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**DETERMINANTS OF COMMERCIAL BANK INTEREST RATE
SPREAD IN A LIBERALIZED FINANCIAL SYSTEM:
EMPIRICAL EVIDENCE FROM NIGERIA
(1989-2000)**

C. I. Enendu

Abstract

This paper provided empirical evidence on the determinants of interest rate spread in a liberalized financial system for the period 1989-2000, using selected banks in Nigeria. Ex-ante Interest rate spread 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 spread 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 spread during the period. The study also provided evidence on the quantitative impact of changes in the independent variables on interest rate spread.

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I. INTRODUCTION

Efficient financial intermediation is key to economic growth in any country. Banking institutions, regardless of their business objectives, propel economic activities by playing this major role. A critical variable in the intermediation process and to a large extent economic development is the interest rate spread or intermediation spread. This is the difference between the interest rate that banks pay on deposits and that charged on loans to customers. High intermediation spread has been a feature of financial systems in developing countries. This has been attributed to various factors including; high operating costs, financial taxation, high inflation rates, and structural factors. High intermediation spread generally constrains efficiency of financial intermediation, as it discourages potential savers and borrowers and ultimately reduces investment and growth of the economy.

High intermediation spread has been a feature of the Nigerian economy in the last fifteen years or so. Unfortunately, the financial liberalization of the 1980s rather than engender efficiency in financial intermediation, appears to have had the opposite effect. Indeed the inefficiency that has attended financial intermediation led to the bank distress of the early 90s. Although the regulatory authorities have addressed the problem of distress in the banking system and restored customer-confidence, the problem of high intermediation margin has remained. This has led to slow growth of the economy. All stakeholders in Nigeria have worried about this burning issue. With financial liberalization came interest rate deregulation. Savings deposit rate has been persistently low, indeed as low as 5 per cent on average, while loan rate has remained as high as 26 per cent or more in many cases. The wide margin between deposit and lending rates leading to higher profit margin might have accounted for the attraction

to investors in this sub-sector. Thus, the deliberate policy of liberal licencing to engender competition during the IMF-supported Structural Adjustment Program (SAP) era gave rise to proliferation of banking institutions, which engendered relatively reasonable competition in the industry. Yet, competition has not affected interest rate spread in the desired direction. Private sector activities, particularly investments in manufacturing and agriculture have suffered serious set backs du to prohibitive high interest rates. Meanwhile, the search for the solution continues to date. It does not yet appear to be empirically clear to the public and stakeholders what determines intermediation spread and how to reduce the wide spread between savings and deposit rate. This is a contemporary challenge to economic research.

This study therefore aims at providing empirical evidence on the factors that affect commercial banks' interest rate spread in Nigeria using a sample of banks, with a view to providing insight thereto and making recommendations on ways to reduce the unacceptably high intermediation margin.

The rest of the work is divided into five section. Section two reviews the literature on financial liberalization and interest rate spread while section three discusses the overview of financial sector liberalization in Nigeria. Section four presents the methodological framework. Section five analyses the data while section six gives the summary of major findings, recommendations, and concludes the work.

II. LITERATURE REVIEW

II.1 Financial Liberalization

Financial sector liberalization has implied eliminating interest rate controls, reducing reserve requirements and lifting direct credit controls. It has become a feature of developing economies in recent times as a means to achieving efficiency in the financial sector and engendering financial deepening. It is believed that after liberalization, positive real rate of interest is realized as interest rates increase from the repressed level. This is predicated on the achievement of price stability. It is also argued that the resulting higher deposit interest rate from liberalization is expected to increase household savings in the banking system by reducing cash holdings, inflation-hedging (real goods holdings) and unproductive self-financed investments (Sarr 2000). Consequently, the volume and quality of investment increases, thereby enhancing output growth. Moreover, the financial system gains efficiency in the intermediation process such that interest rate spread between deposit and lending rate eventually narrows.

There are other arguments against financial liberalization, especially on the apparent gains of interest rate increases. Matutes and Vives (2000), Stiglitz and Weiss (1981) have argued that interest ceilings can be beneficial to the extent of preventing banks from engaging in destructive competition. Their view is that excessive competition in an unregulated environment increase deposit and loan interest rate, thereby increasing the cost of capital to the extent of stifling investment. The higher interest rate induces adverse selection problem on banks as the average quality of the pool of borrowers diminishes. This school of thought also holds that many factors relating to banks' market structure affect their pricing behaviour, and when such factors are taken into account, (i) financial liberalization does not

necessarily lead to increase in deposit interest rates and (ii) financial deepening and better quality investment does not necessarily result from a high deposit rate.

The result of financial liberalization in developing countries have almost in all cases, been disquieting. Interest spreads have widened in some cases to unprecedented level. In contrast, various aspects of financial liberalization programmes in developed countries have been linked to substantial reductions in spread, for example, in Portugal (Honohan 1999). The Columbian attempt at liberalization programmes in the 90s did not have the desired impact. Interest rate spread have not reduced significantly (Barajas et al, 1999). The banking reforms of the 80s in Mauritius to liberalize the sector and similar result. Although financial deepening occurred, interest rate spread have increased in the post-liberalization period (Ramful 2001). The post liberalization experience in Kenya showed similar outcome. Lending rate increased gradually after liberalization while deposit rate remained the same thus, increasing the spread. Also, inflation rate accelerated resulting in negative real interest rates, indicating inefficiency in the intermediation process with weak institutional infrastructure, non-competitive structure in the banking system and macroeconomic instability. A cross-country review of how interest rate changed with financial liberalization (Honohan) confirm that spread remained high in developing countries in the 90s whereas it contracted in industrial countries.

II.2 Interest Rate Spread

In the past, economists have tended to use monetary aggregates such as M1 and M2 as indicators of economic activity. However, some argue that the relationship between these aggregates and real GDP appear to have deteriorated in recent years. This has prompted such proponents to shift attention to alternative indicator some of which are conceptually new, compared to the conventional financial aggregates. Increasingly, policy makers are relying on a broad range of indicators including the new ones. Kashyap, Stein and Wilcox (1993) examined the ratio of bank loans to the sum of both bank loans and funds raised through issuing commercial papers by firms. The literature records variants of interest spread namely ex ante and ex post spreads.

There are several reasons interest rates and interest rate spreads are important to policy analysts. First, it contains information about future economic activities. Spread had helped to signal the on-set of a down turn in an economy. For example, in the U. S., the default risk of commercial papers tend to increase when a down turn is imminent, driving its rates up and since the default risk on government backed treasury bill does not go up. Consequently, the spread between the two widens. It can also signal a tightening of monetary policy. Monetary policy makers in the era of rapidly changing economic conditions would of necessity, monitor and interpret a wide range of potentially useful indicators with changing information content. For instance, each of the five recessions that occurred in the U. S. economy since 1969 had been preceded by inverted interest rate spread. Consequently, some schools of thought believe that interest rate spread has

¹ FRSB Weekly Letter (Number 93-12, March 26 1993)

a better record of forecasting recession more than professional forecasters using elaborate econometric techniques. Moreover, interest rate has recently been added as a component of the Conference Board's Index of Leading Economic Indicators.

The vast literature on determinants of intermediation spread ranges from studies on determinants of interest margins to those on the determinant of intermediation spread. Most of the studies on interest margin focused on the difference between interest income and interest expenses. This is an all-embracing approach as it includes all interest earnings and payments. Some studies however, focused on *ex ante* interest margin; the difference between the quoted actual interest rate a bank pays on deposits and that quoted on contractual agreement on its loan transactions. Notwithstanding, what is not often explained in literature is the details about the specific interest rate used i.e. whether it is the weighted average of rates or the simple average. However, Barajas et al, argue that there is a possible trade-off in the analysis of interest spread. While a high level is generally indicative of inefficiency, excessive risk taking, or lack of competition within the banking sector, it is also true that high spread can contribute to high bank earnings, which if channeled into capital base of the system may promote safety and stability.

Demirguc_Kunt and Huizinga (1999) examined the factors that affect ex post interest margin using bank-level data for 80 OECD countries (1988-1995), using econometric methods. Although the study did not make distinction between interest margin and intermediation spread/margin, they found that differences in interest margin and profitability reflected the following determinants: bank characteristics, macroeconomic conditions, explicit and implicit bank taxes, regulation of deposit insurance and financial structure. More specifically, they found that bank interest margin

has positive relationship with the following and were statistically significant: ratio of equity to lagged total assets, ratio of loans to total assets, bank size (in terms of total assets), ratio of overhead to total assets, inflation rate and money market rate in real terms. However, the ratio of non-interest earning assets was negatively signed while output growth appears not to have any impact in interest margin.

Angbazo (1997) studied the determinants of bank net interest margins for a sample of United States commercial banks using annual data for 1989-1993. However, no distinction was made between net interest margin and core intermediation margin. The study postulated net interest margin to be a function of various risks, leverage, implicit interest payments, opportunity cost of non-interest bearing reserves and management efficiency. In the pooled sample result, the proxies for default risk (ratio of net loan charge offs to total loans), opportunity cost of non-interest bearing reserves (ratio of capital to total assets) and management efficiency (ratio of earning assets to total assets) were found to be statistically significant and positively related to the endogenous variable.

The work by Barajas *et al.* (1999) examined the effects of financial liberalization on bank interest spread in Colombia. They noted that the financial liberalization of the 90s has not succeeded in lowering the spread in that country; nevertheless, the factors affecting bank spreads were affected by the measures taken under the liberalization program. One significant result was the increase in the coefficient of loan quality in the post liberalization era. They also found that on decomposition of the spread, operating costs, financial taxation, and loan quality accounted for 38%, 22% and 4% in the pre-liberalization period while in post liberalization era, their

respective contributions to bank interest spread were 45%, 26% and 29%.

A similar study by Catao (1998) using Argentinean data showed that intermediation spreads were mostly affected by operating costs and problem loans. Other factors were the average tax ratio, cost of reserve requirements etc. Randall (1998) documented the evidence for the Eastern Caribbean countries. He found that operating expenses had large impact on interest spread, with its ratio to total assets explaining 23% of the estimated spread.

Brock and Rojas-Suarez (2000) applied the two-step procedure to examine the effects macroeconomic variables such as inflation, interest rate volatility, and GDP growth rate as well as micro variables on bank spread in five Latin American countries (Argentina, Bolivia, Colombia, Chile and Peru). In the first stage, bank interest spread was regressed against non-performing loans, capital ratio, opening costs, a measure of liquidity and time dummies. The result showed positive relationship for capital ratios (statistically significant for Colombia and Bolivia), cost ratio (statistically significant for Argentina and Bolivia), liquidity ratio (Bolivia, Colombia and Peru), The result for non-performing loans was mixed. While its coefficient showed negative relationship and was statistically significant for Argentina and Peru, it was positive and was statistically significant for Colombia in line with prediction. The authors posit that the result was due to “inadequate provisioning for loan losses: higher non-performing loans would reduce banks’ income, thereby lowering the spread in the absence of adequate loan loss reserves”, In the second stage regression, the result showed that interest rate volatility increased spread in Bolivia while inflation rate was important in Colombia, Chile and Peru. Both macro and

micro factors affected bank spreads in Chile and Colombia. However, a large portion of bank spread in Argentina and Peru could not be explained by any of the factors that had been mentioned above.

Saunders and Schumacher (2000) decomposed the determinants of net interest margin into regulatory, market structure and risk premium components using a sample of banks from seven OECD countries namely, Germany., Spain, France, Italy, USA and Switzerland. They found that the implicit interest rate had a major impact as banks had to increase margins to cover implicit interest payments. The coefficient of opportunity cost of reserves was positive and significant and bank capital ratios were positively related to interest spread. Their results also showed that spreads were sensitive to both market structure and volatility effects. The studies examined above used ex post measures of interest rate spread in the analysis.

Tarsila Segalla Afanasieff et al (2000) used panel data techniques to uncover the main determinants of the bank interest spread in Brazil, with the aim of finding out which of the macroeconomic factors and CAMEL-type (microeconomic) factors is most important. The authors used ex ante interest spread, arguing that the ex post interest margin responds less to changes in economic environment than the former measure (posted rate). A possible pitfall of the posted rate however is that it can be far from the effective rates paid to depositors and charged borrowers. The result of the first step regressions showed that the ratio of non-interest bearing deposits to operational assets, operating costs and the ratio of service revenues to operational revenues were positively related with spread while the ratio of interest bearing funds to total assets and net worth were negatively related. The second step regression result showed that macroeconomic factors such

as inflation, interest rate volatility and economic activity were more important although some yet to be identified factors accounted for a large portion of the spread behavior in Brazil.

The work by Joao Carvalho das Neves and Jose M. Piriquito Costa (1998) using Portuguese data sought to identify the determinants of the observed net interest margin in the banking industry. The study was based on all commercial banks operating in Portugal over the period 1986-1996. They divided the various factors into macroeconomic and microeconomic. The micro economic factors were further classified into funds acquisition efficiency and asset management efficiency. They observed that economic and regulatory variables as well as bank level variables such as efficient management determined interest margin. It was also deduced that net interest margin had negative relationship with economic growth. Results of the study underscore the importance of funds acquisition and asset management efficiency.

Abreu and Mendes (2001) provided cross-country evidence for some EU countries, using market share, operating costs, capital ratio, and loan to asset ratio as explanatory variable. The macroeconomic variables used included inflation rate, unemployment rate and nominal effective exchange rate. They found that Labor/Assets impact on net interest margin only, whilst market share and unemployment rate are relevant for explaining return on assets/equity (ROA/E). Their results did not change significantly, when Equity (instead of total assets) was used in the denominator of the dependent variable, meaning that results were robust. Regarding bank-specific variables, the net interest margin reacted positively to operating costs, but pre-tax profits did not. This means that less efficient banks (that is,

banks with higher operating costs) charge higher interest rates on loans (or pay lower rates on deposit), therefore passing those costs onto customer. However, competition does not allow them to 'overcharge' and thus all banks achieve similar profitability ratios. Well-capitalized banks (i.e, banks with higher equity/assets) face lower expected bankruptcy costs and thus lower funding costs and higher interest margins on assets. In general, this advantage 'translates' into better profitability ratios.

Ramful (2001) used pooled panel data methodology to examine the determinants of interest rate spread in the Mauritian banking sector. According to him the financial liberalization programmes of the eighties in Mauritius has resulted in financial deepening as the ratio of M2 to GDP grew from 39% in the 1970 to 80% in 2000. Furthermore, he found that interest spread has increased in the post liberalization period. His results, like others, showed that operating expenses was positively related to interest spread and was significant at 5 per cent level. The study showed similar relationship for reserve requirement, loan quality and market power. However, the result showed inverse relationship between non-interest income and yield on 3-month Treasury Bills and interest spread.

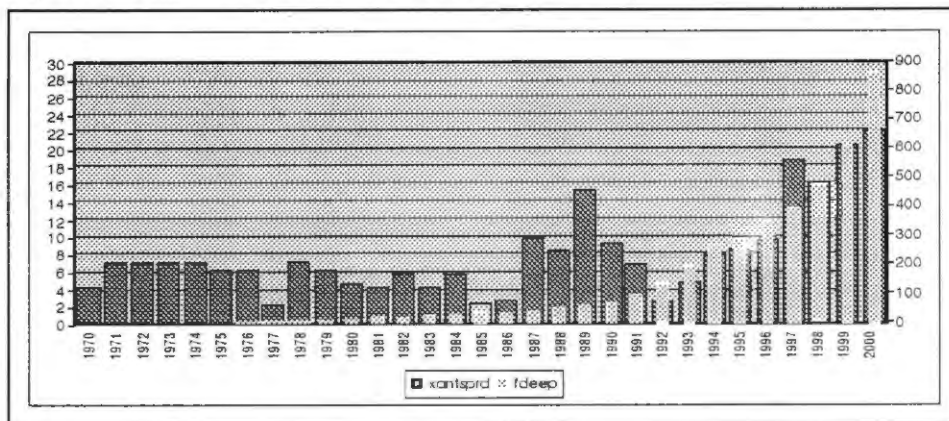
Balachandher, Staunton and Balashanmugam (2000) applied pooled cross section time series technique to identify the determinants of commercial banks profitability in Malaysia. They found that variables external to banks do not significantly affect the asset measures of bank profitability. Expenses variable was highly significant as negative contributor to profitability while loans and advances, inflation size and market share impact on profitability.

Table III. 1 : history of ex-ante interest rate spread and Financial deepening (%)

	Max. Lending Rate	Savings rate	Ex-ante Spread	Financial Deepening {(M2/GDP)*100}
1970	7.3	3	4.3	1.8
1971	10	3	7	1.5
1972	10	3	7	1.7
1973	10	3	7	1.9
1974	10	3	7	2.6
1975	9	3	6	4.5
1976	10	4	6	5.9
1977	6	4	2	7.3
1978	11	4	7	8.7
1979	11	5	6	10.8
1980	9.5	5	4.5	15
1981	10	6	4	22.1
1982	11.75	6	5.75	24.1
1983	11.5	7.5	4	29.2
1984	13	7.5	5.5	34.3
1985	11.75	9.5	2.25	34.6
1986	12	9.5	2.5	34.1
1987	19.2	9.5	9.7	45.4
1988	17.6	9.5	8.1	54.3
1989	24.6	9.5	15.1	55.4
1990	27.7	18.8	8.9	71.9
1991	20.8	14.29	6.51	91.9
1992	18.32	16.1	2.22	131.9
1993	21	16.66	4.34	192.5
1994	21	13.5	7.5	264.1
1995	20.79	12.61	8.18	285.2
1996	20.86	11.69	9.17	344.2
1997	23.32	4.8	18.52	388.1
1998	21.41	5.47	15.94	470.6
1999	25.65	5.68	19.97	602.5
2000	26.75	5	21.75	859.1

Source: Statistical Bulletin, Major Economic and Financial Indicators - Central Bank of Nigeria and audited and Published Annual Accounts of Banks

Figure III. 1 Ex ante interest rate Spread and Financial Deepening in History (1970 - 2000)



III. BRIEF OVERVIEW OF FINANCIAL SECTOR LIBERALIZATION IN NIGERIA

The year 1986 marked the beginning of reforms in the Nigerian Financial Sector. The year coincided with the adoption and implementation

Figure III. 2 Financial Deepening in History (1970 - 1985)

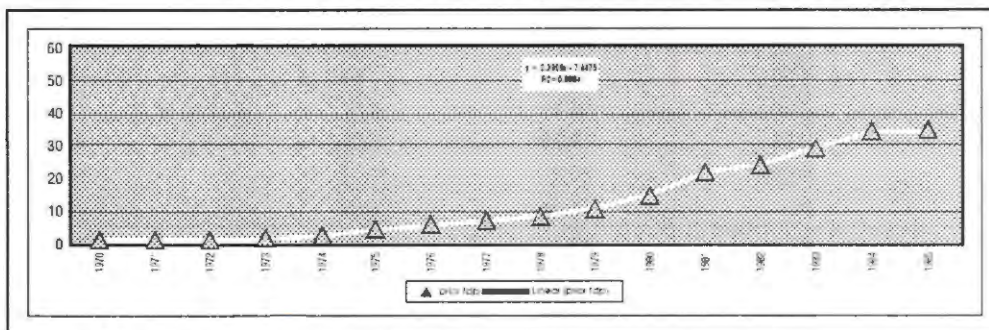


Figure III. 3 Financial Deepening in History (1986 - 1989)

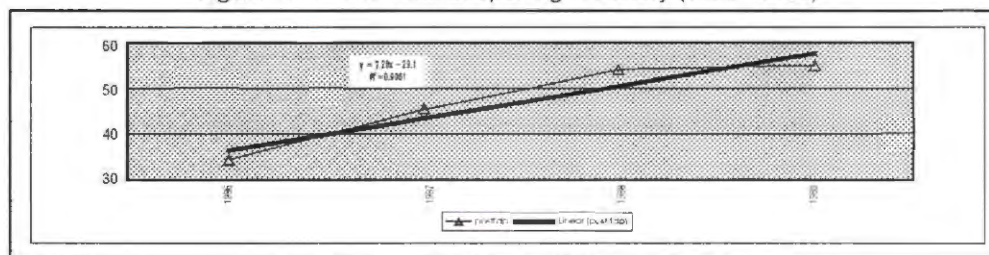
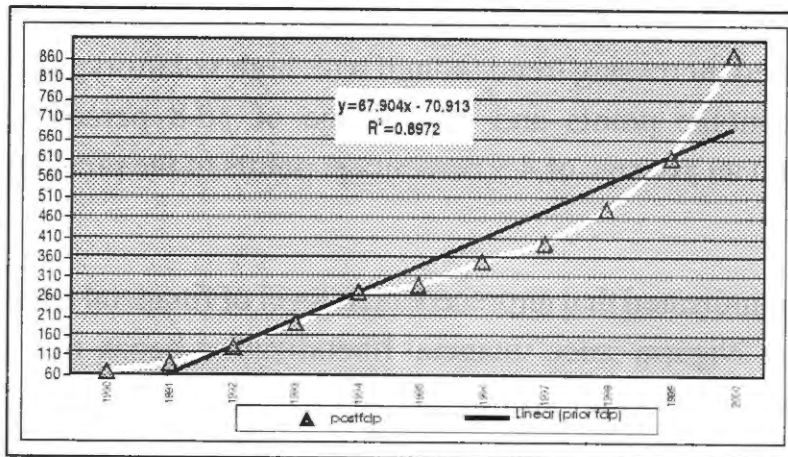


Figure III. 4 Financial Deepening in History (1990 - 2000)



of the IMF structural adjustment program in Nigeria. The program was aimed at removing the inherent distortions in the economy. It involved among other measures, the liberalization of the financial system.

The liberalization program started with a deliberate policy of liberal licensing of banks in order to increase financial intermediation, encourage competition, financial deepening, and private bank ownership. This measure led to unprecedented growth in the number of banking institutions between 1986 and 1994. Total number of banks (commercial and merchant banks) rose from 41 in 1986 to 116 at the end of 1994. This, no doubt, engendered reasonable level of competition among the banks. Furthermore, the gradual deregulation of interest rates began in 1987. This was complemented by the deregulation of the exchange rate. In order to mobilize savings in the rural areas, the government also established other financial institutions. Other reform measures included the abolition of interest rate ceilings as well as ceilings on credit allocation.

The movement in ex ante interest rate spread (derived from industry

weighted average posted interest rate) was relatively stable between 1970 and 1985. However, in the post liberalization period (between 1986 and 2000) it showed increasing trend though with high volatility; a range of 1.7 to 21.8 percentage points and an average of 10.8 percentage points, compared with an average of 4.9 percentage points in the pre-liberalization period.

Table 3.1 also indicated that unprecedented level of financial deepening has taken place in Nigeria since financial liberalization began in 1986. From 34.1 per cent in 1986 the ratio of M2 to GDP, an indication of financial deepening, jumped to 859.1 per cent in 2000. In the 16-year period before the liberalization, M2/GDP ratio on average was 12.9 per cent while the average for the post liberalization period 1986-2000 was 259.4 per cent.

IV METHODOLOGICAL FRAMEWORK

A liberalized financial system assumes a perfectly competitive financial market where there is free entry and exit of banks, perfect knowledge of the workings of the market and no price controls. Whether within the framework of accounting identities or economic agents behavior, a discussion on interest margin and or spread is appropriately situated within the concepts of profit maximizing and cost minimizing framework of a firm, which is based on economic optimization, taken business conditions as given. Profit maximization is superior to cost minimization for most purposes, especially as it is the more accepted economic goal of the owner of the firm who recognize revenues as well as costs when making decisions.

The framework for analyzing bank intermediation spread includes specific balance sheet relationship between deposit and loans to allow for

explicit determination of the spread (Barajas, 1996). Each bank uses deposits (D), labour and other inputs to produce loans (L) (for simplicity). On the asset side of the balance sheet, in addition to loans, the bank is also expected to hold a certain amount of reserves at the central bank. The liabilities comprise deposits and ‘other net liabilities’ (ONL). Thus the balance sheet of the bank is given by the identity:

$$L + R = D + ONL \dots\dots\dots (1)$$

Equation (1) implies that :-

$$L - D(1-r) - ONL = 0 \dots\dots\dots (2)$$

Where *r* is the required reserve

Banks receive interest revenues (*i_l*) from borrowers and pay interest cost (*i_d*) to depositors as well as real resource costs, mostly labour. The bank Maximizes its profit by the difference between financial revenues and financial and non-financial costs:

$$\Pi = i_l L - i_d D - c(L, W, X) \dots\dots\dots (3)$$

where, Π , i_l and i_d are profit, lending and deposit rates, respectively; *w* is wage rate while *X* is a vector of other variables that attract non-financial costs. Assuming that the bank faces no uncertainty and chooses the level of output, the first order condition for profit maximization requires that the first derivative of the function $f(\pi) = 0$

$$\text{Thus, } \partial \Pi / \partial L = i_l + L(\partial i_l / \partial L) - i_d \partial D / \partial L - D \partial i_d / \partial L - C_L = 0 \dots\dots\dots (4)$$

Equation (4), which provides the profit maximizing relationship between the lending interest rate, deposit rate and marginal costs can be written to explain interest rate spread of the bank depending on the assumptions regarding cost function and market for loans and deposit.

Pooled Panel Data Methodology

Panel data modeling allows us to identify the effects of economic interest such as the dynamics of economic relationship that would not be

detected in single cross section. It allows us to study dynamic relationships, and reduce omitted variable bias. Also, with panel data, we generally have more observations than with time series.

Three methods are available for estimating panel data models; pooled OLS, fixed effects model (FEM) and random effects model (REM). However, the OLS estimation produce consistent parameter estimates under limited condition. The fixed effect and the random effects model have been designed to handle the effect of temporal and cross-sectional differences.

Fixed Effects Model (FEM)

The FEM formulation is generally of the form

$$Y_{it} = \alpha_1 D_{1it} + \alpha_2 W_{it} + \dots + X_{it}' \beta + \varepsilon_{it} \dots \dots \dots (5), \text{ also called the Least}$$

Squares with Dummy Variables (LSDV) estimator.

Where:

$\alpha_1 D_{1it}$ is the unit-specific dummy variable to account for cross-sectional differences and assumes the value of 1 for the *i* th unit and zero otherwise, for the time period $t = 2$ to T . (only $N-1$ dummies are included)

$\alpha_2 W_{1it}$ is the specific dummy for temporal differences taking the value of 1 for the t th year and zero otherwise for $i = 2$ to N ($T-1$ dummies for temporal differences) while

X_{it}' is a vector of the independent variables.

The implicit assumption here is that the effects of the temporal and cross sectional differences are limited to the intercept term. This is a necessary assumption because if the slopes were to vary as well over time and cross-sectional units, then each separate cross-section regression would

involve a distinct model and pooling would be inappropriate (Pindyck and Rubinfeld 1991). Furthermore, the individual specific intercepts are assumed to be non-stochastic and the vector of explanatory variables is assumed to be independent of the errors for all i and t .

IV.1 Model Specification

On the basic of the linear relation in (4) and consensus in literature that the appropriate function form for analysis is linear relation, linear equations to analyze the pooled section data is specified as follows:

$$SPRD_{it} = \alpha_1 INFLAT_{it} + \alpha_2 GDP_{it} + \alpha_3 FDEEP_{it} + \alpha_4 MNINESS_i + \delta W_{i,t} + \lambda T_{it} + \mathcal{E}_{it} \dots \dots \dots (6)$$

$$SPRD_{it} = \alpha_1 MRR_{it} + \alpha_2 CRR_{it} + \alpha_3 LTB_{it} + \alpha_4 LTM_{it} + \delta W_{i,t} + \lambda T_{it} + \mathcal{E}_{it} \dots \dots \dots (7)$$

$$SPRD_{it} = \alpha_1 AVTASS_{it} + \alpha_2 RISKPREM_{it} + \alpha_3 TAXR_{it} + \alpha_4 KPTEMP_{it} + \alpha_5 NIY_{it} + \dots \alpha_n X_{3it} + \delta W_{i,t} + \lambda T_{it} + \mathcal{E}_{it} \dots \dots \dots (8)$$

$$SPRD_{it} = \alpha_{11_{it}}(X1) + \alpha_{11_{it}}(X2) + \alpha_{11_{it}}(X3) + \delta W_{i,t} + \lambda T_{it} + \dots \dots \dots (9)$$

(X1), (X2) and (X3) are vectors containing macroeconomic, monetary policy and bank-level variables, respectively.

The variables and their predicted signs are defined in the table below.

IV. 2 Summary of Independent Variables

Table IV. I

Variable Name	Description	Functional description	Expected sign
Micro (Bank level) variables			
LNASS	Average Loans to average total assets	Size of loan asset	-
PROV	Average bad loans to average total loans	Loan asset quality - measure of riskiness	+
LOGAVTASS	Log of average total assets	Bank size	-
NXPVTA	Non interest expenses to average total assets	Expenses management efficiency	+
REMUTA	Remuneration to total assets	Personnel cost	+
NIYAVTASS	Non interest income to average total assets		-
NIM	Net interest margin	Profitability of asset/liabilities operations	-
LSAVDEP	Savings deposit	Availability of loan able funds	-
ROATASSBT	Profit before tax to average total assets	Profit margin	-
RISKPREM	Risk premium	Difference between the rate on risk-free and the maximum lending rate on loans (risk asset)	+
MKTS	Average core deposit to total banks' deposits	Market share	+
LDEPRAT	Loan to deposit ratio	Liquidity risk	+
DIPXP2	Deposit insurance premium to Gross income	Financial taxation/cost of risk absorption	+
KPTEMP	Average capital employed to average total assets	Networth/capital asset ratio/capital adequacy	-
Monetary Policy and Market environment/fiscal			
MRR	Minimum rediscount rate	Nominal anchor of interest rate	+
CRR	Cash reserve requirement	Financial taxation	+
TBR	TB issue rate	Yield on alternative investment	+
TX	Company income tax	Explicit financial taxation	+
Macro variables			
BNKFIN	Avtass/GDP	Bank financing of the Economy	+
FINDEEP	M2 to GDP	Financial Deeping	+
INFLAT	Inflation rate		+
GDP	GDP level	Level of economic activity	+, -

An important macro environmental factor that affects bank interest rate spread is inflation. Banks do not want to be caught unaware in respect of losses from higher costs during inflationary pressures.

Bank will price credit higher in order to hedge against both present and expected inflation and to meet the target real return, thus increasing interest spread. Inflation should have positive relationship with spread.

Related to the macroeconomic environment is the ratio of average total assets of banks to GDP - a measure of bank financing of the economy or "moniness" of the economy. It is expected to increase interest rate spread. This is because as banks increase the financing of economic activities the risk of default also increase and thus increase lending rate. Financing deepening is the ratio of money supply to GDP. If this ratio grows faster than GDP, it is likely to act through inflation to increase spread. However, if economic activities remain sluggish or declines, interest rate may decline thus lowering spread. Growth of GDP requires additional financing, which translates to demand for more loans and higher interest rate. Increase in the level of economic activities could mean competition, which in the banking industry could reduce spread.

Total asset has been widely used as a proxy for bank size, usually as logarithm of nominal values, in order to obtain a more meaningful coefficient since other variables are mainly ratios. Large asset sized banks are assumed to be enjoying scale economies in their operations and this, affects a banks pricing decision. It is expected to reduce spread.

The ratios of overhead (non-interest expenses in this case) to average total assets gives an indication of expense management efficiency. Higher costs imply that a bank would price its credit high enough to cover costs other things being equal. It thus impacts positively on interest spread.

The ratio of capital employed to total asset is a measure of risk. Higher capital asset ratio is safer in the event of losses and it is indicative of low risk. It should have negative relationship with spread.

There is also a possibility of positive relationship between capital-assets ratio and spread as higher ratio may induce banks to absorb greater

risk with the hope of maximizing expected returns. It is expected that interest rate spread increases when the minimum rediscount rate increases or its volatility. A positive relationship is expected between spread and MRR. Similarly, Treasury bill rate and three-month deposit rate are expected to increase lending rate and hence interest rate spread. Similarly, the ratio of tax to profit before tax is expected to increase spread as banks pass the tax burden to consumers of credit. Moreover, the cash reserve ratio is an implicit taxation and especially in the case where it is not remunerated. It increases spread.

Literature shows that the impact of deposit insurance premium on spread is theoretically ambiguous. It is a cost, which banks want to recover and therefore it tends to increase spread. On the other hand, deposit insurance covers risk in banking business. Consequently, it can thus reduce a bank's risk premium and hence interest spread, all things being equal. It is possible for a bank to engage in excessive risk taking due to mis-priced deposit insurance and this will in turn, increase the price of credit. Provision for bad and doubtful loans is a measure of asset quality and proxies non-performing loans.

The higher its value, the higher the bank will set price of credit to cover the risk. Thus, it has positive relationship with interest spread. Size of loan is expected to lower spread in line with demand and supply principle. It is expected to impact negatively on spread. The ratio of loans to deposit indicates liquidity risk. Higher risk increases spread while lower risk reduces spread. A positive relationship is expected between spread and liquidity risk. Larger banks in terms of capture of deposit market, could exercise its market power to increase lending rate. Market share is expected

to have a positive relationship with spread all things being equal.

IV.3 The dependent Variable

Ex ante spread (ANTECSPRD) - Difference between industry weighted average savings and maximum lending rate quoted in contractual agreements.

IV.4 Data Sources and sample

Annual data for 13 commercial banks for the period 1989-2000 were used for the study. The pooled data for the sample yielded 156 observations (data points). Data relating to macroeconomic variable were obtained from the Central Bank of Nigeria's Statistical Bulletin (various editions) and Annual Reports (various years). The data relating to bank characteristics were accounting balance sheet data extracted from the published annual accounts of the banks.

The sample banks used for the study were selected randomly and on the basis of availability of data. For purposes of meaningful interpretation of results of estimation, ratios rather than the naira values of accounting balance sheet data were used. To deal with the problem of accounting stock data, which varies at different time points and do not remain constant throughout the year, the average of the opening and closing balances of consecutive years were used in the study in line with Frame and Holder (1994). However, the differences in banks' end of financial year have been ignored for simplicity. In order to provide evidence on the extent and direction of influence of key variables on interest rate spread, the specified equation 9 was estimated using the multiple regression capabilities of E-views-version 4.0 software.

V. Data Analysis

V.1 Scatterplots

The data was analyzed graphically using scatter plot to see the relationships between the variables.

Charts 1-3 in figure 4 show some of the relationships between the spread and some explanatory variables.

The scatter plots show that inflation is negatively related to ex-ante

Figure 4.1

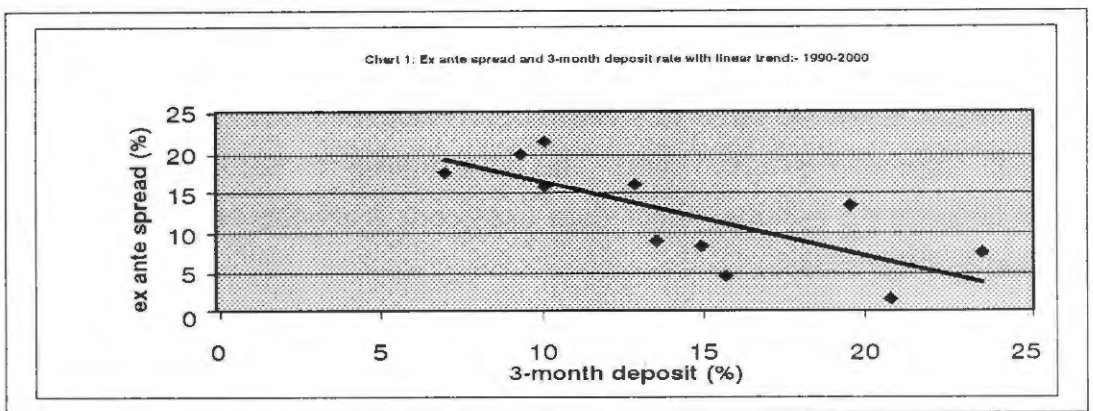


Figure 4.2

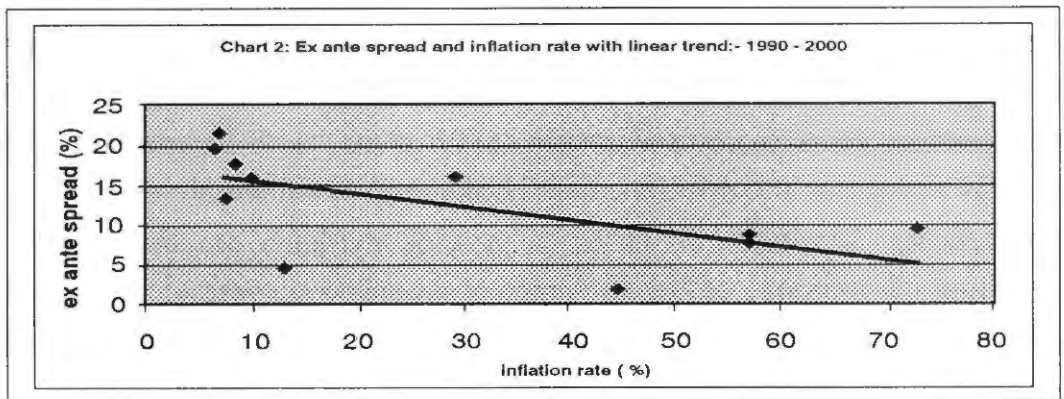


Figure 4.3

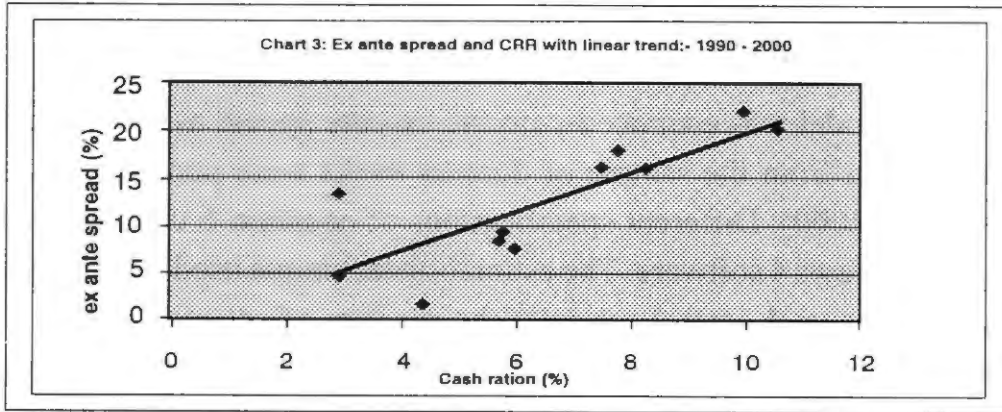
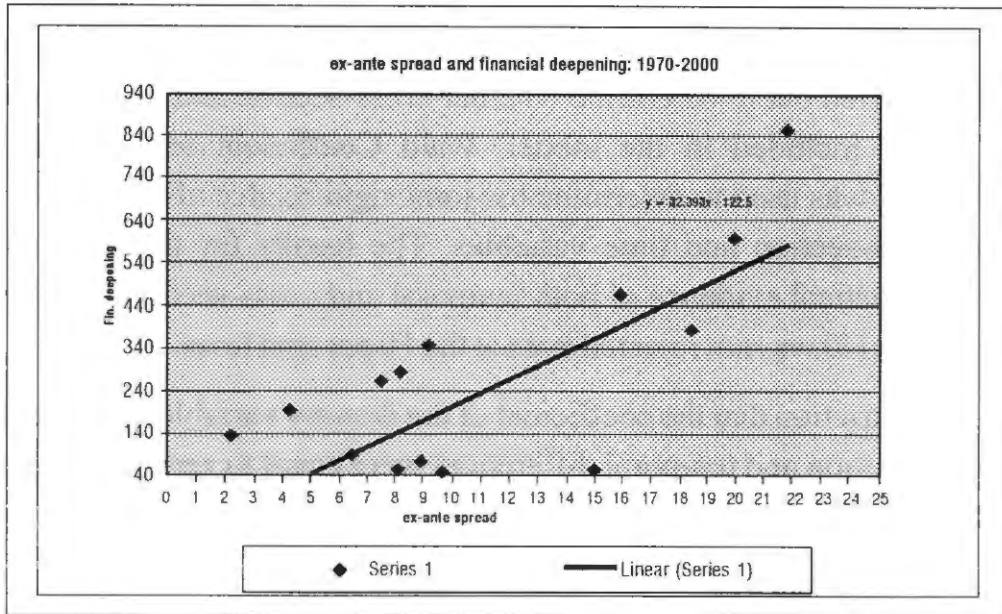


Figure 4.4



interest rate spread. This is contrary to most of the position in literature probably because it did not react to expected inflation while costs rose faster. However, empirical analysis will confirm this. On the other hand, the cash ratio showed positive relationship with ex-ante spreads. This is in line with

findings in literature.

V.2 Model Estimation

The model was estimated with the ex-ante spread as the dependent variable. Data from the sample of thirteen banks were pooled for twelve years (1989-2000). Different specifications of equation 6 were estimated, using the E-views 4 software. The estimation technique used was panel data method. E-views 4 cannot estimate the random effect model where the number of cross section in the sample is less than the number of parameters to be estimated. Since the number of cross-section was thirteen, the estimation of the pooled data was done with the fixed effect model.

The model was first estimated and test of cross section and temporal stability carried out to determine whether cross-section and time dummies were to be included in the model. Wald Coefficient test (coefficient restrictions) was used to determine the joint significance of the coefficient of the cross-section and time variables. The results for the estimations showed statistical evidence of both temporal and cross-section stability of the model as H_0 was not rejected even at the 10 per cent level.

A restriction that the coefficient of the dummy variables representing the cross-section and temporal differences were equal to zero was imposed in the Wald test.

The test hypothesis was

$$H_0: \delta_1 = \delta_2 = \dots \delta_N = \lambda_1 = \lambda_2 = \dots = \lambda_T = 0$$

$$H_1: \text{Not all the } \delta \text{'s and } \lambda \text{'s} = 0$$

The Wald test result was as follows:

F-statistic	1.191144	Probability	0.318200
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Chi-square	4.764577	Probability	0.312317
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Conclusion: H_0 could not be statistically rejected (accept H_0), as the coefficients were not significantly different from zero.

The result indicated that the appropriate models would be estimated without cross-section and temporal dummy variables.

Determinants of interest rate spread (core intermediation spread) were estimated using the ex-ante spread measure.

VI. Summary of Major Findings, Recommendations, and Conclusion

VI.1 Discussion of Empirical Results

This section analyzes and discusses the regression results. As stated earlier, the various spread equations were estimated with the Fixed Effect model. In line with adaptive expectations, only the dynamic forms of the equations were estimated. Furthermore, the equations were estimated using the log transformation of the dependent variable. The general-to-specific approach was adopted in arriving at the parsimonious equations shown on the tables. Variables were eliminated from the equations on the basis of level of significance and improvements in adjusted R^2 and D.W statistic. The macroeconomic and monetary policy variables served as control variables in order to isolate the effects of bank characteristics on banks' interest rate spread. The results of the regression equations presented in the tables 1-4, are based on the strict condition of 5 per cent level of significance. The significance of variables at 10 per cent level of significance is in the appendix. Further details about the regression results are available on request.

The results in table 1 (equations 1 and 2) relate to regression of log transformations of ex-ante spread, ANTECSPRD, on the macroeconomic variables. The price variable, inflation, was overall negatively signed contrary to expectation and both the current and lag values were statistically significant at the 1 per cent level. This counter-intuitive result could mean that banks' formation of inflation expectation (expected increase in inflation) leads to higher interest rates next period. In other words, they do not react to expected inflation but actual inflation with a lag. The ratio of M2 to GDP, financial deepening, had the a priori sign in both cases at the 1 per cent level, reflecting monetary policy response to excessive money growth, transmitted through interest rate mechanism. The level of GDP was significant at the 1 per cent level although with net negative impact. The measure of bank financing of the economy (average total assets of the banking system to GDP), "moniness" of the economy, was not statistically significant in either of the cases although positively signed. The adjusted R^2 at 0.97 in each case was quite high, indicating that macro variables explain about 97 per cent of the variations in the ex-ante interest rate spread of commercial banks holding other variables constant.

Table 1: Interaction of Macroeconomic variables and Spread: Dynamic Equations
 Dependent Variable-LANTECSPRD1

Variable/Equation	Coefficients	
	1	2
LINFLAT	0.106408*** (3.175580)	0.108263*** (3.262626)
LINFLAT(-1)	-0.678888*** (-19.20982)	-0.675172*** (-19.44732)
LCPI		
LCPI(-1)		
LLFDEEP	1.010459*** (9.683767)	1.039604*** (21.32929)
LFDEEP(-1)	0.214169*** (9.167547)	0.217258*** (9.440293)
LGGDP		
LGGDP(-1)		
LGGDP	0.846503*** (8.323103)	0.885010*** (10.15095)
LOGGDP(-1)	-1.190772*** (-13.30737)	-1.236721*** (-18.18361)
LBNKFIN		
LBNKFIN(-1)		
LANTECSPRD(-1)	-1.793234*** (-15.97582)	-1.782202*** (-16.08840)

Adjustment R2	0.971	0.971
S.E	0.12	0.12
F-Statistic	540.3	727.1
D-W Statistic	1.88	1.87

Columns 3-5 of table 2 relate to the regression of monetary policy/financial regulation and market interest rate variable on the ex-ante spread. MRR had the expected signs and both the current and lag values were significant at the 1 per cent level. This was expected given that MRR is an anchor rate in Nigeria signaling the direction of monetary policy by its influence on interest rates. CRR and its lag values were statistically significant at the 1 per cent level. It had positive impact on spread given the larger positive coefficient on its current value. On the other hand, TB rate had the opposite sign, reflecting substitutability between risky and risk-free assets when the yield on the latter increases. CRR was appropriately signed and significant at 1 per cent in equation 3 and 4 and at 5 per cent in equation 5. The 3-month deposit rate had the opposite sign and was significant at 1 percent level. As in the control equations for the macro variables, the dynamic specifications had high explanatory power, R^2 of above 60%, indicating that monetary policy variables are important determinants of spread holding other variables constant.

Table 2
Interaction of Monetary policy/market rate variables and Spread: Dynamic Equations
Dependent Variable:LANTECSPRD1

Variable/Equation	Coefficients		
	3	4	5
LMRR	2740390*** (-29.89723)	-4.374076*** (-21.55144)	
LMRR(-1)	1.009483*** (8.378370)	6.706271*** (19.72592)	
LMRR(-2)	2.111725*** (18.92526)	5.070109*** (22.72625)	
LCRR	7.384527*** (27.40100)	10.94433*** (21.60580)	-0.928423** (-3.028388)
LCRR(-1)	- 6.614907*** (-31.08225)	- 10.80227*** (-21.97995)	1.125633** (3.144628)
LTM	-1.675012*** (-16.08821)	- 3.984665*** (-19.23307)	
LTM(-2)		- 1.666974*** (- 15.49805)	-1.075499*** (-4.652283)
LTM(-3)	- 2.095794*** (-39.87685)		
LTB			
LTB(2)			-0.890108*** (-3.045785)
LTB(-3)			
LANTECSPRD		- 1.39605*** (16.100063)	-0.429232*** (-4.714159)

Adjusted R2	0.979	0.935	0.613
S.E	0.10	0.18	0.45
F-Statistic	915.3	269	44.5
D-W Statistic	2.0	2.1	2.6

Columns 6-9 were controlled for the effects of bank level variables. Risk premium, non-interest expenses, and deposit insurance premium had the expected positive sign on their coefficients and were significant at the 1 per cent level. Each of the variables met aprior expectation. Banks add on a certain percentage to their cost of funds to cover the various risks involved in loan operation including default risk, market risk, credit risk, and other

risks. As the operating expenses increase, banks charge higher interest rate to cover the costs. The deposit insurance is financial taxation and banks pass on this to borrowers in higher interest rate. Similarly, the loan to deposit ratio and capital asset ratio had the expected sign but significant at the 5 per cent level. Variables that showed negative impact and significant at 1 per cent include non-interest income, size of loan funds and market share. The results indicate that banks might be subsidizing credit price by charging higher for services while large volume of available loan funds will dampen interest rate on loans. With the exception of equation 8, the equations had relatively good explanatory power with adjusted R² of 67.3%, 85.0%, and 80.0%, respectively.

Table3
Interaction of Bank level variables and Spread: Dynamic Equations

Variable/Equation	Coefficients			
	6	7	8	9
RISKPREM		0.101515*** (21.00370)		0.102067*** (19.48144)
LLDEPRAT				0.197520** (2.092309)
LSAVDEP	-0.158959* (-1.669779)			
LKPTEMP				
LKPTEMP(-2)		0.093012** (2.319165)		
LAVLNS				
LAVLNS(-1)			-0.291149*** (-3.509040)	-0.162136*** (-3.955349)
LNIM				
LNIM(-1)				
LNIY				
LNIY(-1)			-0.525916*** (-3.074018)	
NXPVTA	0.522437*** (8.279354)			
NXPVTA(-1)		0.114393*** (4.064226)	0.437834*** (6.111733)	0.158505*** (5.139915)
LDIPXP(-1)	0.535740*** (10.07897)	0.134339*** (4.413456)		
LTX1			-0.209285* (-1.937491)	
LMKTS			-0.142677*** (-2.790052)	
LMKTS(-1)				
LANTECSPRD(-1)	-0.127257*** (-1.567159)		-0.237729*** (-2.147023)	

Adjusted R2	0.673	0.850	0.23	0.80
S.E	0.43	0.28	0.63	0.29
F-Statistic	28.7	185.8	9.7	108.4
D-W Statistic	2.1	2.3	2.1	2.4

Table 4
Interaction of all variables and Spread: Dynamic Equations

Variable	Equation 10	11	12	13	14	15	16
LINFLAT (-1)		-0.257436*** (-38.35543)	-0.253056*** (-47.00840)	-0.282815*** (-30.26666)		-0.184247*** (-5.118315)	-0.258378*** (-3.560070)
LCPI					-1.932814*** (-7.109859)		
LFDEEP	0.178543** (2.274350)	0.085844*** (3.324681)			0.810856*** (15.58876)		
LFDEEP (-1)	0.323116*** (8.181481)	0.356762*** (14.67624)	0.362631*** (27.23195)	0.148936*** (2.910761)			
LBNKFIN						0.101076*** (3.650715)	
LBNKFIN (-1)						-0.724239*** (-7.010659)	
LOGGDP			-0.112759*** (-5.926870)				
LOGGDP (-1)				-0.504602*** (-10.46631)	-0.632639*** (-7.478077)	-0.261585*** (-3.420640)	-0.992034*** (-13.44386)
LMRR		1.661474*** (36.52288)	1.754163*** (38.33942)	0.881449*** (12.09075)		1.223851*** (3.913706)	
LMRR(-1)	2.136385*** (16.74966)	-0.591678*** (-18.09567)	-0.517271*** (-21.11991)				
LTBR					-1.404296*** (-3.422708)		-1.173183*** (-3.710514)
LCRR				0.756345*** (8.586511)	3.499269*** (5.997249)		1.304838*** (8.013711)
LDIPXP			0.007140** (2.472424)				
LDIPXP(-1)						0.063448*** (3.989532)	0.093242** (2.104876)
LTM	-0.322947*** (-2.714365)	-0.304892*** (-9.683254)	-0.385730*** (-11.58394)			-1.251944*** (-11.69452)	
LMKTS	0.185948*** (4.100527)	0.040075*** (2.927155)					
LMKTS(-1)						-0.201141*** (-5.272336)	
RISKPREM	0.116965*** (17.47493)	0.087883*** (57.57398)	0.085159*** (58.40662)	0.086214*** (44.67042)			
LSAVIDEP(-1)						-0.068191*** (-2.655282)	
ROATASSBT (-1)	-0.035324*** (-3.006052)						
LNIM		-0.027141** (-2.490699)	-0.025884** (-2.672467)			-0.205652*** (-5.459295)	
LNIXPVTA	0.158770*** (3.667661)	0.092771*** (10.29343)	0.066905*** (6.843528)	0.144416*** (16.52220)			
LNIXPVTA (-1)						0.204209*** (5.833895)	0.546291*** (11.58588)
LNYYVTA(-1)							-0.295228*** (-4.285321)
LOGAVTASS	-0.326301*** (-5.77882)	-0.111816*** (-6.691839)	-0.041822*** (-3.110021)	-0.144498*** (-9.362913)			
LOGAVTASS (-1)							-0.202645*** (-2.975174)
LKPTEMP							0.050442* (1.844156)
LLNASS	-0.368899*** (-5.657898)	-0.100365*** (-4.697369)	-0.044285*** (-2.978645)	-0.095650*** (-3.671093)			
LLDEPRAT	0.355941*** (5.375712)	0.108481*** (4.891290)	0.064054*** (3.854715)	0.092301*** (3.211220)			
LANTECSPRD (-1)	-0.455822*** (-6.848576)	-0.803910*** (-25.84187)	-0.774247*** (-33.20930)	-0.997426*** (-30.18299)	-0.364939*** (-4.574563)	-0.344200*** (-2.800235)	-1.483269*** (-13.866556)

Adjusted	0.986	0.997	0.992	0.992	0.923	0.965	0.951
S.E	0.08	0.03	0.05	0.05	0.20	0.13	0.16
F-Statistic	491.4	3661.7	1325.1	1448.1	142	210.1	160
D-W	1.8	1.9	2.0	2.0	2.3	2.2	1.8

The dynamic interaction of all variables and ex-ante spread are shown in equations 10 to 24. of table 4. All macroeconomic variables were found to be statistically significant at the 1 per cent level of significance. The price variable, inflation rate, or CPI consistently came out with negative sign contrary to expectation. Even, where both the current and lag values were used, the negative effect more than offset the positive effect. The results for inflation indicate that banks' formation of inflation expectation and response to actual inflation could lead to higher interest rates in the next period or more, all things being equal. In addition, it may be indicative of the fact that costs rise faster than banks adjust interest rate in line with expected and actual inflation. The result is similar to the findings of Abreu and Mendes. The ratio of M2 to GDP, FINDEEP was significant at 1 per cent with positive coefficient in all the equations where it was included. Both the current and lag values came out with positive effect, indicating that the effect of increase in money supply lasts beyond one period. The ratio of banks' total assets to GDP, a measure of bank financing of the economy, BNKFIN, had the predicted sign and was significant at 1 per cent (equations 15, 17 and 19). This could be interpreted in terms of wider risk horizon. In case of GDP, the result show that increased economic activities impacted negatively on spread contrary to expectation. This could be interpreted to mean that increased economic activities relate to increased competition in the banking industry in Nigeria, and negatively affects spread. Macroeconomic stability could also account for such, although this is less likely in this case. A similar result was obtained for the Brazilian banking sector (Tarsila S. Afanasieff et al).

The minimum rediscount rate (MRR) had positive coefficient in the equations in line with prediction. Both the current and lag values were

statistically significant at the 1 per cent level. The result is in line with the function of MRR as a nominal anchor rate that transmits the direction of monetary policy through interest rate mechanism. Similarly, the CRR appeared with the expected sign and was significant at the 1 per cent level. CRR is financial taxation and imposes an implicit cost on banks, which is ultimately passed on to borrowers in higher interest rate. On the other hand, Treasury bill rate (TBR) was significant at the 1 per cent level but had the opposite sign contrary to expectation. The reason for this outcome is not difficult to see. Loan asset and Treasury bill are substitutes, which derives from the nature of the assets. While the former is a risky asset, the later is usually regarded as a risk-free asset. Thus if the yield on T bill goes up, banks will prefer holding the risk-free asset to holding a risky one like loans. Furthermore, the increase in T bills rate provides some subsidy on the price of credit and hence banks would, with increase in the proportion of risk-free asset coupled with interest elasticity of loan market, lower spread in order to achieve optimum portfolio mix and revenue. The three-months deposit rate consistently showed negative sign on its coefficient and significant at the 1 per cent level. The outcome may be due to interest elasticity of loan funds market.

Table 4 ctd

Variable	Equation	17	18	19	20	21	22	23	24
LINFLAT (-1)							-0.711737*** (-259.0639)	-0.643062*** (-119.3501)	-0.550452*** (-57.37789)
LCPI	1.033733*** (-3.970730)	0.830546*** (-7.409831)			-0.341792*** (-5.453361)	0.448587*** (3.220486)			
LCPI (-1)		0.800098*** (5.184402)		-1.588614*** (-63.28695)		-0.461619*** (-3.145658)			
LFDEEP		0.567895*** (13.13000)			0.827175*** (19.82670)	0.082008*** (5.188396)	-0.662730*** (-129.7247)	0.218389*** (40.92509)	0.264799*** (35.33444)
LFDEEP (-1)							1.010221*** (212.5895)		
LBNKFIN	0.247986*** (4.574166)			0.352454*** (7.790170)					
LOGGDP				-7.322582*** (-15.26016)					
LOGGDP (-1)		-0.666097*** (-14.19210)			-0.477368*** (-11.01832)	-0.076168*** (-7.385891)	-0.055054*** (-6.565796)	-0.950507*** (-119.3395)	-0.921409*** (-67.94962)
LMRR		1.216112*** (10.46384)			1.37079*** (9.288447)	2.473825*** (48.78340)			
LTBR	-1.341211*** (-3.811245)								
LCRR	3.043871*** (6.095705)			3.763795*** (65.87605)			1.213029*** (157.8027)		1.232043*** (40.26800)
LDPXP(-1)	0.113532** (2.495778)	0.078592*** (2.884579)					0.002284** (2.553457)		
LTM				-1.357814*** (-4474623)		-0.609444*** (-20.34580)		-0.245834*** (-22.88769)	
LMKTS (-1)					0.109954** (2.500808)	0.049226*** (3.233880)			
L RISKPREM		0.775902*** (15.05413)	0.408359*** (31.52766)	0.941183*** (15.34491)	0.843456*** (34.08760)	0.371248*** (92.22333)	0.344177*** (30.18215)		0.466290*** (23.87925)
LSAVDEP				-0.010853** (-2.273015)					-0.016865** (-2.435331)
LSAVDEP(-1)					-0.060624** (-2.382677)				
ROATASSBT									
ROATASSBT (-1)									-0.009510*** (-1.983235)
LNIM							-0.006992*** (-3.028324)		-0.040675*** (-2.986779)
LNIXPVTA			0.085765*** (18.74415)	0.191871*** (4.569292)			0.016186*** (6.750558)		0.087262*** (11.00330)
LNIXPVTA (-1)	0.473477*** (9.363180)	0.248986*** (8.975379)							
LNYYVTA					-0.174371*** (-4.208176)		-0.006620*** (-3.028188)		
LNYYVTA (-1)	-0.376909*** (-6.121834)	-0.183451*** (-5.012980)							
LOGAVTASS				-0.094968*** (-13.96762)		-0.063215*** (-3.036295)			-0.056443*** (-3.498198)
LOGAVTASS (-1)					-0.173602*** (-2.833205)				
LKPTEMP									
LPROV.					0.037603* (1.986675)	0.012093* (1.945228)		0.007472** (2.297502)	
LLNASS			-0.021963*** (-2.617243)	-0.197671*** (-2.137098)	-0.045486** (-2.111149)				-0.061491*** (-3.157276)
LLDEPRAT			0.036820*** (3.278942)	0.261474*** (3.686547)	0.063455** (2.486788)	0.004429* (1.808825)	0.019805** (2.160926)	0.082598*** (3.865859)	0.082598*** (3.865859)
LANTECSPRD (-1)	-1.315513*** (-12.09833)	-1.006705*** (-11.78977)			0.0573870*** (-8.274427)		-1.659116*** (-215.6415)	-1.491079*** (-114.6952)	-1.427495*** (-66.57979)

Adjusted	0.947	0.976	0.996	0.976	0.992	0.999	0.999	0.997
S.E	0.17	0.10	0.02	0.11	0.03	0.00	0.02	0.03
F-	161	267.4	1741.7	223.5	716.4	30198.3	7690.0	2714.0
D-W	2.5	1.9	1.75	1.8	1.9	2.2	1.9	1.7

The estimations showed that the bank-level variables that increase spread included risk premium, market share, loan to deposit, and non-interest income. Risk premium was significant at the 1 per cent level and had the expected sign in all the equations where it was included. The result confirms lenders practice of adding a premium to cover various risks in Nigeria's credit market including; market, default, credit and liquidity risks. A related outcome was that of loan to deposit ratio, which showed positive relationship with spread and statistical significance largely at the 1 per cent level. The result could be interpreted in terms of liquidity risk. Higher loan to deposit ratio implies that banks run the risk of insolvency and therefore have tendency to cover such risk in higher lending rates, which increase spread. Non-interest expense is an important determinant of spread as it showed strong statistical significance at the 1 per cent level and with the predicted sign. This result is an indication that banks factor in rising operating costs in determining the price of loan funds. Rising operating cost would usually be passed on to borrowers, particularly in an inefficient market. However, personnel cost taken separately, whether as a ratio of total assets or as a ratio of gross income was highly insignificant when introduced in any of the equations.

The market power measured in terms of share in total deposits also showed statistically significant positive relationship with spread. The result met expectation and in line with the oligopoly market structure in Nigeria, where a few banks dominate deposit mobilization. The result shows that the big banks could be exercising market power to increase interest rates in order to increase earnings (the big banks were included in the sample).

The deposit insurance premium showed the predicted, though relatively weak relationship with spread and was significant at both the

1 percent and the 5 percent levels. It is a regulatory taxation on banks' resources, which is passed on to borrowers in higher interest rates and wider spread. A contrary outcome could have meant that banks were engaged in excessive risk taking.

Capital adequacy ratio and ratio of bad loans to total assets had the predicted signs on their coefficients but were not significant at 1 per cent level. Increase in bad loans means deteriorating asset quality and exposure to default risk is higher and hence banks would charge higher rates of interest on loans.

On the other side of the result of the estimations are the factors, which negatively affect spread. They include; non-interest (services) income, asset size, loan volume, net interest income, volume of savings deposit and return on assets. Non-interest income met the apriori expectation with strong statistical significant at the 1 per cent level. The result is an indication that banks could be using various fee incomes to subsidize interest rates on lending and hence the moderating influence on spread. Asset size proxied by the average total assets was found to have strong statistical negative influence on spread at the 1 per cent level. It showed that large sized banks enjoy economies of scale in pricing of their credit. Loan to total assets showed similar result. Expectedly, as a measure of volume of loan and or availability of loan funds, interest rate will fall at higher supply of loan funds and the reverse will be the case if the ratio falls. In other words, the law of supply and demand for loan funds affect interest rate spread. Similarly, savings deposit showed a negative relationship with spread though largely at 5 the per cent level. An increase in savings deposit will increase supply of credit and hence moderate interest rate. Net-interest margin was negatively signed in line with prediction. Banks watch the ex-post interest margin,

which includes earnings from other interest earning assets while making credit-pricing decisions. Increase in this variables helps banks to lower spread because of interest elasticity of credit. The profitability variable, return on assets (ROA) showed a negative relationship with spread with its lag value. Profitable operations in the preceding year reduce banks' incentive to increase spread all things being equal.

The equations had very high explanatory power with adjusted R²s ranging from 92.35% to 99.9% and F-statistic ranging from 142 - 30198. The DW statistic ranged from 1.7 - 2.5

Table 5: Summary of the performance of the estimated coefficients (based on ex-ante spread equation 10-24, with dynamic interaction of all variables)

Coefficient of:	No. of ***	Average t-value
INFLAT/CPI	14	-70.0/-13.7
GDP	12	-24.1
FINDEEP	11	23.3
BNKFIN	3	5.3
CRR	7	-41.8
TBR	3	-3.6
MRR	8	-17.1
TMR	7	-17.7
DIP	2	3.5
RISKPREMIUM	11	38.2
LNASS	8	-3.5
NXPVTA	12	9.5
LDEPRAT	7	-4.0
LOGAVTASS	9	-5.7
ROATASSBT	2	-2.5
NIY	5	-4.5
NIM	4	-3.5
SAVEDEP	1	-2.7
MKTS	4	1.2

*** Significant at 1% level

Table 5 summarizes the performance of all categories of independent variables in the dynamic equations 10-24, in terms of statistical significance at the one per cent level and average value of t-statistic. Among the variables that increased interest rate spread, the most important were risk premium, financial deepening, CRR, MRR and non-interest expense. On the other hand, the most important that had negative influence on spread included the general price level, level of economic activities, 3-month deposit rate, size of total assets, loan assets service revenue and net interest margin

VI.2 Quantitative Impact Analysis

To further provide insight on the determinants of interest rate spread and possibly the relative importance of the independent variables, the sizes of impacts of the Xs (at 1 per cent level of significance) on the dependent variable were calculated from the estimated dynamic coefficients of equations 10 - 24. The impact analysis was applied to the estimated coefficients of the log transformed dependent variable equations.

Table 7 provides an indication of the quantitative impacts of some of the important independent variables on interest rate spread. The implication appears to be that on average, a 100 basis point change in the Xs, *ceteris paribus* and holding other variables constant, changes interest rate spread, by the percentage points and in the direction indicated. However, it is important to state that the direction of impact would also depend on the strength of the intervening variables at the particular period. A 100 basis points increase in CRR would on average, increase interest rate spread by 195 basis points. This was in line with expectation as CRR is an implicit taxation on banks, which must be necessarily passed on to borrowers in order to maintain the desired level of profit. The net effect of prices, when either inflation rate or CPI was used was negative contrary to expectation.

The explanation could be that banks in Nigeria did not react to anticipated inflation but responded to actual inflation with a lag.

The average net impact on spread of 1 per cent increase in the level of economic activities (GDP) was negative 81.3 basis points, reflecting possible increased in competitive behavior by banks under the condition. The average net impact of financial deepening variable on spread was 41.3 basis points increase. MRR showed average of 145.6 basis points positive impact. This is expected of a nominal anchor (indicative) variable. The average net impact of the 3-month deposit rate appears to be a reduction of spread by 66 basis point. Risk premium came out the most important bank level factor that positively affect spread with average impact of 59.2 basis points. From a policy perspective and based on the estimated dynamic relationships, the most important factors to worry about are the cash reserve ratio, MRR, risk premium, financial deepening (ratio of M2 to GDP) and the level of bank financing of the economy. The bank level variables in general showed relatively weaker impact than the macroeconomic and monetary policy variables notwithstanding the direction of impact. Nevertheless, the variables to watch include non-risk premium, interest expenses of banks, liquidity risk (loan to deposit ratio) and deposit insurance premium.

Table 7
Average net impact (basis points) of a one per cent change in selected Xs on ex- ante spread 1/

Independent Variable	Average Impact (Basis Points)
CRR	195.9
MRR	145.6
RISK PREMIUM	59.2
FINANCIAL DEEPENING	41.3
BANK FINANCING (MONINESS)	23.3
NON-INTEREST EXPENSES	19.2
LOAN TO DEPOSIT RATIO	12.0
MARKET SHARE	11.7
DEPOSIT INSURANCE PREMIUM	5.9
CAPITAL ASSET RATIO	5.0
ASSET LOAN QUALITY (BAD LOANS TO TOTAL ASSET	1.9
TBILL RATE	-129.1
GDP	-97.5
INFLATION (CPI)	-39.0 -81.3
3-MONTH DEPRATE	-66.2
NON-INTEREST INCOME	-21.2
TOTAL ASSETS	-13.3
LOAN TOTAL ASSET	-11.6
NET INTEREST MARGIN	-6.1
SAVINGS DEPOSIT	-4.6
PROFITABILITY (ROA)	-2.2

Source: Computed from estimated coefficients
1/ See appendix 1 for the basis of the calculations

VI.3 Summary of major findings

The regression results and the impact analysis in table 7 have provided evidence on the determinants of commercial banks interest rate spread in Nigeria. From the results and analysis, it was evident that cash reserve requirement, MRR, risk premium, money to GDP ratio, “moniness” of the economy, non-interest expenses, market share and deposit insurance premium were the most significant factors that have positive impact on spread (at 1 per cent level of significance) in Nigeria. On the other side of the coin, Treasury bill rate, GDP, inflation, 3-month deposit rate, fee income, size of assets and loan to asset ratio turned out to be the important variables that has negative impact on spread in Nigeria. Although price variable was

statistically significant at 1 per cent level in all the models that included it, the sign on its coefficients was contrary to prediction. The negative sign showed that banks might not be reacting to inflationary expectation, and could be adjusting lending rates to actual inflation with a lag. The result confirmed the finding in Abreu and Mendes possibly for the same reason above. The money supply to GDP variable was positively signed with all its coefficients statistically significant at 1 per cent level, and could be indicative of monetary policy tightening that is transmitted through interest rate. The result, in addition to the reason of monetary policy responses could also point to preponderance of liquidity, which could lead to actual inflation to which banks would respond in the next period. Bank financing of the economy had the expected sign with positive average net impact of 23.3 basis points.

Generally, the explanatory power of the independent variables in the estimated dynamic spread equations 10 - 24 were very high with adjusted R^2 ranging between 92.3% and 99.9%, indicating that the included variables almost explained all the changes in interest rate spread in commercial banks in Nigeria. Similarly, the F-statistics of the spread equations were quite high, ranging from 142.0 - 30198.3, all with p-value of 0.000000, indicating that the estimated coefficients, jointly, were significantly different from zero. The standard errors of the regressions were very low.

VI.4 Recommendations

Notwithstanding the shortcomings of the study, the above findings have provided empirical evidence on the major factors that impact on commercial banks' rate spread in Nigeria. The following recommendations, which may be useful to the Nigerian economy issue from the findings:

It is suggested that the monetary authorities should reduce the cash reserve ratio, which according to the preceding analysis had been found to have significant positive impact on spread. Similarly, MRR, which impacts positively on spread should be reviewed downward and efforts made to sustain it at moderate level, especially in line with the two-year medium term monetary programming adopted by the CBN. As a complementary policy, and in order to mitigate inflationary pressures that may attend such downward reviews, the frequency of the open market operations (OMO) should be increased to check liquidity on a sustainable basis. Furthermore, government should pursue fiscal prudence as the problem of excess liquidity often compels the monetary authorities to increase the 'reserve tax' and or tighten monetary policy through upward reviews of the MRR.

In order for the above measures to have the desired effects, Government and the Monetary Authority should vigorously pursue anti-inflationary measures, as inflation was observed to increase spread though with a lag. Government and the Monetary Authorities, and the National Assembly should work out modalities for sterilizing part of foreign earnings to stem the growth of GDP ratio, which had been found to have positive impact on spread.

It is also necessary that banks should exercise highest standard of professionalism in their operations to reduce the incidence of high overheads, which tends to increase ex-ante interest rate spread.

Furthermore, it is suggested that commercial banks should gear their efforts towards mobilizing cheaper funds with a view to increase the availability of loan funds. This will increase supply and dampen the price of credit, reduce interest rate spread and ultimately the economy will be better for it.

This study recognized the differences in banks' financial year but had ignored it for simplicity. The non-uniformity in the reporting of banks' annual accounts also posed a problem during the research. It is recommended that the financial year of banks should correspond to fiscal year to enhance more meaningful and uniform assessment of policy impact on banks operations.

In a similar vein, the new emphasis on financial statement reporting across the world is transparency, which is secured through full disclosure by providing fair and comprehensive presentation of information necessary for making meaningful economic decisions to a wide range of users. In this regard, it is suggested that the regulatory authority could require banks to adopt the internationally accepted accounting standards (IAS) 1989 framework for preparation and presentation of financial statements, especially the IAS 30, for the reasons given above.

VI.5 Conclusion

The preceding empirical analysis has provided some evidence on the determinants of commercial banks interest rate spread in Nigeria. The study provided evidence for only the ex-ante measure of interest spread. This is because it is contractual (quoted) deposit and lending rates that affect expectations, transaction, responds to economic activities and policy changes, and govern loan contractual agreements. The study confirmed some of the earlier findings on the subject.

The estimation results showed that policy actions to narrow interest rate spread bear more on macroeconomic and monetary policy than bank level factors. Banks in Nigeria as in other places use interest rate spread to cover the cost of operating expenses and pass the burdens of implicit

financial taxation (CRR) and insurance premium to consumers of credit. In addition, banks use interest rate risk premium to cover losses from bad credit. Furthermore, some of the outcomes depicted in particular, the inefficiencies in financial intermediation and the Nigerian financial market in general. Finally, it should be noted that the scope of this work is limited as only data from thirteen banks were used in the analysis. Because of the small sample, the result should be interpreted with caution.

Appendix I

Notes on the computation of Impact on the dependent variable when the Xs change by certain unit

1. When both the dependent and independent variables are untransformed, estimated coefficient represent the change in the dependent variables expected when the independent variable changes by a unit holding other variables constant.
2. Note that if $\text{Log}_{10} X = y$, then $10^y = X$, and $\log_e X = y$, then $e^y = x$
 To increase X by 10% means $X(1+10/100)$
 $\text{Log}_{10} X + 1 = 10(X)$ i.e., the number whose log increased by 1 is equal to 10 times that number, and $\log_e X + 1 = e(x)$
 Thus, $\log X$ is increased by 1 then 10 have multiplied X.
3. For $Y = b \log X$ (unlogged dependent and logged dependent variable)
 In this case, b is the absolute change in Y expected when X is multiplied by 10. Change in Y as a result of x per cent increase in X is $\text{Log}_{10} (100+x)/100$
 Thus, a 1 per cent increase in X will result in $\text{Log}_{10} (100+1)/100) * b$
 Percentage points or $\text{Ln}((100+1)/100) * b$ depending on the base
4. For $\log y = b X$ (logged dependent and unlogged independent variable)
 In this case, every unit change in X multiplies Y by 10^b
 The percentage change in Y as result of 1 per cent change in X is $(10^b - 1) * 100$. or $(e^b - 1) * 100$, depending on the base.
5. For $\log y = b \log X$ (logged dependent and logged independent variable)
 In this case, every unit change in X multiplies Y by 10^b
 The percentage change in Y as a result of x per cent change in X is 10^{ab} where $a = (10 + x)/100$
 $(10^{(10+x)/100 * b} - 1) * 100$ or $(e^{b(\ln(10+x)/100)} - 1) * 100$

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