

The Determinants of Interest Rate Spreads in Nigeria: An Empirical Investigation

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ABSTRACT

The paper examines the determinants of interest rate spreads in Nigeria using a panel of 12 commercial banks for the period 1986-2007. The results suggest that cash reserve requirements, average loans to average total deposits, remuneration to total assets and gross domestic product have positive effect on interest rate spreads. However, non-interest income to average total assets, treasury certificate and development stocks have negative relationship with interest rate spreads. In general, the findings that suggest a reduction in cash reserve ratio, high bank overhead costs amongst others will help to moderate the high interest rate spreads in Nigeria.

Keywords: Interest Rate Spread; Determinants; Nigeria

1. Introduction

The interest rate spreads (measured as the difference between deposit and lending rates) not only indicate the level of inefficiency of the banking sector but show the level of development of the financial system. Bank interest rate spreads have several important implications for growth and development of any economy. Specifically high interest rate spreads tend to discourage potential savers and thus limiting the quantum of funds available to potential investors. A reduction in lending arising from low savings often leads to low investment and thus the economic growth rate [1-3]. Incidentally, interest rate spreads in Nigeria increased by a large amount over the study period¹. However, not many studies have been undertaken to analyze the main factors underlying the high interest rate spreads in the country. There is the need to fill this gap. Hence, the main objective of this paper is to investigate the issue of the determinants of interest rate spreads in Nigeria.

The paper is organized as follows. In Section 2, we provide an overview of the development in the banking sector and interest rate spreads in Nigeria. Section 3 provides a survey of empirical literature on determinants of interest rate spreads. Section 4 provides the methodology, data sources and variable measurements. Section 5 reports the empirical findings of the study. The last section concludes the article.

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¹Evidence of high interest rate spreads in Nigeria over the years has been documented in the works of [4,5] amongst others.

2. An Overview of the Banking Sector and Interest Rate Spreads in Nigeria

Banking activity started in Nigeria with the establishment of the First Bank by the African Banking Corporation in 1892. Subsequently, several other banks were established but failed except National bank of Nigeria, African Continental Bank, the Bank of British West Africa, Barclays Bank and the British and French Bank. The development led to enactment of the 1952 Banking Ordinance to regulate the activities of banks in country.

After independence in 1960, further legislation in the form of the Banking Act of 1969 was passed to regulate the activities of banks in Nigeria. During this period, most banks in Nigeria maintained their pre-independence era focus on financing trade transactions. Following the indigenization decree promulgated in the 1970s, most of the foreign owned banks in the country were nationalized, and the federal government assumed a significant ownership of stake in these banks. Commercial and merchant banks were empowered by law to accept deposits from individuals and companies and to conduct general banking business.

However, with the adoption of the Structural Adjustment Programme (SAP) in 1986, many far reaching reforms were introduced to enhance the efficiency of the banking industry. These included gradual changes from the regime of strict direct controls to indirect monetary controls and elimination of the policy of selective allocation of credit by the early 1990s. The commercialization and privatization programmes of this period led to a di-

vestment of the Federal Government's holdings in several banks. Moreover, several new commercial banks were granted licenses. The number of banks in operation in Nigeria increased from 58 1990 to 90 in 2001. The first community bank commenced operations in December 1990. However, many of the banks became distressed, principally because regulatory capacity building could not keep up with the expansion in banks. To address the distress situation in the banking sub-sector, several policy reforms were introduced. One of the reforms was the 2004 directive by the Central Bank of Nigeria (CBN) mandating all (deposit money) banks operating in Nigeria to increase their capital base to a minimum of ₦25 billion by December 2005. Of the 89 banks that operated prior to this directive, only 25 banks emerged. Fourteen banks licenses were revoked, as they were unable to meet the minimum capital requirement. Four of these banks (Assurance Bank Plc, Leadbank Plc, Allstates Trust Bank Plc and Trade Bank Plc) were subsequently acquired by three capitalized banks under the 'Purchase and Assumption' strategy.

The trend of interest rate spreads is as shown in **Figure 1**. It shows that the interest rate spreads was low at 2.5 in 1986. It increased to 5.2 in 1987 following governments' liberalization of the entering requirements into the banking business and the total removal of interest rate control. The spreads experienced a fall in 1988 which could be linked to the establishment of the Nigerian Deposit Insurance Corporation and relaxation of bank portfolio restrictions. It rose to 8.2 and 8.9 in 1989 and 1990. This was the period when banks were permitted to pay interest on demand deposits. Auction markets for government securities were introduced; capital adequacy standards were reviewed upward and the extension of credit based on foreign exchange deposits was banned. All these might have in one way or the other influenced the interest rate spreads. It dropped to 6.51 in 1991 when embargo was placed on bank licensing. The Central Bank was to regulate and supervise all financial institutions and interest rate re-administered. Interest rate spreads became double-digit from in 1992 and 1993 standing at 15.1 and 19.43 respectively. This was the period when government once again removed interest rate control, commenced the privatization of government-owned banks, deregulated the capital market and removed the credit controls. Moreover, in 1993, the monetary authority introduced the indirect monetary instruments and took over five banks for restructuring. The interest rate spreads decelerated to a single-digit value between 1994 and 1996 following government re-imposed control of interest and exchange rate. However, spreads maintained double digit value through the period 1997 and 2007 attaining a peak of 24.62 in 2002. On the average over the

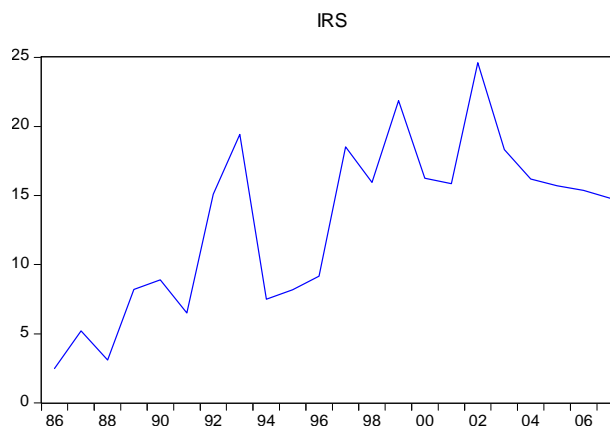


Figure 1. Plot of interest rate spreads 1986-2007.

study period, interest rate spreads maintained upward trends.

3. Empirical Evidence on the Determinants of Interest Rate Spreads

Some empirical studies have been conducted on the determinants of interest rate spread in the developed countries. However, in developing countries, Nigeria inclusive, not very many studies have been conducted on the subject matter. In this subsection, we provide a summary of the findings of the few existing empirical studies on the determinants of interest rate spreads. The study by [6] examined the determinants of bank net interest margins for a sample of US banks using annual data for 1989-1993 in a country specific basis. The results for the pooled sample suggested that the proxies for default risk (ratio of net loan charge—offs to total loans), the opportunity cost of non-interest bearing reserves, leverage (ratio of core capital to total assets), and management efficiency (ratio of earning assets to total assets) are all statistically significant and positively related to bank interest margins. The ratio of liquid assets to total liabilities, a proxy for low liquidity risk, was inversely related to the bank interest margins. [7] in a cross country study found that between 1988-1995 interest margins in six European countries and the US were affected by the degree of bank capitalization, bank market structure, and the volatility of interest rates.

The study by [8] observed that for the Eastern Caribbean countries, unlike the evidence gathered above, the impact of loan loss provisioning has been to reduce bank interest margin rather than increase it once the tendency of banks to under provision in the case of government loans was accounted for. Like in other countries, operating expenses seem to have a large impact on bank spreads in the Eastern Caribbean region. Over the sample period, the ratio of operating expenses to total asset explains 23 percent of the estimated spreads. Using monthly data for Argentinean banks from June 1993 to

July 1997 period, [9] studied the determinants of the intermediation spreads for loan and deposits dominated in both domestic as well as foreign currencies. Both intermediation margins are related to the average tax ratio, the cost of reserve requirements, operating costs, problem loans, exchange rate risk, and market structure measured using Herfindahl index. The only marked difference between domestic and foreign currency markets is a positive and significant impact of the market structure on spreads for the former markets and a non-significant impact for the latter. For both markets, the intermediation spreads are mostly affected by operating costs and problems loans. The quantitative effects of both factors are nearly the same for the domestic currency market.

The study by [10] found that interest margin was positively related to bank's market power, operating costs, credit risk and degree of interest rate risk. However, increase in bank's equity was found to have an adverse effect on margin when the bank faced little interest rate risk. The paper by [11] examined the impact of financial liberalization of the Colombian economy on interest rate margin in the banking system. The results obtained were mixed. They found that liberalization increased banking sector competition significantly, lowered market power and reduced financial taxation from its highest level of the late 1970s. Moreover, they found that banks were responsive to changes in loan quality, possibly reflecting an improvement in the banking supervision and/or reporting.

In his work, [12] applied the two-step procedure for a sample of five Latin American countries during the mid 1990's (Argentina, Bolivia, Colombia, Chile and Peru). Their results showed positive coefficients for capital ratio (statistically significant for Bolivia and Colombia), cost ratio (statistically significant for Argentina and Bolivia), and the liquidity ratio (statistically significant for Bolivia, Colombia, and Peru). As for the effect of nonperforming loans, the evidence was mixed. Apart from Colombia, where the coefficient for nonperforming loans was positive and statistically significant, for the other countries the coefficient was negative (statistically significant for Argentina and Peru). In the second stage, [12] ran a regression for the measure of "pure" bank spreads on macroeconomic variables reflecting interest rate volatility, inflation rate and GDP growth rate. Their results showed that interest rate volatility increased bank spreads in Bolivia and Chile; the same happened with inflation in Colombia, Chile and Peru. For the other cases, the coefficients were not statistically significant.

The study by [13] examined the determinants of banks spreads in Uganda from 1999-2005. They found that spreads and margins have been mainly driven by time invariant bank characteristics as well as overhead costs

and sectoral compositions of loans.

Likewise, [5] provided empirical evidence on the determinants of interest rate spreads in a liberalized financial system for the period 1989-2000, using selected banks in Nigeria. Ex-ante interest rate spreads equations were estimated using bank balance sheet and income statement as well as macroeconomic data. The results showed that macroeconomic and monetary policy/financial regulation factors were more important determinants of commercial banks' interest spreads than bank level factors. Inflation rate, GDP, financial deepening, cash reserve requirement, risk premium, Treasury bill rate, loan asset quality, liquidity risk and non interest expenses were the most important factors that affected commercial banks' interest rate spreads during the period.

The study by [14] used unique bank-by-bank balance sheet and income statement information to investigate the intermediation efficiency in the Nigerian pre-consolidated banking sector during 2000-2005. He analyzed whether the Central Bank of Nigeria's policy of recent banking consolidation can be justified and rationalized by looking at the determinants of spreads. Indeed, spreads decomposition and panel estimations showed that the reform of the banking sector could be the first step to raise the intermediation efficiency of the Nigerian banking sector. He found that larger banks enjoyed lower overhead costs and that increased concentration in the banking sector was not detrimental to spreads. The results equally showed that increased holdings of liquidity and capital positively impacted spreads in 2005, while stable macroeconomic environment enhanced more efficient channeling of savings to productive investments.

The work by [15] explored the factors behind consistently high interest rate spreads and margins in Uganda. The results showed that small size of Ugandan banks, high treasury bill rates and institutional deficiencies were major determinants of bank spreads and margins. Moreover, the results showed that macroeconomic factors such high inflation rate and exchange rate appreciation had significant impact on interest rate spreads in Uganda.

4. Methodology

In examining the determinants of interest rate spreads in Nigeria, the study employs panel data procedures since the sample contains data across banks and over time. In the estimation, three estimation models were adopted, namely, pooled OLS, fixed-effects and random effects. The adoption of pooled OLS is based on the assumption that there is no group or individual effects among the banks. However, as panel contains observation on the same cross-sectional units over several time periods, the possibility of cross-sectional effects on each firm or on a set of group of banks is very high. In order to take care of

this problem, the study adopts other estimation techniques namely, fixed effects and random effects. Random effects assume that the individual or group effects are uncorrelated with other explanatory variables and can be estimated. The fixed effects, on the other hand, takes into consideration the individuality of each bank or cross-sectional unit included in the sample by allowing the intercept vary for each bank while assuming that the slope coefficients are constant across banks.

4.1. Model Specification

The general model specification is represented by the following equation²:

$$IRS_{i,t} = \alpha + \beta X_{i,t} + \gamma W_t + \delta Z_t + \varepsilon_{i,t} \quad (1)$$

where IRS is defined as interest rate spreads for bank i indexes bank i and t indexes time t ; X_{it} is a vector of bank-specific variables for bank i and time t ; W_t contains time varying, banking industry-specific variables; Z_t is a vector of time-variant macroeconomic variables, and ε_{it} is error term for bank i and time t . In this equation, it is assumed that the error term is distributed independently and identically in a manner that the variance is equal to zero.

4.2. Sources and Measurement of Data

The study utilized data obtained from 12 banks selected from the 25 banks that survived the consolidation exercise of 2004. The banks were selected based on the availability of the relevant data on the various variables used in the study. Only banks with complete data set for all the variables used in the estimation were selected for the study. Bank-specific and industry-specific data were sourced from annual reports and statement of accounts of the selected banks. However, data on macroeconomic variable were sourced from Statistical Bulletin (2007) published by the Central Bank of Nigeria (CBN).

4.3. Definition and Measurement of Variables

Interest Rate Spreads (IRS): This refers to the difference between bank's lending and deposit rate. It was calculated as average bank lending rate minus average bank deposit rate³.

Cash Reserve Requirements (CRR): This is the prescribed percentage of Commercial banks' total deposits that must be kept with the monetary authority as a caution. The cash deposit is expressed as a ratio of each bank's total demand deposit liabilities.

²This model has been adopted by few existing studies including [15-17].

³The ex-ante ante approach in calculating the interest rate spreads was used. This approach uses the rates quoted on loans and on deposits and draws inferences from the difference between them.

Average Capital Employed to Average Total Assets (KPTEMP): This refers to a bank's net worth, capital asset ratio or capital adequacy.

Loan to Deposit Ratio (LDEPRAT): This is the ratio of commercial bank loans to total deposit. It is referred to a bank's liquidity risk.

Average Loans to Average Total Assets (LNASS): This refers to the size of a bank's loan asset.

Non Interest Expenses to Average Total Assets (NXPVTA): This refers to bank's expenses management efficiency.

Remuneration to Total Assets (REMUTA): This refers to bank's personnel cost.

Minimum Rediscount Rate (MRR): This is the most favorable rate of interest at which the Central bank lends to financially sound deposit money banks.

Gross Domestic Product (GDP): This is the productive capacity of an economy. The real domestic product is the nominal value of the GDP deflated by the consumer price index.

Development Stocks (DS): This is one of the traditional money market/government-issued financial instruments that provide the government with short term funds as well as provide financial institutions with opportunities for local investment of idle funds. It has about thirty-six month's maturity.

Treasury Certificates (TC): This is also a traditional money market/government-issued financial instrument. It was introduced to have a longer maturity period (one to two years), but not long enough to be used as a government long term security.

Treasury Bonds (TB): It is also a government-issued financial instrument.

Changes in Inflation (CINFLAT): This refers to variability in the level of inflation over selected number of years.

5. Empirical Results

5.1. Descriptive Statistics

Table 1 provides the descriptive statistics of the data series employed in the study. For almost all the variables, the mean and median values lie within their maximum and minimum values showing a good level of consistency. The kurtosis of the eight of the twelve variables included in the analysis exceeds 3 meaning that the series are leptokurtic (peaked) relative to the normal⁴. Also, the probability that the Jarque-Bera statistic exceeds (in absolute value) the observed value is generally low for all the series. This suggests the rejection of the hypothesis of normal distribution at 5%.

⁴The few exception are Gross domestic Product (GDP), development stocks (DS), treasury bonds (TB) and treasury certificates (TC).

Table 1. Descriptive statistics.

	IRS	KPTMP	LDEPRAT	LNASS	REMUTA	NXPVTA	GDP	MRR	DS	TB	TC	CINFLAT
Mean	61555.757	0.15871	0.502605	0.542839	0.080573	0.13809	390702.7	15.67626	3009.171	210967.1	11579.37	0.807634
Median	1826	0.070665	0.467513	0.286839	0.020186	0.069746	377830.8	14.31	2960	134387.6	0	1.5
Maximum	43537	2.131332	2.034027	5.9	6.602041	1.211406	562043.7	26	4909	430608.2	37342.7	31.5
Minimum	0	0.20076	0.121213	0.090174	1.89E-05	0.017219	255997	12.75	980	0	0	-43.5
Std. Dev.	9421.071	0.333611	0.239431	0.969675	0.580736	0.231762	81991.11	3.240154	1232.408	179291.9	15278.39	17.67513
Skewness	1.960768	4.483397	2.851987	3.544564	10.96457	3.433519	0.402367	1.70739	-0.01967	0.208101	0.812722	-0.77919
Kurtosis	6.087207	23.37996	17.92046	14.95635	123.3166	13.57072	2.420211	5.889912	1.751833	1.326232	1.824441	3.84996
Jarque-Bera	135.9632	2705.948	1392.724	1054.605	81640.14	867.3095	5.369655	109.2339	8.512096	16.23704	21.96437	17.19916
Probability	0	0	0	0	0	0	0.058233	0	0.014178	0.000298	0.000017	0.000184
Sum	806404.2	20.79101	65.84131	71.1119	10.5551	18.08977	51182048	2053.59	394201.4	27636691	1516897	105.8
Sum Sq. Dev.	1.15E+10	14.46855	7.452511	122.2352	43.84313	6.982757	8.74E+11	1364.818	1.97E+08	4.18E+12	3.03E+10	40613.31
Observations	131	131	131	131	131	131	131	131	131	131	131	131

5.2. Correlation Matrix

Table 2 shows the degree of association among the variables. In general, the results show that while some are positively related to interest rate spreads, few others are negatively related. Specifically, cash reserve requirements, ratio of non-interest expenses to average total assets, non-interest income to average to average total assets, gross domestic product and treasury bills have positive relationship with interest rate spreads. However, ratio of loan to total deposit, remuneration to total assets, minimum rediscount rate, development stocks, treasury certificates and changes in inflation have negative relationship with interest rate spreads⁵.

5.3. Panel Unit Root Tests

To ascertain the unit root characteristics of the panel data, we estimate unit root test for each variable in the model. Specifically, the study used Levin, Lin and Chu; Im, Pesaran and Shin W-stat, ADF-Fisher Chi-square and PP-Fisher Chi-square tests. The results as contained in **Table 3** show stationarity for all the variables at different levels of difference. Specifically, IRS, CRR and TC were stationary at second difference. However, KPTMP, LDEPRAT, LNASS, NXPVTA, REMUTA, NIYAV-TASS, GDP, TB were stationary at first difference while MRR, DS and CINFLAT were stationary at level.

5.4. Regression Results

The results for the determinants of interest rate spreads

using pooled and fixed effects panel methods respectively are presented in **Table 4**. Column 1 refers to the estimation with pooled OLS and column 2 shows estimation results with fixed effects approach⁶. The results obtained from pooled OLS are quite consistent with that obtained using the fixed effects in both signs and magnitude. The results from the two estimation approaches show that cash reserve ratio is positively related to interest rate spreads. The coefficient is significant in both results. The results show that a 1 percent increase in cash reserve ratio will increase interest rate spreads by 0.43 percent in the fixed effects model. This results support the findings of [18-21]. The finding is very much in support of the assertion that statutory minimum reserve requirements are implicit taxes that increase interest rate spreads because banks tend to shift them to customers by either increasing the lending rate or reducing the deposit rate.

The ratio of average capital employed to average total assets has negative effect but only significant at 10 percent in the pooled OLS. A 1 percent increase in the ratio of average capital employed to average total assets will lead to 0.82 percent reduction in the interest spreads. Loan to deposit ratio (LDEPRAT) has a positive sign but significant only in the fixed effect model. The result shows that a 1 percent rise in LDEPRAT would increase IRS by 0.53 percent. The average loan to average total assets (LNASS) coefficient is positive but not significant⁷. The coefficient of the ratio of non interest expenses to average total assets (NXPVTA) is positive but not significant in the two estimation approaches. The ratio of remuneration to total assets (REMUTA) has a significant

⁵In general examining simple bivariate correlation in a conventional matrix does not take account of each variable's correlation with all other explanatory variables; hence caution should be exercised in interpreting the result of the correlation matrix.

⁶The [22] test conducted showed that fixed-effects model provide a better results. Therefore, we only report the fixed effects model here.

⁷The ratio of average loans to average total assets is only significant at 20 percent in the fixed effect model.

Table 2. Correlation matrix.

	IRS	CRR	KPTTEMP	LDEPRAT	LNASS	NXPVTA	REMUTA	NIYAVTASS	MRR	GDP	DS	TB	TC	CINFLAT
IRS	1.000													
CRR	0.754	1.000												
KPTTEMP	0.601	0.346	1.000											
LDEPRAT	-0.065	-0.046	-0.057	1.000										
LNASS	0.501	0.258	0.812	0.009	1.000									
NXPVTA	0.537	0.323	0.785	-0.073	0.719	1.000								
REMUTA	-0.036	-0.034	-0.030	-0.099	-0.031	-0.025	1.000							
NIYAVTASS	0.303	0.133	0.608	-0.010	0.897	0.615	-0.015	1.000						
MRR	-0.065	-0.083	-0.007	-0.097	-0.027	-0.031	-0.060	0.002	1.000					
GDP	0.453	0.539	0.209	0.204	0.077	0.143	-0.110	-0.022	0.019	1.000				
DS	-0.499	-0.565	-0.197	-0.301	-0.106	-0.168	0.103	0.0004	0.123	-0.836	1.000			
TB	0.479	0.539	0.189	0.243	0.129	0.169	-0.079	0.022	-0.054	0.753	-0.941	1.000		
TC	-0.329	-0.363	-0.130	-0.154	-0.169	-0.126	-0.022	-0.089	0.366	-0.326	0.560	-0.633	1.000	
CINFLAT	-0.039	-0.007	0.003	-0.131	0.027	0.029	0.016	0.022	0.033	0.033	0.130	-0.138	0.198	1.000

Table 3. Panel unit root tests individual effects 1986-2007.

Variables	Level	LLC	$\rho-V$	IPS	$\rho-V$	ADF	$\rho-V$	PP	$\rho-V$
IRS	2	2.37	0.99	-2.7	0.00**	63.04	0.00**	124.27	0.00**
CRR	2	-2.70	0.00**	-12.58	0.00**	125.33	0.00**	234.22	0.00**
KPTTEMP	1	-11.47	0.00**	-9.2	0.00**	111.38	0.00**	135.47	0.00**
LDEPRAT	1	-23.37	0.00**	-10.36	0.00**	67.52	0.00**	134.7	0.00**
LNASS	1	-6.48	0.00**	-5.29	0.00**	73.82	0.00**	145.59	0.00**
NXPVTA	1	-4.06	0.00**	-7.17	0.00**	92.49	0.00**	176.04	0.00**
REMUTA	1	3,784,800	1.00	-5.43	0.00**	72.88	0.00**	175.24	0.00**
NIYAVTASS	1	-6.45	0.00**	-5.81	0.00**	78.28	0.00**	136.91	0.00**
MRR	0	-9.46	0.00**	-6.58	0.00**	83.82	0.00**	144.78	0.00**
GDP	1	-8.31	0.00**	-5.04	0.00**	65.1	0.00**	221.07	0.00**
DS	0	-2.66	0.00**	-5.43	0.00**	70.4	0.00**	33.98	0.09***
TB	1	-8.71	0.00**	-7.06	0.00**	89.5	0.00**	175.06	0.00**
TC	2	-16.95	0.00**	-13.39	0.00**	164.51	0.00**	282.25	0.00**
CINFLAT	0	-9.19	0.00**	-5.95	0.00**	76.44	0.00**	70.57	0.00**

Notes: The null hypothesis (Ho) is that there is no unit root, (H1) some do not have a unit root process. Significance levels are denoted *: 1%, **: 5%, ***: 10%: and indicate rejection of the null hypothesis. 0, 1, and 2 represent level, first and second difference respectively. Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality. LLC denotes Levin, Lin and Chin, IPS denotes Im Pesaran Shin W-Stat, ADF indicates Augmented Dickey Fuller test, PP denotes Phillip Peron is also reported, and $\rho-V$ indicates Probability value.

Table 4. Pooled OLS and fixed effects 1986-2007.

Variable	Pooled OLS 1	t-statistic	Fixed Effects 2	t-statistic
Constant	-	-	-0.989741	-0.079724
LOG (CRR)	0.606898***	19.07599	0.428597***	12.92405
KPTMP	-0.820387*	-1.731124	-0.371179	-0.979037
LDEPRAT	0.274806	1.157877	0.531888**	2.594412
LNASS	0.941695***	4.015137	0.294473*	1.465834
NXPVTA	0.210381	0.384788	0.141088	0.327951
D (REMUTA)	2.43E-05**	2.365429	2.06E-05**	2.588548
NIYAVTASS	-2.867447**	-2.975764	-1.078530	-1.347358
MRR	0.018147	0.888362	0.017399	1.129850
LOG (GDP)	0.273711**	2.685783	0.832121	1.069112
LOG (DS)	-0.091433	-0.610702	-0.756797**	-2.224561
D (TB)	-5.42E-07	-0.607967	-1.11E-07	-0.164564
D (TC)	-1.96E-05***	-2.976032	-2.48E-05***	-3.260388
CINFLAT	-0.004690*	-1.569960	-0.003215	-1.050968
R ² squared	0.872880		0.924384	
F-statistic			108.4750	
Durbin-Watson	0.610638		0.856808	
Schwarz criterion	2.531685		2.194683	

Note: ***, ** and * denote significance at 1%, 5% and 10% respectively.

positive effect on interest rate spreads. The results show that a 1% rise in ratio of remuneration to total assets will cause interest rate spreads to increase by 0.0000243%. This means that as profitability of the bank decreases due to increase in remuneration or other expenses, the banks recoup the losses by increasing the spreads, that is, either charging more on loans or paying less to deposits or some combination of the two. Non interest income to average total assets (NIYAVTASS) has a negative coefficient. However, the coefficient is significant only in the pooled OLS estimation. The coefficient of minimum rediscount rate (MRR) is positive but not significant. Gross domestic product (GDP) has a positive relationship interest rate spreads but significant only in the pooled OLS estimation. The results show that a 1 percent increase in gross domestic product will lead to 0.27 percent increase in interest rate spreads. The positive relationship between GDP and interest rate spreads contradicts the business cycles effect discussed by [23]⁸. Development stocks (DS), treasury bills, treasury certificates and changes in inflation have negative effects on

interest rate spreads. However, the coefficients of treasury bills and changes in inflation are not significant at 5 percent level in either of the estimation techniques⁹. In the fixed effects results, a 1 percent increase in development stock will reduce interest rate spreads by 0.76 percent, while a 1 percent increase in treasury certificate will reduce interest rate spreads by 0.000025 percent.

5.5. Further Consideration

The adoption of pooled OLS is premised on the assumption of the exogeneity of the explanatory variables. However, this approach breaks down when the assumption of exogeneity is relaxed. Hence, relaxing the assumption requires that we adopt another estimation approach capable of correcting biases introduced by including the lagged dependent variable in the right hand side of the equation. Consequently, a Generalized

⁸The authors argue that during recession the creditworthiness of the borrower declines and therefore he can borrow only at a higher interest rate, and this raises the spread.

⁹The coefficient of changes in inflation is only significant at 20 percent in the pooled OLS estimation results. The negative effect of inflation on interest rate spreads could be attributed to conduct of monetary policy in Nigeria and some other developing countries. Generally, lending rates tend to vary more than deposit rate, such that a loose monetary policy that leads to higher inflation would be associated with lower lending rates, and, as a result, lower the interest rate spreads. See [20] for details.

Method of Moments (GMM) estimator in [24] approach was adopted to generate consistent estimates. Basically, such panel estimation techniques allow one to control for endogeneity or simultaneity of some of the explanatory variable in particular GMM estimators, as well as for potential biases due to correlation between the explanatory variables and the regression residual. Moreover, the use of GMM estimation technique provides the robustness check for the results obtained through the pooled OLS and fixed-effects approaches. The results of the Generalized Method of Moments (GMM) for the sample period are as shown in **Table 5**. In general, the results from the GMM seem to diverge from the results from pooled OLS and fixed effects. Many areas of differences are discernible. In particular, some of the variables that are significant in pooled OLS and fixed effects are either not significant or barely significant. Moreover, the signs of the coefficients of some variables are different. The lagged value of the dependent variable, interest rate spreads (IRS (-1)) has a positive effect and is significant. This confirms the positive inertia effect of interest rate spreads. The coefficient of cash reserve requirement (CRR) is negative as compared with the positive sign obtained in the pooled OLS and fixed effects estimation techniques. However, the coefficient is not significant. Therefore, firm inference cannot be drawn from it. The ratios of average capital employed to average total assets, non interest expenses to average total assets, and remuneration to total assets have negative effects on interest rate spreads as against positive effects obtained under pooled OLS and fixed effects models. However, their

coefficients are not significant. In like manner, the coefficient of minimum rediscount rate is negative as opposed to the positive sign obtained under pooled OLS and fixed effects models. Non-interest income to average total assets (NIYAVTASS) has a non significant positive effect on interest rate spreads.

Gross domestic product (GDP) has negative relationship with interest rate spreads while treasury bills and development stocks have positive relationship with interest rate spreads. The signs of the coefficients of these three variables are contrary to those obtained under pooled OLS and fixed effects models. In general, as the coefficients of many of these variable are not significance, firm can conclusion cannot be based on them. This simply suggests that pooled OLS and fixed effects tend to perform better in the estimation of the model adopted in our work. Thus attention should be focused on the results generated through these estimation techniques.

6. Concluding Remarks

The purpose of this study is to examine the determinants of interest rate spreads in Nigeria over the period 1986-2007. Based on data availability, some of the potential determinants of interest rate spreads analyzed include cash reserve ratio, ratio of average capital to average total assets, ratio of loans to total deposit, ratio of average loans to average total assets, and ratio of non interest expenses to average total assets. Others include ratio of remuneration to total assets minimum rediscount rate, gross domestic product development stocks, treasury certificates, treasury bills and changes in inflation. The specified model was estimated using both pooled OLS and fixed-effects methods. However, for robustness check the model was estimated using the GMM approach. The results show among other things that cash reserve ratio and loans to total deposits ratio are positively related to interest rate spreads. In the same way, ratios of average loans to average total assets and remuneration to total assets are positively related to interest rate spreads. The same pattern holds for gross domestic product. However, development stocks and treasury certificates are negatively related to interest rate spreads in Nigeria.

Generally, the results show that policy measures that would lead to a reduction in remuneration and other expenses and a reduction in the ratio of loan to total assets have potentials of reducing the interest rate spreads in Nigeria. Also, reduction in the statutory reserve requirements prescribed by the Central banks would help to reduce the interest rate spreads.

REFERENCES

- [1] G. Quaden, "Efficiency and Stability in an Evolving Financial System," 2004.

Table 5. Panel generalized method of moments 1986-2007.

Variable	Pooled OLS	t-statistic
IRS (-1)	1.330263	6.096511***
CRR	-0.071689	-0.388612
KPTMP	-1483.884	-1.556921*
LDEPRAT	-115.6666	-0.368751
LNASS	-162.0543	-0.221647
NXPVTA	-2790.196	-1.239996
REMUTA	-75.38301	-0.441414
NIYAVTASS	3849.895	1.166095
MRR	-13.75431	-0.592386
GDP	-0.002142	-1.100810
DS	0-266873	1.554071*
TB	0.001709	1713846*
J-statistic	1.48E-16	
Instrument rank	12.000000	

Note: *** and * denote significance at 1% and 10% respectively.

www.bub.be/Sg/En/Contact/pdf/2004/spo40517an.pdf

- [2] S. C. Valverde, R. L. del Pasto and F. R. Fernandez, "Banks, Financial Innovations and Regional Growth," 2004. www.ugr.es/~franrod/ingrowth04.pdf
- [3] N. S. Ndung'u and R. W. Ngugi, "Banking Sector Interest Rate Spreads in Kenya," Kenya Institute for Public Policy Research and Analysis (KIPPRA), Discussion Paper No. 5, 2000.
- [4] E. A. Onwioduokit and P. Adamu, "Financial Liberalization in Nigeria: An Assessment of Relative Impact," In: *Nigerian Economic Society, Benefits and Costs of Economic Reforms in Nigeria. Selected Papers for the 2005 Annual Conference of Nigerian Economic Society*, 2005.
- [5] C. I. Enendu, "Determinants of Commercial Bank Interest Rate Spreads in a Liberalized Financial System: Empirical Evidence from Nigeria 1989-2000," *Economic and Financial Review*, Vol. 41, No. 1, 2003.
- [6] L. Angbazo, "Commercial bank Net Interest Margins, Default Risk, Interest-Rate Risk, and Off-Balance Sheet Banking," *Journal of banking and Finance*, Vol. 21, No. 1, 1997, pp. 55- 87. [doi:10.1016/S0378-4266\(96\)00025-8](https://doi.org/10.1016/S0378-4266(96)00025-8)
- [7] A. Saunders and L. Schumacher, "The Determinants of Bank Interest Rate Margins: An International Study," *Journal of International Money and Finance*, Vol. 19, No. 6, pp. 813-832. [doi:10.1016/S0261-5606\(00\)00033-4](https://doi.org/10.1016/S0261-5606(00)00033-4)
- [8] R. Randall, "Interest Rate Spreads in the Eastern Caribbean," IMF Working Paper, WP/98/59.
- [9] L. Catao, "Intermediation Spreads in a Dual currency Economy: Argentina in 1990s," IMF Working Paper, WP/ 98/90.
- [10] K. P. Wong, "On the Determinants of Bank Interest Margins under Credit and Interest Rate Risks," *Journal of Banking and Finance*, Vol. 21, No. 2, 1997, pp. 251-271. [doi:10.1016/S0378-4266\(96\)00037-4](https://doi.org/10.1016/S0378-4266(96)00037-4)
- [11] A. Barajas, R. Steiner and N. Salazar, "Interest Spreads in Banking in Colombia, 1975-96," *Journal of Development Economics*, Vol. 88, pp. 192-204.
- [12] P. L. Brock and L. Rojas-Suarez, "Understanding the Behaviour of Bank Spreads in Latin America," *Journal of Development Economics*, Vol. 63, 2000, pp. 113-135. [doi:10.1016/S0304-3878\(00\)00102-4](https://doi.org/10.1016/S0304-3878(00)00102-4)
- [13] T. A. Beck and H. Hesse, "Bank Efficiency, Ownership and Market Structure: Why Are Interest Spreads So High in Uganda?" World Bank Policy Research Working Paper 4027, 2006.
- [14] H. Hesse, "Financial Intermediation in the Pre-Consolidated Banking Sector in Nigeria," World Bank Policy Research Working Paper 4267, 2007.
- [15] T. Beck and H. Hesse, "Why Are Interest Spreads So High in Uganda?" *Journal of Development Economics*, Vol. 88, No. 2, 2009, pp. 192-204. [doi:10.1016/j.jdeveco.2008.07.004](https://doi.org/10.1016/j.jdeveco.2008.07.004)
- [16] T. Ho and A. Saunders, "The Determinants of Bank Interest Margins: Theory and Empirical Evidence," *Journal of Financial and Quantitative Analysis*, Vol. 16, No. 4, 1981, pp. 581-600. [doi:10.2307/2330377](https://doi.org/10.2307/2330377)
- [17] P. Martinez and M. S. Mody, "How Foreign Participation and Market Concentration Impact Bank Spreads: Evidence from Latin America," *Journal of Money, Credit and Banking*, Vol. 36, No. 3, pp. 511-537. [doi:10.1353/mcb.2004.0048](https://doi.org/10.1353/mcb.2004.0048)
- [18] E. W. Chirwa and M. Mlachila, "Financial Reforms and Interest Rate Spreads in the Commercial Banking System in Malawi," *IMF Staff Papers*, Vol. 51, No. 1, 2004, pp. 96-122.
- [19] W. Samuel and L. Valderrama, "The Monetary Policy Regime and Banking Spreads in Barbados," IMF Working Paper, WP/06/211, 2006.
- [20] J. Crowley, "Interest Rate Spreads in English-Speaking African Countries," IMF Working Paper, WP/07/101, 2007.
- [21] D. Tennant and A. Folawewo, "Macroeconomic and Market Determinants of Banking Sector Interest Rate Spread: Empirical Evidence from Low and Middle Income Countries," Department of Economics, University of West Indies, Mona, Mimeo.
- [22] J. A. Hausman, "Specification Tests in Econometrics," *Econometrica*, Vol. 46, No. 6, 1978, pp. 1251-1271. [doi:10.2307/1913827](https://doi.org/10.2307/1913827)
- [23] B. Bernanke and M. Gertler, "Agency Costs, Net Worth, and Business Fluctuations," *American Economic Review*, Vol. 79, No. 1, 1989, pp. 14-31
- [24] M. Arellano and S. R. Bond, "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies*, Vol. 58, No. 2, 1991, pp. 277-297. [doi:10.2307/2297968](https://doi.org/10.2307/2297968)