THE INFLUENCE OF INTEREST RATE RISK ON THE PERFORMANCE OF DEPOSIT MONEY BANKS IN NIGERIA

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Abstract

Banks perceive interest rate as either the price of deposits on one hand and cost of borrowing on the other hand. It performs a major function of rationing limited available financial resources (credit) among numerous competing demands. This study makes inquiry into the influence of interest rate risk on the performance of DMBs in Nigeria between 2002 and 2011, using a sample consisting of 6 tier 1 capital banks. The regression model specifies return on assets to measure bank performance as a function of interest rate risk indexed with loans to asset ratio, average lending ratio, and risk of interest diversity. Employing fixed effect regression method, each measure of interest rate risk is found to have insignificant effect on bank performance. It is also found that interest rate risk weakly determines changes in return on assets; hence, it does not possess significant influence on bank performance.

Keywords: Interest Rate Risk, Performance, Deposit Money Banks, Return on Assets, Fixed Effect Regression, Nigeria

INTRODUCTION

The role of interest rate in the bank is prominent as it influences the extent to which deposits are mobilised and credits are allocated. Interest rate is a major determinant of the consumption level and the level of investment in a country which consequentially affects economic growth. Banks perceive interest rate as either the price of deposits on one hand and cost of borrowing on the

other hand. It performs a major function of rationing limited available financial resources (credit) among numerous competing demands. The structure, direction and magnitude of changes in interest rate are relevant for healthy performance of banks because of the incidence of interest rate risk. Interest rate risk is closely associated with the assets and liabilities of banks.

In a bid to match the maturities of assets and liabilities, banks are likely to be exposed to interest rate risk. Entrop, Memmel, Wilkens and Zeisler (2008) define interest rate risk as the exposure of bank's financial condition to adverse movements in interest rates. A key source of interest rate risk resulted from a common characteristic of banks in that they borrow short and lend long, leading to the maturity mismatch or re-pricing mismatch (Zainol & Kassim, 2010). The risk is capable of causing change in the cash inflows and outflows of a bank as well as the economic value of bank's assets and liabilities.

The sensitivity of a bank's economic value to fluctuation in interest rates is a particularly important consideration of shareholders, management and supervisors alike (Basel Committee on Banking Supervision, 2001). This is due to the fact that variations in interest rate are a major threat to the financial stability of a bank. A historical example of a banking crisis where interest rate risk played an integral role is the 'Savings and Loan Crisis' which occurred in the US during the 1990s and the total cost of the crisis was estimated at $160billion (Entrop, Memmel, Wilkens & Zeisler, 2008). Hence, a sound interest rate risk management practice is essential.

Interest rate risk management aims at maintaining interest rate risk exposure at its bearest minimum. The traditional approach to interest rate risk management and valuation developed and often used by actuaries assumes a single interest rate (Ang & Sherris, 1997). A modern approach is the establishment of asset/liability management committee (ALCO). ALCO is concerned with the protection of both income and capital from interest rate risk by avoiding asset-liability mismatch. The effectiveness of a bank's interest rate risk management is crucial in enhancing bank performance and stability.

Interest rate risk is one of the main risks that banks encounter and which poses a lot of challenges. In this vein, banks strategise to reduce the exposure level to interest rate risk. However, due to frequent mismatch of assets and liabilities in deposit money banks (DMBs) in Nigeria, it is very unlikely that the banks would hedge interest rate risk. A common case is the habitual nature of the banks to finance loans and advances of long-term nature with demand deposits, implying that short-term liabilities are matched with long-term assets. This further heightens the exposure to interest rate risk.

This paper aims to examine how interest rate risk influences performance of DMBs in Nigeria for the period between 2002 and 2011. The study is motivated on the grounds that interest rate risk is associated with the credit facilities which accounts for a lion share of bank's

profitability. The empirical findings will help Nigerian banks to identify the effect of interest rate risk and gear up bank management to monitor and control the risk in a timely and comprehensive manner. Presently, 21 DMBs exist in Nigeria. However, six banks were chosen for this study. The banks are United Bank for Africa Plc., First Bank of Nigeria Plc., Guaranty Trust Bank Plc., Zenith Bank Plc., Access Bank Plc., and Ecobank Plc. Their selection is based on the fact that these banks made the top 1000 global banks according to the 2014 edition of The Banker published annually by the Financial Times Group of London and their ranking was based on the Tier 1 capital held by the banks. Tier 1 capital is the main measure of the financial strength of a bank from the perspective of a regulator and it is the best form of capital to support all the risks banks take.

The rest of this paper is organised as follows: section two focuses on literature review, section three discusses the methodology, section four presents the findings and section five concludes the research.

LITERATURE REVIEW

Interest rate risk is adjudged to be one of the major causes of bank failure. The Basel Committee on Banking Supervision (2004) suggests that interest rate risk is a normal part of banking and an important source of profitability but emphasized the need that interest rate must be maintained within prudent levels. Interest rate risk is the potential for changes in interest rate to reduce bank's earnings and net worth. Interest rate risk of a bank is given by the maximum absolute decline of its economic value caused by an upward and downward 200 basis point parallel interest rate shock in relation to its regulatory capital (Entrop, Memmel, Wilkens&Zeisler, 2008). Oesterreichische Nationalbank (OeNB) defines interest rate risk or exposure in its "Guidelines on Managing Interest Rate Risk in Banking Book" published in 2008 as the risk of reduction in a projected or anticipated measure of net interest income (target measure) resulting from changes in market interest rates. Bank that is exposed to significant interest rate risk is challenged with the inability to exploit new business opportunities due to the decline in the economic value of its assets. A bank is exposed to interest rate risk when it experiences a situation of imbalance in terms of size or maturity dates between assets and liabilities sensitive to interest rates, leading to potential losses for the bank when interest rate increases or declines and this influences the net asset value in the budget, which some call risk (Cicea & Hincu, 2009).

Interest rate risk manifests from different sources. According to the Basel Committee on Banking Supervision (2004), these sources include Repricing risk, Yield curve risk, Basis risk and Optionality.

i. Repricing risk: This is the common source of interest rate risk which banks are exposed to. It arises from differences between the timing of interest rate changes and timing of cash flows. The risk exposes a bank's income and the economic value of its assets and liabilities to unexpected fluctuations as interest rates changes.

ii. Yield curve risk: It arises from changing rate relationships across the spectrum of maturities of assets and liabilities. Repricing mismatches is a major cause of bank exposure to changes in the slope and shape of the yield curve.

iii. Basis risk: It emanates when there are interest rate changes which give rise to unanticipated variations in the cash flows, earnings spread and off-balance-sheet (OBS) instruments of similar maturities.

iv. Optionality: This otherwise called option risk is a prominent source of interest rate risk arising from the options incorporated in many banks' assets, liabilities and OBS portfolios. Option risk is the most difficult to measure and control.

Bank's interest rate risk exposure can be accessed from two main perspectives. These perspectives according to the Basel Committee on Banking Supervision (2004) are the earnings perspective and economic perspective. Earnings Perspective: This perspective considers how movements in interest rate will affect a bank's reported earnings. It is an orthodox method to interest rate risk assessment. The assessment of risk from this perspective may not be adequate if a bank has significant positions that are not short-term in nature. Economic Perspective: This perspective sufficiently addresses the limitation of the earning perspective because it identifies risk arising from long-term maturity gap. The economic perspective create a means to measure the underlying economic value of a bank and evaluate how that value is affected by changes in interest rate.

Interest rate risk has the potential to have an adverse effect on banks; therefore, they put in place an interest rate risk management system. Interest rate risk management (IRRM) is of crucial importance to the economic and financial health of a bank as it seeks to keep interest rate risk at a minimum level. It involves timely identification, measurement, monitoring and control of interest rate exposure. Interest rate risk management in the traditional deterministic approach aims at managing variations in asset and liability values on the assumption that interest rates undergo small deterministic changes (Ang & Sherris, 1997).

IRRM policies should be consistent with the growing complexity in the banking business. The Basel Committee on Banking supervision (2004) states that a sound IRRM involves the application of four basic elements in the management of assets, liabilities and OBS instruments. These include:

- Appropriate board and senior management oversight;
- Adequate risk management policies and procedures;
- Appropriate risk measurement, monitoring and control functions; and
- Comprehensive internal controls and independent audit.

Review of Related Empirical Studies

Patnaik and Shah (2004) assessed the impact of interest rate risk on a sample of Indian banks in March 2002. They found evidence of substantial exposure to interest rates. A striking feature of their results is the heterogeneity seen across banks. Banks holding similar portfolios of government securities seem to have rather different interest rate risk exposures. Memmel (2010) investigated the banks' exposure to interest rate risk as well as their earnings from term transformation using a data set of German banks. The findings from the empirical study showed that for the sample period September 2005 to December 2009, the systematic factor for the exposure to interest rate risk rises and falls in synchronization with the shape of term structure. At bank level, the time variation of exposure is largely determined by idiosyncratic effects (83%). In the period 2005-2009, the earnings from term transformation was estimated at 26.3 basis points in relation to total assets for the median banks, this accounted for roughly 12.3% of the interest margin. For savings and cooperative banks, changes in earnings from term transformation over time have a large impact on interest margin.

Peng, Lai, Leung and Shu (2003) evaluated how an increase in interest rates affects bank profits. They decomposed changes in Hong Kong dollar interest rates into movements in the US interest rate and the spread over the US rate. Empirical estimates on data from 1992 to 2002 showed that the net interest margin declined in response to increase in the risk premium because deposit rate were more sensitive to changes in the risk premium than the lending rate. Also, the study found that a change in the domestic interest rate along with the US interest rate had little impact on the margin in the period under study. Entrop, Memmel, Wilkens and Zeisler (2008) conducted a thorough analysis of interest risk of German banks on an individual bank level. They developed a new method that is based on time series of accounting-based to quantify the interest rate risk of banks and applied it to analyse the German banking system. The model employed provide evidence of a significant better fit of banks' internally quantified interest rate risk than a standard approach that relies on one-point-in-time data, and interest rate risk differs between banks of different size and banking group. They also discovered structural differences between trading book and non-trading book institutions.

Zainol and Kassim (2010) analysed the dynamic effects of interest rate changes on the rate of return of Islamic banks and amount of deposits in the conventional and Islamic banks in

Malaysia. Using data covering the period from January 1997 to October 2008, the study revealed that Islamic banks' rate of return and conventional banks' interest rate have a long-run equilibrium and bi-directional causality exists between them. Also, Islamic banks' rate of return and deposits respond significantly to changes in the conventional interest rates. This implies that when the conventional banks interest rate increases, the Islamic bank depositors will transfer their funds from the Islamic banks to conventional banks. Kalluci (2011) appraised the Albanian banking system in a risk-performance framework. Using quarterly time series of the risk index calculated over the period December 2001 to June 2009, the index exhibited high values over the period under review, largely supported by the high returns on assets and a well-capitalised banking system, as well as by low return on assets (ROA) volatility. Another major finding was that in 2008, net interest margin fell as a result of the increase in the cost of borrowed funds and earning assets financed by paying liabilities.

Zagonov, Keswani and Marsh (2009) conducted a study to show how banks regulate their interest rate profile. They found that majority of the banks in the sample are negatively affected by adverse interest rate movements, implying that the managers fail to adopt comprehensive hedging strategies. They also observed that greater levels of economic freedom, better governance, efficiency of the legal system, and higher quality of government supervision are all associated with lower bank exposure to interest rate risk. How, Karim and Verhoeven (2005) examined the exposure of Malaysian banks offering Islamic financing to credit, interest rate and liquidity risks. Analysing data on a sample of 23 banks from 1988 to 1996, their findings show that the banks providing Islamic financing facilities have significantly lower credit and liquidity risks and exposed to significant higher interest rate risk than banks that do not offer Islamic financing facilities.

Bacha (2004) analysed the extent of potential interest rate risk exposure for Malaysian Islamic banks using monthly data from January 1994 to July 2003. Employing Pearson Correlation, Ordinary Least Square regression analysis and Granger Causality test, it could be inferred that changes in conventional banks interest rates and total deposits granger cause changes in Islamic banks rate of return and total deposits respectively. This implies that the Islamic banks are exposed to interest rate risk due to their operation within a dual banking system.

METHODOLOGY

This study examines the effect of interest rate risk on the performance of Nigerian Deposit Money Banks (DMBs). The period under review spans from 2002 to 2011 and six banks were drawn into a sample based on their global ratings and Tier 1 capital which places them as the

top 6 banks in Nigeria in 2014. The banks are United Bank for Africa Plc., First Bank of Nigeria Plc., Guaranty Trust Bank Plc., Zenith Bank Plc., Access Bank Plc., and Ecobank Plc. An ex-post facto research design is employed and the secondary data needed are sourced from the annual statements of accounts and reports of the respective banks. The estimation is done using the fixed effects regression model.

Model Specification

The model used for this study is adopted from Zagonov, Keswani and Marsh (2009) in which Return on Equity (ROE) proxy for bank performance as a function of loans to asset ratio (LTAR), average lending ratio (ALR) and risk of interest diversity (ROID), all representing indices to measure interest rate risk. However, Return on Assets (ROA) is incorporated into the model because it is preferred as a better measure of bank performance to ROE while the interest rate risk measures remain unchanged.

The functional relationship of the model is given as;

ROA= f (LTAR, ALR, ROID)

The econometric equation for the model is specified as;

$$ROA = \alpha_0 + \alpha_1 \, LTAR + \alpha_2 \, ALR + \alpha_3 \, ROID + \mu$$

α_0= Intercept value

α_1 - α_3 = Coefficients of parameters in the model

μ= error term

The variables in the model are financial ratios and can be calculated as:

$$ROA = \frac{Profit\ after\ Tax}{Total\ Assets}$$

$$LTAR = \frac{Net\ Loans}{Total\ Assets}$$

$$ALR = \frac{Interest\ Income}{Total\ Earning\ Assets}$$

$$ROID = 1 - \frac{(Net\ Interest\ Income - Non-Interest\ Income)}{Total\ Operating\ Income}$$

A priori expectation

The expected results from this study is depicted as α_1, $\alpha_2 > 0$ and $\alpha_3 >< 0$. This denotes that it is expected that bank performance (ROA) is directly or positively related to LTAR and ALR while there is a possibility of a negative or positive relationship between ROID and bank performance.

ANALYSIS & FINDINGS

The fixed effect regression allows for heterogeneity among banks by permitting each bank to have its individual intercept value. The intercept value indicates the reaction of a bank when the measures of interest rate risk are left unchanged or held constant. This intercept is time-invariant. The findings from the fixed effect regression are presented in Table 1. It must be noted that the statistical significance of each measure and the model is determined at 5% significance level when its probability value (p-value) falls below or equals 0.05.

Table 1: Fixed Effect Result

Variable	Coefficient	p-value
C	0.021184	0.0000*
LTAR	-0.011378	0.1419
ALR	0.004041	0.7829
ROID	0.005535	0.1171
Fixed Effects (Cross)		
FIRSTBANK--C	0.002539	
UBA--C	-0.011021	
ACCESS--C	-0.004962	
GTB--C	0.012928	
ZENITH--C	0.001578	
ECOBANK--C	-0.001558	
R^2 = 0.454397 F-statistic = 5.205210		
p-value = 0.000093*		

denotes statistical significance

From table showing the fixed effect result, it can be seen that intercept value is 0.021184 with p-value of 0.0000; thus, implying that when the interest rate risk measures are held constant, ROA increase by 2.1184% ≈ 2.12% and statistically significant because its p-value < 0.05.The coefficient of LTAR, ALR and ROID are -0.011378, 0.004041 and 0.005535 respectively.ROA is negatively related to LTAR and positively related to ALR and ROID. They all agree with their respective 'a priori' expectation except LTAR. LTAR increases by a percent, ROA decreases by 1.1378% ≈ 1.12% while a percentage increase in ALR and ROID causes ROA to rise by 0.4041% ≈ 0.40% and 0.5535% ≈ 0.55% respectively. The p-value of each of the interest rate risk measure > 0.05; thus, indicating none exerts statistical significance on ROA at 5% significance level.

The intercept of each bank reflects how the bank is affected when these measures are fixed. The intercept of FIRSTBANK, UBA, ACCESS, GTB, ZENITH and ECOBANK as indicated in Table 4.1 are 0.002539, -0.011021, -0.004962, 0.012928, 0.001578 and -0.001558

respectively. ROA of FIRSTBANK, GTB and ZENITH increases by 0.25%, 1.29% and 0.16% respectively when interest risk measures are held constant while ROA of UBA, ACCESS and ECOBANK decreases by 1.10%, 0.496% and 0.16% respectively.

The coefficient of multiple determination (R^2) is $0.454397 \approx 0.45$. This indicates that 45% of variation in ROA is accounted for by changes in the measures of interest rate risk while the remaining 55% is explained by factors not specified in the model. The F-statistic has p-value of 0.000093 which shows that the model is statistically significant at 5% significance level since p-value < 0.05.

CONCLUSION

Interest rate risk is a major financial risk capable of influencing bank performance. Banks handle assets and liabilities and mismatching of assets and liabilities peculiar among Nigerian banks expose them to interest rate risk. As result, this study examined the influence interest rate risk has on DMBs in Nigeria, taking the case of 6 Tier 1 capital banks. Individually, each measure of interest rate risk had no statistically significant effect on return on assets; thus, all are not determining cause of bank performance. The R^2 value of 0.45 is weak; thus, affirming that interest rate risk does not have substantial effect on bank performance. On the basis of the aforementioned, it is concluded that interest rate risk wields no significant influence on the performance of DMBs in Nigeria. The limitations of the current study are that it was restricted to banks having Tier 1 capital and it used only three measures of interest rate risk; hence, further studies should consider Tier 2 capital banks and incorporate more measures of interest rate risk in their empirical model.

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