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An investigation of the relationship between interest rates and economic growth in Nigeria, 1970 - 2006

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The paper investigates the relationship between interest rates and economic growth in Nigeria, using time series analysis and annual data from 1970 - 2006. The co-integration and error correction model were used to capture both the long-run and short-run dynamics of the variables in the model. The empirical results indicate that real lending rates have significant effect on economic growth. There also exists a unique long-run relationship between economic growth and its determinants, including interest rate. The results imply that the behaviour of interest rate is important for economic growth in view of the relationships between interest rates and investment and investment and growth. Thus, the formulation and implementation of financial policies that enhance investment-friendly rate of interest is necessary for promoting economic growth in Nigeria.

Key words: Interest rates, economic growth, financial reforms.

INTRODUCTION

Interest rate reform, a policy under financial sector liberalisation, was to achieve efficiency in the financial sector and engendering financial deepening. In Nigeria, financial sector reforms began with the deregulation of interest rates in August 1987 (Ikhide and Alawode, 2001). Prior to this period, the financial system operated under financial regulation and interest rates were said to be repressed. According to McKinnon (1973) and Shaw (1973), financial repression arises mostly when a country imposes ceiling on deposit and lending nominal interest rates at a low level relative to inflation. The resulting low or negative interest rates discourage saving mobilisation and channelling of the mobilised savings through the financial system. This has a negative impact on the quantity and quality of investment and hence economic growth. Therefore, the expectation of interest rate reform was that it would encourage domestic savings and make loanable funds available in the banking institutions. But, the criticism has been that the "tunnel-like" structure of interest rate (Ojo, 1976) in Nigeria is capable of discouraging savings and retarding growth in view of the empirical link between savings, investment and economic growth. The critical question, therefore, is whether real interest rates have any positive effect on economic growth in Nigeria.

The purpose of this study is to investigate the relationship between real interest rates and economic growth in

Nigeria. This is important because the behaviour of interest rates, to a large extent, determines the investment activities and hence economic growth of a country. The paper is relevant and timely in view of the shortage of empirical works on the effects of interest rates on the growth rate in Nigeria. The findings will guide the policy makers in designing and implementing financial policies that will enhance private and public investment-friendly interest rates which are crucial to economic growth.

Theoretical and empirical models

The association between interest rates and economic growth as recognised in the literature on growth can be found in the neoclassical growth framework and the McKinnon-Shaw hypothesis. For instance, McKinnon-Shaw (1973) argued that financial repression – indiscriminate distortions of financial prices including interest rates – reduces real rate of growth. One of the basic arguments of McKinnon-Shaw model is an investment function that responds negatively to the effective real loan rate of interest and positively to the growth rate. McKinnon-Shaw school expects financial liberalisation to exert a positive effect on the rate of economic growth in both the short and medium runs. Albu (2006) used two partial models to investigate the impact of investment on

GDP growth rate and the relationship between interest rate and investment in the case of Romanian economy. The models are specified as:

$$r(\alpha) = a^*\alpha + b$$
$$\alpha(I) = c/(d+i)$$

Where; r = GDP growth rate, α = investment rate, i = interest rate, p = inflation, a, b, c, and d are parameters to be estimated.

He found that the behaviour of the national economic system and the interest rate - investment – economic growth relationships tend to converge to those demonstrated in a normal market economy.

Oosterbaan et al. (2000) estimated the relationship between the annual rate of economic growth (YC) and the real rate of interest (RR) in equations of the basic form:

$$YC = \beta_0 + \beta_1(RR + \beta_2).(RR + \beta_2)$$

The study shows the effect of a rising real interest rate on growth and claimed that growth is maximized when the real rate of interest lies within the normal range of say, - 5 to +15%. De Gregorio and Guidotti (1995) cited in Oosterbaan et al. (2000) suggest that the relationship between real interest rates and economic growth might resemble an inverted U-curve: Very low (and negative) real interest rates tend to cause financial disintermediation and hence to reduce growth. However, the World Bank reports, cited in Oosterbaan, et al. (2000) show a positive and significant cross-section relationship between average growth and real interest rates over the period 1965 to 1985.

METHODOLOGY

The paper made use of both descriptive and econometric analyses. The descriptive approach of trend analysis was used to determine the relationship between interest rates and economic growth. Following the neoclassical model, McKinnon- Shaw hypothesis and Albu's (2006) specifications, the standard growth function of the relationship between economic growth and interest rates is modified and expanded to include the ratio of broad money to GDP (which captures the effect of financial deepening), domestic savings/GDP ratio and shift in financial policy from regulation to deregulation of interest. The model for this study is specified as:

$$GDP_t = \delta_0 + \delta_1 RLR_t + \delta_2 RDR_t + \delta_3 FID_t + \delta_4 INF_t + \delta_5 DSG_t + \delta_6 FPS_t + \varepsilon_t$$

Where; GDP is real GDP growth rate, RLR is real lending interest rate, RDR is real deposit interest rate, INF is inflation rate (measuring macroeconomic instability), FID is ratio of broad money to GDP, M2/GDP (index of financial deepening), DSG is ratio of gross domestic savings to GDP and FPS is dummy variable to capture the shift in financial policy from regulation to deregulation of interest rates in 1987, ε is a white noise disturbance term and $\delta_1, \delta_2,$ … δ_6 are parameters to be estimated.

The a priori expectation is summarised as follows:

$$\delta_1 < 0, \ \delta_2 > 0, \ \delta_3 > 0, \ \delta_4 < 0, \ \delta_5 > 0, \ \delta_6 > 0.$$

Real deposit/lending rate is nominal deposit/lending rate adjusted for inflation (π): RDR/RLR = (1+ r) − 1)/(1+π). Inflation rate (π) is the annual rate of inflation.

Prior to estimation, the time series properties of all the variables were ascertained to avoid spurious regression, which results from the regression of two or more non-stationary time series data. This means that the time series have to be detrended before any sensible regression analysis can be performed. Granger and Newbold (1974) had concluded that regression results of non-stationary series may, most of the times, be 'spurious' to the extent that a relationship would be accepted as existing between two variables as measured by their coefficient of determination, R^2, when in actual fact no such relationship exists. In other words, time series analysis was carried out to examine the data for stationarity or non-stationarity problems, using Augmented Dickey-Fuller (ADF), which is an extension of Dickey-Fuller test (Dickey and Fuller, 1979 and 1981). The next step was to establish whether the non-stationary variables were co-integrated. This was done by the Johansen test to confirm the existence of a long run equilibrium relationship between the variables. Having established cointegration, an Error Correction model is specified to present the short run dynamics while preserving the long run equilibrium relationship. The econometric analysis covered the period of 1970 – 2006. Data were obtained mainly from publications of the Central Bank of Nigeria, supplemented with data from other secondary sources.

Trend analysis of interest rates policies and economic growth rates in Nigeria

Interest rates policy in Nigeria is discussed along the dividing period of pre-reform (1970 - 1986) and post-reform (1987 - 2006) periods. In order to compare the structure of interest rates between the sub-periods, the paper combined deposit rate, lending rate and minimum rediscount rate to see how the correlations among these three variables change as the interest rates reform process sets in (Figure 1).

The pre-reform period (1970-1986) is considered as a period of financial repression and was characterised by a highly regulated monetary policy environment in which policies of directed credits, interest rate ceiling and restrictive monetary expansion were the rule rather than the exception (Soyibo and Olayiwola, 2000). Although, the interest rate policy instruments remained fixed, there were marginal increases. For instance, the deposit rate was increased from 3% in 1975 to 9.5% in 1986, while the lending rate rose from 9 to 12% within the same period.

For the reform period, deposit and lending rates were allowed to be determined by market forces and the interest rates actually increased as envisaged. For instance, the nominal deposit and lending rates rose from 9.5 and 12% in 1986 to 14 and 19.2% respectively in 1987, as a result of the interest rates reform in Nigeria. By 1990, the deposit and lending rates have risen to 18.8 and 27.7% respectively. The government intervened in 1991 and pegged the deposit and lending rates at 14 and 21% respectively. Unfortunately, between 1997 and 2006, the lending rate did not show a significant trend in reduction, with an average of 22%, despites the declining deposit rate, averaging 5%.

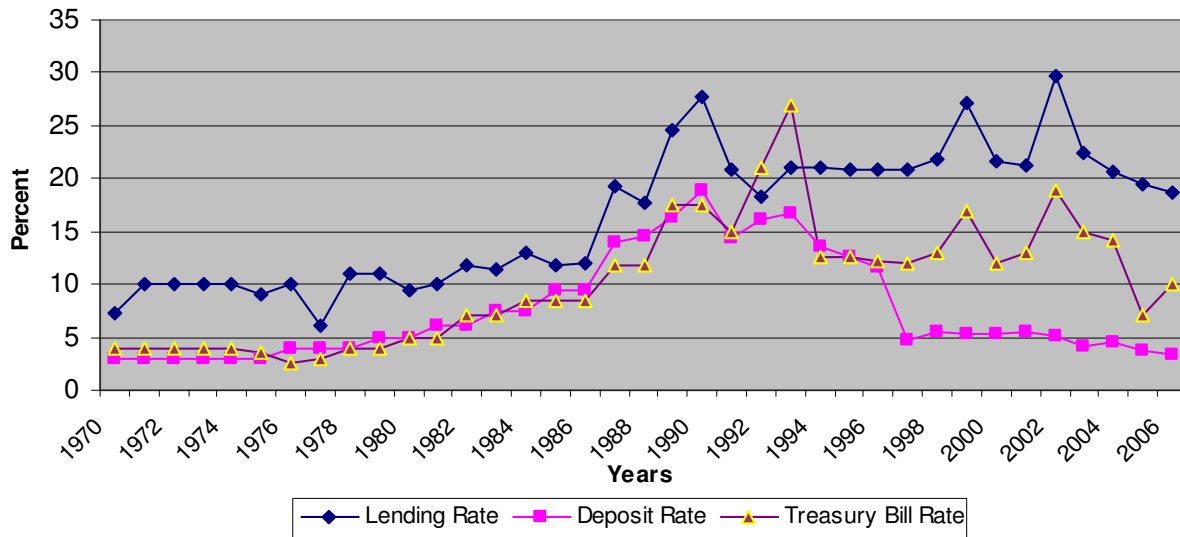The implications of the "tunnel-like" structure of interest

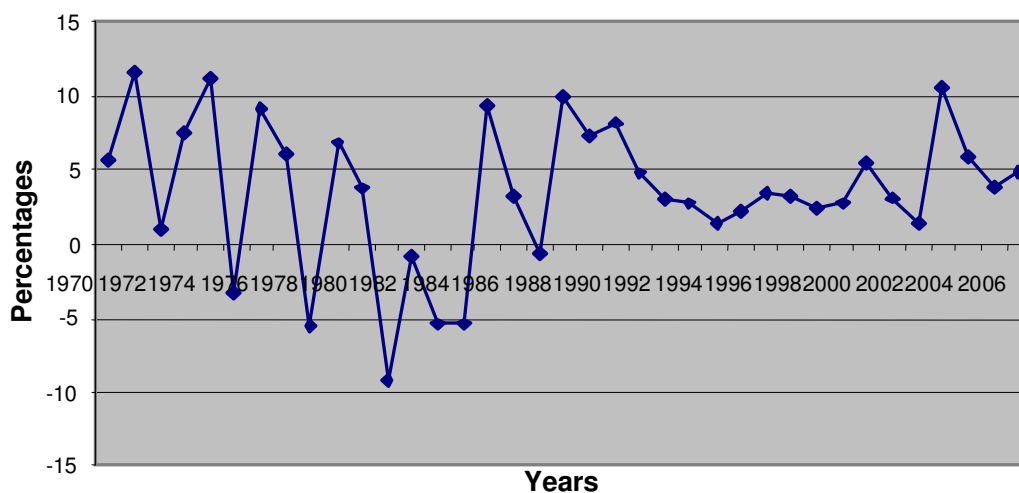**Figure 1.** Interest rates structure in Nigeria, 1970 - 2006.

Figure 2. Trend analysis of real GDP growth rates (1970 - 2006).

rates (Figure 1) and the low deposit rates are that savings will likely be discouraged and this will negatively affect funds mobilisation by the banks. This will in turn affect the amount of funds available for investment with retarded influence on economic growth. On the other hand, the high lending rate is detrimental to productive investment and hence economic growth. As Soyibo and Olayiwola (2000) observe, borrowers with worthwhile investments may be discouraged from seeking loans and the quality of the mix of applicants could change adversely. Again, high lending interest rates could create moral hazard where loan seekers borrow to escape bankruptcy rather than invest or finance working capital. Generally, the behaviour of the interest rate structure is such that there is a wide spread margin between deposit and lend-

ing rates which may encourage speculative financial transactions. The performance of the real GDP growth rate in Nigerian for the pre- and post-reform periods is presented in Figure 2.

The real GDP growth rate which was 5.7% in 1970 increased to 11% in 1974, but became mostly negative during the pre-reform period, until 1985, when a positive real GDP growth rate of 9.4% was achieved. Interestingly, Figure 3 shows that the introduction of interest rate reform in 1987 brought a positive change in real GDP growth rate to a peak of 10 % in 1988. With real GDP growth rate of 4.9% in 2006, the country requires an average annual GDP growth rate of 7% in order to meet the United Nations Millennium Development Goals (MDGs) of halving poverty by 2015 (AIAE, 2005).
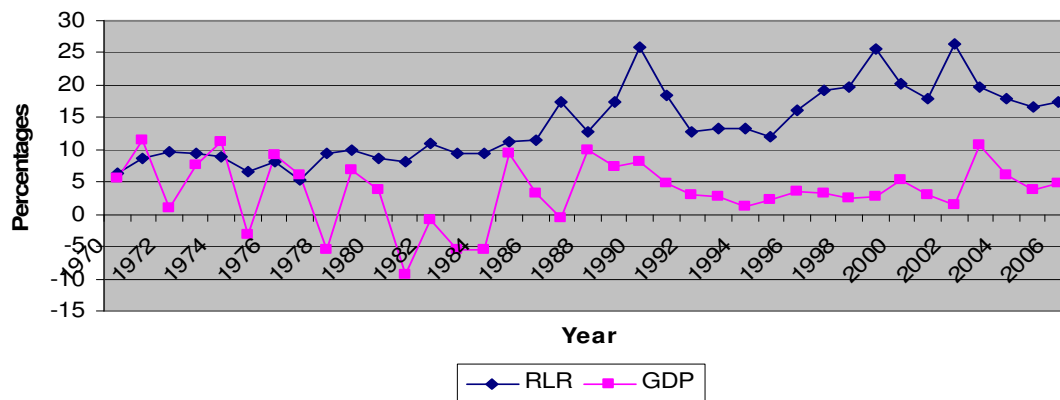
Figure 3. Growth and interest rates policies in Nigeria, 1970 - 2006.

Table 1. ADF unit root test results.

Variables difference	At levels	At first	Order of integration
GDP	-5.197923	-	1(0)
RLR	-2.270717	- 6.283574	1(1)
RDR	- 1. 596011	- 7.531699	1(1)
FID	- 1.937845	- 7.446874	1(1)
INF	- 3.144085	-	1(0)
DSG	- 2.725329	- 6.431129	1(1)
FPS	- 1.190238	- 5.916080	1(1)
5% CV	- 2.945842	- 2.948404	

Although, the GDP growth rate has been very low thereafter, it has maintained a positive stand since the introduction of interest rate reform. Thus, it is clear that implementing interest rates reform has contributed to economic growth in Nigeria.

Econometric analysis

In modelling the growth equation, the paper examined each series entering the model to determine whether it is stationary and its order of integration. The results of the Augmented Dickey-Fuller (ADF) unit root test (Table 1) show that only the GDP and INF variables were statio-nary at levels, while the other variables were stationary at first difference(integrated of order one).

Given the unit root properties of the variables, the study proceeded to establish whether or not there is a long-run co-integrating relationship among the variables by using the Johansen co-integrating test. The results reported for the trace and maximum Eigenvalue statistics (Table 2) show that the null-hypothesis of no-cointegrating vector linking real GDP growth rate and its economic determi-nants is rejected at the 5 percent level of significance.

The trace test statistics reveal that there are, at most, three cointegrating relationships. The maximum Eigen-value statistic suggests, at most, two co-integrating rela-

tionships among the real GDP growth rate and its economic determinants. Since the trace statistics takes into account all of the smallest Eigenvalues, it possesses more power than the maximum eigenvalue statistic. Johansen and Juselius (1990) cited in Owoeye and Onafowora (2007) recommend the use of trace statistics when there is a conflict between the two statistics.

The conclusion drawn from the results is that there exists a unique long run relationship between economic growth (GDP) and its economic determinants (RLR, RDR, FID, INF and DSG). In the short run, deviations from this relationship could occur due to shocks to any of the variables. Therefore, Soyibo and Olayiwola (2000) suggest that the short-run interactions and the adjust-ment to long-run equilibrium are important because of the policy implications. Thus, the vector error correction model (ECM) was applied to analyse the short-run dynamics.

The results of ECM regression (Table 3) show that the real lending rate variable has a significant effect on eco-nomic growth. This is because lower and stable interest rates create a lot of economic certainties that encourages investors to borrow and invest in productivity-improving projects. This result is consistent with existing empirical findings (Oosterbaan et al., 2000). However, such a rela-tionship is theoretically plausible, if there is link between total investments (public and private) and economic growth.

Table 2. Johansen maximum likelihood cointegration test results.

Hypothesized No. of CE(s)	Eigenvalue	Trace statistic	5% critical value	Max-Eigen statistic	5% critical value
None	0.768747	173.7153*	124.24	51.24847*	45.28
At most 1	0.723077	122.4668*	94.15	44.94058*	39.37
At most 2	0.598420	77.52625*	68.52	31.93222	33.46
At most 3	0.484810	45.59403	47.21	23.21272	27.07
At most 4	0.350732	22.38131	29.68	15.11683	20.97
At most 5	0.175042	7.264479	15.41	6.734785	14.07
At most 6	0.015020	0.529694	3.76	0.529694	3.76

Note: Trace statistic indicates 3 co-integrating equations at the 5% level. Max-Eigenvalue statistic indicates 2 co-integrating equations at the 5% level.

Table 3. Estimates of the error-correction model.

Variable	Coefficient	t-statistic	t - probability
Constant	0.442222	0.603229	0.5512
D(RLR)	-0.898968	-3.008745	0.0055*
D(RDR)	1.194865	2.268558	0.0312*
D(FID)	-0.415057	-1.864513	0.0728
D(INF)	-0.212303	-3.416348	0.0020*
D(DSG)	-0.299034	-2.040775	0.0508*
D(FPS)	-3.180398	-0.640130	0.5273
ECT(-1)	-1.138859	-6.818580	0.0000*

Adj R^2; 0.602720, F –statistic; 0.602720, SSE; 4.252345, F-statistic; 8.585588, Prob(F-statistic); 0.000013, Durbin-Watson stat; 1.852488, *indicates significant at 5% level.

Empirical evidence by Guseh and Oritsejafor (2007) showns that investment has negative impact on economic growth in Nigeria, indicating that investment has not promoted economic growth. Further, Guseh and Oritsejafor (2007) supported their findings with the following arguments:

1) Most public sector infrastructure investments are not worthwhile.
2) Political and military elites implemented public projects that proved to be money-draining projects.
3) Government contracts were awarded at inflated prices by as much as three or four times their worth and development projects were shoddily executed or completely abandoned after mobilisation fees had been paid.
4) There was looting of public funds necessary for savings and investment.
5) Low per capita income in Nigeria making the household component of private domestic saving to be low and thus may not be a major source of investment.
6) Declining government savings.
7) Frequent regime changes, concomitant with policy uncertainties, leading to lower long-run investment.
8) Public and private corrupt practices, which divert scarce

resources from productive activities and reduce economic growth.

The analysis also indicates that a real deposit rate has a statistically significant impact on economic growth in Nigeria. Thus, a high deposit rate of interest encourages savings and economic growth in view of the link between savings, investment and economic growth. This result is consistent with the prediction of economic theory and existing studies that higher deposit interest rate from liberalisation will increase household savings in the banking system thereby enhancing economic growth.

The econometric results further reveal that financial deepening has negative effect on economic growth in Nigeria. The financial system in Nigeria is weak and can best be described as an inhibitor and banks are only in business to reap 'wind fall' profit. As Taylor (2004) observed, if financial markets are weak, the effectiveness of transmitting policy through interest rates will be limited. Thus, there is the need for the financial system to be well developed so that it can efficiently and cheaply mobilise and allocate funds within the system to guarantee reasonable returns for savers and investment needs of the borrowers in order to contribute to economic growth.

Our results show that inflation rate has negative and

statistically significant effect on economic growth, which means that the higher the rate of inflation, the lower the rate of economic growth. Studies have shown that high inflation rate is detrimental to growth (Akinlo, 2005). The gross domestic savings have negative and fairly significant effect on economic growth. This is justifiable in Nigeria because the present low-deposit interest rate makes savings unattractive and a sizeable proportion of income is spent on consumption as a result of the low per capita income and high inflation rate in the country. The policy shift dummy has negative and an insignificant effect on economic growth, suggesting that the totality of the interest rate reform has not achieved the optimal growth rate in Nigeria. The error correction term (ECT_{t-1}) is of the expected negative sign and also significant. The absolute value of the coefficient of the error-correction term indicates that about 114% of the disequilibrium in the real GDP growth rate is offset by short-run adjustment in each year.

Although, the goodness-of-fit of the estimated model indicates that the model is reasonably accurate in prediction, it is important to note that there are other factors (such as political instability, political unrest and the degree of democracy), which may have impact on economic growth, especially in less developed countries. For instance, Fosu (2002), cited in Guseh and Oritsejafor (2007) assessed the impact of political instability on economic growth, using the incidence of coups d'etat in 31 sub-Saharan African countries and found that abortive coups had the largest effect on economic growth, followed by coup plots. Studies have also shown that there is a significant positive association between democracy and economic growth (Guseh and Oritsejafor, 2007). As Soyibo and Olayiwola (2000) argue, government will need to take appropriate notice of the complimentality of policies in its economic reform programmes.

Conclusion and Implications

The paper investigates the relationship between real interest rates and economic growth in Nigeria. The results show that there exist a unique long-run relationship between interest rates and economic growth. Thus, interest rate is an important determinant of economic growth in Nigeria. However, the deregulation of interest rates in Nigeria may not optimally achieve its goals, if those other factors which negatively effects investment in the country, as suggested by Guseh and Oritsejafor (2007), are not tackled. This implies that the link between interest rate, investment and economic growth is not automatic. Thus, the relationship between investment and growth in Nigeria may not allow for optimal benefits from interest rate reforms in the country.

The important condition for promoting economic growth, therefore, is for the government to formulate and implement financial policies that enhance investment-friendly rate of interest and take into consideration those other factors which negatively affect investment in the country.

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