and shocks to inflation affects high-frequency components.

3.0 STUDY METHOD
3.1 Data Collection and Sources
Secondary data were used for this study. Specifically, data on interest rate, real gross domestic product, money supply, and inflation were sourced from the Central Bank of Nigeria Statistical bulletin. The data covers the period 1981 – 2021 (41 observations).
3.2 Research Design & Data Analysis Technique
The choice research design to be adopted is determined by the type of data to be used for the study as well as the choice of statistical analysis to be used (Nwankwo, 2011). Given the nature of data to be used i.e. secondary data, and the preferred analytical tool, the casual comparative research design was used for the study.

The test for unit root or stationarity of the data shall be conducted using the Augmented Dickey Fuller unit root. In addition, the Pearson correlation matrix shall be used to test the degree of association among the variables in the model.

3.3 Model Specification
The specified model for this study attempts to capture the determinants of interest rates as postulated by various theories.
The functional form of the model is stated thus;
$\mathbf{TR_b}$ = f (Rgdp, M_s, Inf) ………………..…………………………………. (3.1)
Where,
$\mathbf{TR_b}$ = Treasury Bills (Used as proxy for interest rate)
$\mathbf{M_s}$ = Money Supply (M_2 definition of money)
$\mathbf{Inf}$ = Inflation rate

The econometric model of equation (3.1) above is postulated as the following linear specification.

$\mathbf{TR_b}$ = $\beta_0 + \beta_1$Rgdp + $\beta_2 M_s$ + β_3Inf + U……………………………………… (3.2)
Where; TR_b, Rgdp, and Inf are described in equation above (3.1)
β_0 = Constant regression estimate, $\beta_1 - \beta_3$ = slope regression estimates and U = random error term
4.0 RESULTS & DISCUSSION
The results and findings of the various analytical tools employed in this study are presented in the following sections.
Descriptive Statistics
The descriptive statistics of the dataset are presented in table 1.0 followed by detailed explanation of the implication of the outcome.

An Empirical Analysis of the Determinants of Interest Rate in Nigeria (1981 -2021)

Table 1.0: Descriptive Statistics

	TRB	RGDP	MS	INF
Mean	12.28226	26105.23	7288.791	18.68561
Median	12.25	24075.15	1315.87	12.5
Maximum	26.9	50564.26	39955.52	72.81
Minimum	3.185	16211.49	16.7	5.4
Std. Dev.	5.032487	8351.758	10537.89	15.98336
Skewness	0.421117	1.284181	1.476508	1.830066
Kurtosis	3.232163	4.144059	4.256616	5.586232
Jarque-Bera	1.303896	13.50499	17.59478	34.31214
Probability	0.52103	0.001168	0.000151	0
Sum	503.5725	1070314	298840.5	766.11
Sum Sq. Dev.	1013.037	2.8E+09	4.44E+09	10218.71
Observations	41	41	41	41

Source: Authors Computation Using E-view

As shown in table 1.0 above, the treasury bill rate (TR_b) got to a minimum of 3.2%, and a maximum of 26.9% within the period under review. In addition, it averaged 12.2% between 1981- 2021. The kurtosis of 3.2 is indicated that the distribution has more values higher than the mean of the distribution i.e. the distribution is leptokurtic. The real gross domestic product (Rgdp) has an average of ₦26, 105.23 with corresponding minimum and maximum values of N16,211.49 and N50,524.26 respectively. Again, the value of the kurtosis show that the distribution if leptokurtic i.e. the distribution has more values higher than the mean of the distribution. The money supply has an average of N7,288.79 with corresponding minimum and maximum values of 16.7 and 39,955.52. The value of the kurtosis indicates that the distribution has more values higher than the mean of the distribution. Finally, the mean of the rate of inflation (Inf) was 18.68 with corresponding minimum and maximum of 5.4 and 72.8 respectively. Again, the value of the kurtosis show that the distribution has more values higher than the mean of the distribution**.**

Unit Root Test
Over time it has been observed that time series data are often time that not are non-stationary. The implication of using non stationary data for analysis is that the regression outcome spurious or non-sense. Hence, we have conducted the unit test using the Augmented Dickey fuller method. The outcome of the unit root test in shown in table 2.0 below.

Table 2.0: Augmented Dickey Fuller Unit Root Test Result

VARIABLES	LEVELS		1st DIFFERENCE		Order of Integration
	ADF Test Statistics	Test Critical Value @ 5%	ADF Test Statistics	Test Critical Value @ 5%	
TR_b	-3.250462	-3.526609	-7.118232	**-3.529758	I(1)
RGDP	-1.70237	-3.526609	-6.084935	**-3.529758	I(1)
M_S	3.318253	**-1.949609	3.268479	**-1.949856	I(0)
INF	-3.016651	**-2.936942	-6.089263	**-2.938987	I(0)

Source: Authors Computation Using E-view

As shown in table 2.0 above, money supply(M_S) and inflation(Inf) were both stationary at levels and first difference while treasury bills (TR_b) and real gross domestic product (Rgdp) were stationary only at first difference.

Correlation Matrix
The output of the correlation matrix is shown in table 3.0 below.

An Empirical Analysis of the Determinants of Interest Rate in Nigeria (1981 -2021)

Table 3.0: Correlation Matrix

	TRB	RGDP	MS	INF
TRB	1.00	-0.1125	-0.8719	0.276201
RGDP	-0.1125	1.00	0.131282	-0.27648
MS	-0.1719	0.13128	1.00	-0.2704
INF	0.276201	-0.27648	-0.2704	1.00

Source: Authors Computation Using E-view

From the correlation matrix output shown in table 3.0, the coefficient of money supply (M_S) is -0.87 meaning that there is strong negative relationship between interest rate and money supply. The above outcome is in consonance apriori expectation which states that an increase in money supply (M_s) will result to a fall in interest rate ceteris paribus. Again, the coefficient of real gross domestic product (RGDP) (-0.11) indicates weak negative correlation between interest rate and real gross domestic product. The above outcome is in consonance with apriori expectations which stipulates that lowering of the interest rate is likely to encourage investment expenditure and thus, boost the country's gross domestic product (Abdul & Marwan, 2013; Tomola & Sola, 2011). The coefficient of inflation (0.27) indicates weak positive correlation between inflation and interest rate. Under normal circumstance, an increase in the price level (Inflation) is an indication of a fall in the purchasing power of the consumer, and a reduction in savings. Theoretically, the lower the level of savings the higher the interest rate.

5.0 SUMMARY AND CONCLUSION

The rate of interest plays vital roles in the smooth operations of the financial market and the real sector of the Nigeria economy. Thus, the aim of this study was to empirically investigate the determinants of interest rate in Nigeria. The treasury bill (TR_b) was used as a proxy for interest rate. Other variables used for the study are the real gross domestic product (RGDP), money supply (M_s), and the rate of inflation (Inf). The data were all sourced from the Central Bank of Nigeria statistical bulletin.

The Augmented Dickey Fuller unit root test was used to ascertain whether or not the dataset are stationary while the Pearson correlation matrix was used to test the degree of association between the dependent and independent or explanatory variables in the specified model. Findings from the study show that there is strong negative relationship between money supply and interest rate. The real gross domestic product has inverse or negative relationship with the rate of interest which is in consonance with apriori expectation. The coefficient of inflation indicates weak positive correlation between inflation and interest rate which is at variance with economic theory. The outcome however, was attributed to the global market for capital in which the interest rate is determined via the interaction between global investment demand and desired savings.

Based on the findings of this paper, the following conclusions have been put forward;

a) The money supply especially the (M_2) components are a veritable tool that can be used in tinkering the interest rate geared towards achieving targeted macroeconomic objectives.

b) There should be proper cohesion in the use of monetary and fiscal policy in directing the interest rate to ensure that it positively boost the country's real gross domestic product.

c) Besides monetary and fiscal policy other policy instruments such as the balance of trade policy and exchange rate policy should be carefully formulated to capture the influence of external factors that affects the rate of interest of the domestic economy.

REFERENCES

1) Abayomi, A. T., & Adebayo, S. M. (2010). Determinants of Interests Rate in Nigeria: an Error Correction Model. *Journal of Economics and International Finance, 2*(12), 261-271.

2) Abdul Aziz, F. S., & Marwan Mohammed, A. O. (2013). The Effect of Interest Rate, Inflation rate, gdp, on real economic growth rate in Jordan. *Asian Economic and Financial Review, 3*(3), 341-354.

3) Adrian, O., Macolm, E., & Michael, K. (1995). The Determinant of Rela Long-term Interest Rates: 17 Country Pooled-Time-Series Evidence . *OECD Economics Department Working Papers*(OECD (95)61).

4) Anthony, A. E., & Babatunde, O. A. (2012). The Determinants of Interest Rate Spread in Nigeria: An Empirical Investigation. *Modern Economy, 2*, 837-845.

5) Bredino, S. (2024). *Monetary Economics: A Concise Text.* Sofiata Publications, Nigeria.

6) Bredino, S., & Fiderikumo, P. (2018). Foreign Direct Invesment and Economic Growth in Nigeria. *Journal of Economics and Business*, Vol. 1, No. 3, 260 -267.

7) Bredino, S., Dikeogu, C., & Fiderikumo, P. (2022). Fiscal Policy and Unemployment in Nigeria: A Structural Analysis. *African Journal of Business and Economic Development*, Vol. 2, Issues 12, Pp. 117 -126.

8) Bredino, S., Fiderikumo, P., & Adedoyin , A. (2018). Impact of Capital Flight on Economic Growth in Nigeria: An Econometric Approach. *Journal of Business and Economic Development*, 3(1), 22-29.

9) Central Bank Of Nigeria. (2022). *Annual Statistical Bulletin.*

10) Christ, U. O., & Ayingan, R. (2012). The Effect of Interest Rate Fluctuation on teh Economic Growth of Nigeria. *International Journal of business and Social Science, 3*(20), 295 -302.

11) Dickey, D. A., & Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series with a unit root. *Journal of the American Statistical Association*, 74(1): 427-431.

12) Keynes, J. (1936). *General Theory of Employment, Interest and Money.* London: Harcourt.

13) Nwankwo, O. C. (2011). *A Practical Guide in Research Writing.* Port Harcourt: Pam Unique Publishers Co. Ltd.

14) Obamuyi, T. M., & Olorunfemi, S. (2011). Financial Reforms: Interest rate behaviour and economic growth in Nigeria. *Journal of Applied Finance & Banking, 11*(4), 39-55.

15) Tomola, O. M., & Sola, O. (2011). Financial Reforms, interest rate behaviourand economic growth in Nigeria. *Journal of Applied Finance & Banking, 1*(4), 39 -55.