

## Dynamic of Risk Management and Intermediate Functions of Commercial Banks: The Supply Side Evidence from Nigeria



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**ABSTRACT:** This study investigated the relationship between risk management and financial intermediation of quoted commercial banks in Nigeria. Panel data were sourced from the Nigeria Stock Exchange for a period that spans 2009 to 2018. Financial intermediation was measured domestic credit of the commercial banks. Domestic credit was modelled as the function of Risk diversification, Basel compliance, risk transfer, credit securitization and risk retention and risk evaluation. Multiple regressions were formulated to ascertain the relationship between risk management and capital investment decision of commercial banks. Panel Unit root test was utilised to establish the stationarity of the data. Panel cointegration, and granger causality test analyse the data. The panel unit root test proved presence of unit root at first difference and concluded that the variables were integrated in the order of 1(I). The study found that, there is a significant relationship between risk management and domestic credit decision, of the quoted commercial banks. The panel cointegrations show the presence of long run relationship between the endogenous variables and the exogenous variables while the granger causality test found uni-directional causality among the variables. From the findings, the study concludes that risk management have significant relationship with domestic credit decisions of the commercial banks. The study recommends that to mitigate the riskiness of banking operations, more avenues for risk diversification should be explored. Although Basel compliance enhances domestic credit decision, its implementation should be done cautiously and in consideration of the intricacies and peculiarities of the Nigerian banking space, as it impinges on most domestic credit decisions.

**KEYWORDS:** Risk Management, Intermediate Functions, Commercial Banks, Supply Side, Nigeria

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### INTRODUCTION

Bank is the transmission mechanism for the implementation and the realization of government monetary and macroeconomic goals. The function of banks includes money supply transmission, credit allocation, efficient payment system and general intermediation in the economy. Banks intermediate between the deficit and the surplus economic units and bridge the savings-investment gap and restore financial equilibrium that facilitates the realization of the set goals. This can be achieved effectively and efficiently in a well-functioning and structured banking sector with effective credit risk management strategy. Banking lending operation is characterized with risk that endangers the intermediate functions of commercial banks.

The financial intermediation theory suggests that banks play two important roles in the economy; namely, liquidity creation and risk management. Banking system liquidity measures the ability of banks, especially the deposit money banks, to meet their funding requirements without disrupting their main operations. The important role banks play through liquidity creation impacts on the larger economy by stimulating growth in the real economic variables. Banks create liquidity on the balance sheet by financing assets that are less liquid using funds from relatively liquid liabilities (Ndukwe, 2013). When banks are liquid, their fund inflows would exceed their fund outflows.

Banks' credit function defines they intend to be fully funded at the minimum cost consistent with its risk appetite. Such a strategy must balance cost efficiency and stability. The process of bank lending is fraught with credit risk that gave birth to non-performing loans. Prudential Guideline for Licensed Bank issued in 1991 defined non-performing loans as credit facilities in which the principal sum and the interest payment had not been paid for 90 days after their due date or has been rescheduled or interest rate has been recapitalized and row over into a new loan (Onoh, 2002).

Credit risk management has been an integral part of the loan process in banking business. Credit risk in the current and prospective risk to earning or capital arising from an obligor's failure to meet the terms of any contract with the bank or otherwise to perform

## **Dynamic of Risk Management and Intermediate Functions of Commercial Banks: The Supply Side Evidence from Nigeria**

as agreed Kargi (2011). The process of bank credit, the principal function of commercial banks is fraught with risk due to uncertainty in the banks business environment. Okereke (2003) posited that the banking business is characterized with judicial risk, compliance risk, reputational risk and professional risks.

Ezirim and Emeyonni (1998) posited that decreasing rate of loans is caused by the banks poor credit management policies. While some banks are conservative in lending, others are aggressive in its lending functions, this expose the bank to credit risk that result to non-performing loans. For instance the inability of credit officers to monitor, appraise and collect back the loans with interest, couple with macroeconomic challenges after the deregulation of the economy in 1986 lead to huge non-performing loans in the banking system that caused the banking crisis of the 1990s. Studies on credit risk management focused on profitability, this study focused on credit risk management and intermediate functions of commercial banks in Nigeria.

### **LITERATURE REVIEW**

#### **Risk Management**

Risk management is a systematic process of understanding, evaluating and addressing risks to maximize the chances of objectives being achieved and ensuring organizations, individuals and communities are sustainable. It also enables the organization to be aware of new possibilities. In effect, risk management requires an informed understanding of relevant risks, an assessment of their relative priority and a rigorous approach to monitoring and controlling them. It is indeed the practice of identifying potential risks in advance, analyzing them and taking precautionary steps to reduce or curb the risk. In finance and business term, when an organization makes an investment decision, it exposes itself to a number of financial risks. The quantum of such risks depends on the type of financial instrument. The financial risks might be in form of high inflation, volatility in capital markets, recession and bankruptcy and so on. In order to minimize and control the exposure of investment to such risks, bank managers and investors resort to the practice of risk management. Tsevisani (2007) holds the view that the interaction between human factors and tangible aspects of risk highlights the need to focus closely on human factors as one of the main drivers for risk management: a change driver that comes first from the need to know how humans perform in changing environments and in the face of risks.

#### **Risk Diversification**

Diversification is a portfolio strategy designed to cut back risk by combining various investments. Diversification gain from shifting into non-interest income in bank's revenue and reduced volatility of bank profit (Stiroh, 2004). In investment planning and finance, diversification improved cost influence through lower risk from diversification if it occurred; it lowered the needed risk premiums on un-insured debt (Moon, 1996). Income supply diversification refers to banks shifting their financial gain sources into non-intercession financial gain generating activities as opposed to the normal inter-mediation financial gain generating activities.

Banks have shifted their sales mix by diversifying in financial gain sources. There are two main sources of financial gain; interest financial gain and non-interest income. Non-interest income elements embrace fees and commissions on loans and advances, other fees and commissions, buying shares trading financial gain, dividend financial gain and different non-interest income. Non-interest financial gain increase bank franchise price and banks with higher non-interest income have higher market betas (Baele et al, 2007). The Nigeria industry is steady shifting off from ancient sources of revenue like Loan-making and toward untraditional activities that generate fee financial gain, service charges, commercialism revenue, and different kinds of non interest financial gain whereas non interest financial gain has perpetually contend a very important role in banking revenue, by 2001, non interest financial gain accounted for forty third of web operational revenue (net interest financial gain and non-interest income), up from solely twenty fifth in 1984. This shift toward non interest financial gain has contributed to higher levels of bank revenue in recent years, however there's conjointly a way that it will lower the volatility of bank profit and revenue, and cut back risk (Baele et al, 2007).

#### **Basel Compliance**

The Basel Accord is international principles and regulations guiding the operations of banks to ensure soundness and stability. The Accord was introduced in 1988 in Switzerland. Compliance with the Accord means being able to identify, generate, track and report on risk-related data in an integrated manner, with full audit ability and transparency and creates the opportunity to improve the risk management processes of banks. The New Basel Capital Accord places explicitly the onus on banks to adopt sound internal credit risk management practices to assess their capital adequacy requirements (Chen and Pan, 2012).

In order to improve the flexibility of banks against the financial crisis in the global banking system, the Committee on Banking Regulations and Supervisory Practices later named as Basel Committee on Banking Supervision (BCBS) was formulated by the central bank governors of the G10 countries (Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, Switzerland,

## **Dynamic of Risk Management and Intermediate Functions of Commercial Banks: The Supply Side Evidence from Nigeria**

the United Kingdom and the United States) after the breakdown of Bankhaus Herstatt in West Germany and Franklin National Bank in the United States in 1974 (Basel Committee, 2013). The Basel Committee has established an internationally accepted set of principles to cope with the various risks, officially known as the Basel Accords (Basel I, Basel II and Basel III). Initially, the Basel Accords were mainly designed for the G10 Countries. However, these guidelines have been planned in such a way that they might be applicable in the developed countries as well as the developing countries (Al-Tamimi, 2008). According to these principles, banks are required to maintain a prescribed level of capital against the operational and other financial risks. Van Rixtel, Alexopoulou and Harada (2004) propose that the implementation of the Basel Accords might have offered a positive impact on the risk management and amplify the financial solidity by providing risk-sensitive methodologies.

### **Credit Securitization**

It is the transfer of credit risk to a factor or insurance firm and this relieves the bank from monitoring the borrower and fear of the hazardous effect of classified assets. This approach insures the lending activity of banks. The growing popularity of credit risk securitization can be put down to the fact that banks typically use the instrument of securitization to diversify concentrated credit risk exposures and to explore an alternative source of funding by realizing regulatory arbitrage and liquidity improvements when selling securitization transactions (Michalak & Uhde, 2009). A cash collateralized loan obligation is a form of securitization in which assets (bank loans) are removed from a bank's financial statement and packaged (trenched) into marketable securities that are sold on to investors via a special purpose vehicle (SPV) (Marsh, 2008).

### **Risk Retention**

Involves accepting the loss, or benefit of gain, from a risk when it occurs. True self-insurance falls in this category. Risk retention is a viable strategy for small risks where the cost of insuring against the risk would be greater over time than the total losses sustained. All risks that are not avoided or transferred are retained by default. This includes risks that are so large or catastrophic that they either cannot be insured against or the premiums would be infeasible. War is an example since most property and risks are not insured against war, so the loss attributed by war is retained by the insured. Also any amounts of potential loss (risk) over the amount insured are retained risk. This may also be acceptable if the chance of a very large loss is small or if the cost to insure for greater coverage amounts is so great it would hinder the goals of the organization too much. Risk retention or acceptance is common type of risk response on treats and opportunities.

### **Financial Intermediation**

Financial intermediation relates to intermediate functions of financial institutions in mobilizing savings and allocating resources. The importance of financial institutions especially banks in generating growth within the economy has been widely discussed in literature (Nwaeze et al, 2014). Several economists have argued that the role of intermediation which banks play help in providing linkages for different sectors of the economy as well as encouraging high level of specialization, expertise, economies of scale and creating a conducive environment for the implementation of various economic policies of government.

Schumpeter (1912) as cited in Zakaria (2008) argued that financial intermediation through the banking system plays an essential role in economic development by affecting the allocation of savings, thereby improving productivity, technical change and the rate of economic growth. He acknowledged that efficient savings through identification and funding of entrepreneurs is vital to achieving desired objectives. Thus, one of the activities of financial institutions involves intermediating between the surplus and deficit sectors of the economy. The availability of credit function positively allows the fruition of this role and is also important for growth of the economy (Nwaeze et al, 2014).

### **Supply Side of Financial Intermediation**

The supply side of the financial intermediation function represents the financing function of a typical financial institution. Financing function, according to finance theory, is the function of the firm geared toward the sourcing and/or raising of funds from alternative sources in such a cost-effective and time-efficient manner as to enable the firm to achieve its objectives. Thus, four elements are cardinal in the financing function of firms: the alternative sources, the cost implications, time-efficiency, and objective criterion of the firm, e.g. maximization of owners' wealth. Efficiency in the conduct of financing function is attained when the business unit mobilizes funds from convenient sources that guarantee the attainment of cost effectiveness and time efficiency (Ezirim, 1996).

This function is known as the supply side of the institution's intermediation function. The culmination of the funds' mobilization effort of a typical depository institution is the total portfolio of the various types of deposits (alternative sources of funds) generated by the financial intermediary (Ezirim, 1999, 2003). Funds are mobilized by the help of institutional and non-institutional arrangements, instruments and facilities provided by the financial markets.

## **Dynamic of Risk Management and Intermediate Functions of Commercial Banks: The Supply Side Evidence from Nigeria**

The complex whole or congeries of the financial markets, institutions, and instruments in a given economy is known as the financial superstructure (Goldsmith, 1969; Odedokun, 1987). It is taken to mean the most important institutional divides such as commercial banks and other deposit money banks, and insurance companies that operate in the financial markets to assist in the creation of financial instruments. Banks for instance create financial instruments in their depository function. For the banks, the major types of deposits are the savings, time, and foreign currency deposits, and current account or demand deposits. These make up the total deposit portfolio of banks.

### **THEORETICAL REVIEW**

#### **Portfolio Theory**

Investing all the funds in single asset or single stock is risky. If the company is bankrupted, the whole investment becomes worthless. To minimize the risk, the investment should be made on more than one asset. Because if there is no return from one asset there is chance that investors may have returns from another asset. The portfolio theory explains that for the minimization of risk investors should include more than one asset in their portfolio. A portfolio is a set of investment opportunity.

The Modern Portfolio Theory (MPT) was put forward by Markowitz Harry (1952), based on the idea of portfolio optimization to maximize return based on a given level of market risk. It suggests that it is not sufficient to look at the only one stock's risk and return; rather, it is important to invest in portfolio of stocks causing an investor to reap the benefits of diversification due to a reduction in the riskiness of the portfolio. One of the basic assumptions in this revolved around the fact that investor seeks to fully maximize discounted expected returns and variance of returns is undesirable. Variance is a measure of dispersion from the expected. Expected returns can be measured by the yield of the asset while the variance of return is considered as a risk. The choice of portfolio is separated from beliefs using the expected return-variance of returns rule. Hence, the evaluation of this relationship is the basis of the choice made by investors, thus eliminating decisions made of beliefs. The efficient frontier can be defined as a combination of assets with maximum expected returns that is superior to any other combination and gives the highest level of returns at the lowest level of risk. Return on the portfolio is the weighted sum of expected return of the component assets the theory concludes that diversification provides a superior portfolio. It minimizes the variance with caution being placed on ensuring that the assets do not have a high covariance with each other. Weaknesses in the MPT emerge from the difficulty in estimating the correlation coefficient for two assets. It is even harder for multiple assets which require complex tools, thus it is not practical. In reality, unlimited range of possibilities of investments exists.

#### **Behavioural Finance Theory**

Theory of Behavioural finance is the study of how psychology influences the behaviour of investors and the eventual effect on the markets (Sewell, 2007). The behavioural finance theory arose in response to the difficulties faced by the traditional view of efficient markets. In essence, it argues that investment choices are not always made on the basis of full rationality and basically there does not exist any efficient market. De Long et al. (1990) developed a behavioural finance model that classified investors into rational and irrational investors. They argued that the rational investors are arbitrageurs and are free from sentiments while the irrational investors are prone to market sentiments. Both group of investors compete in the market and all together determine equity market prices. However, they point out that rational investors do in practice face limitations to trading. Among the limitations include: the cost of information, the cost of trading, limits to arbitrage and short selling restrictions. Short selling is defined as the selling of investment securities that are rented with the objective of buying them back at a reduced price.

#### **Investment Theory**

The simplest theory of investment demand is the rigid accelerator model formulated by Clark (1917). In its simplest form, the rigid accelerator theory of investment states that investment is proportional to the increase in output which is proxied by changes in demand in the coming period. Thus, the accelerator model relates investment to changes in demand and proposes that an increase in a firm's output will require a proportionate increase in its stock of capital. The theory basically assumes that firms desired capital-output ratio is roughly constant and net investment takes place when output is expected to increase. In effect, the theory implies that the level of output or the changes in aggregate demand determines investment or the change in capital stock. Mathematically, this proposition of the theory is expressed as  $K_t^* = \sigma Y_t$ , where  $\sigma$  is the desired capital-output ratio which is assumed to be constant,  $K_t^*$  is the desired capital stock in period  $t$ , and  $Y_t$  is the level of output in the same period.

Tobin (1958) expanded on Markowitz's work by adding a risk-free asset to the analysis. By so doing it was possible to leverage or deleverage portfolios on the efficient frontier; this lead to what is now known of a super-efficient portfolio and the capital market line. Through the leverage, all portfolios found with the region of the capital market line were able to outperform portfolio on the efficient frontier (Witt and Dobbins, 1979).

# Dynamic of Risk Management and Intermediate Functions of Commercial Banks: The Supply Side Evidence from Nigeria

## Empirical Review

Taiwo and Abayomi (2013) evaluated the impact of credit risk management on bank profitability of some selected DMBs in Nigeria. The result from Panel Least Square (PLS) estimate found that credit risk management has a significant impact on the profitability of Nigerian banks.

Poudel (2012) studied the factors affecting commercial banks performance in Nepal for the period of 2001-2012 and used a linear regression analysis technique. The study revealed a significant inverse relationship between commercial bank performance measured by ROA and credit risk measured by default rate and capital adequacy ratio. In this study, the a priori assumption is that credit risk (non-performing loans, loan loss provisions, loans and advances) has a negative impact on profitability. Additionally, other internal variables such as capital adequacy, bank size and age could affect the profitability (ROA and ROE) of a bank. The 2015 Credit Management and Bank Performance of Listed Banks in Nigeria revealed that ratio of non-performing loans and bad debt have a negative and insignificant effect on the performance of banks in Nigeria. While secured and unsecured loan ratio and bank's performance was not significant.

Saeed and Zahid (2016) studied the impact of credit risk on profitability of the commercial banks and the result showed that credit risk indicators had a positive association with profitability of the banks. Moreover, sound management of credit risk is a significant element of an all-inclusive method to risk management as a whole and vital to the future progress of any financial institution. Banks play a major role in the credit market because they assemble deposits from the various surplus units and make them available to the deficit unit for development activities. This implies that banks give out loan to borrowers from deposits made by the public with the objective of increasing their profitability. Now, since banks make huge profit through their role as financial intermediaries, it beholds on them to find pragmatic ways of managing credit risk and thereby guarding and enhancing their profitability.

Alalade, Binuyo and Oguntodu (2014) examined the impact of managing credit risk and profitability of banks in Lagos state. The research hypothesis was tested and analyzed in relation to credit risk and its significant effect on banks profitability. It was also the aim of this research to evaluate how effective it is for a bank to manage its credit risk effectively to enhance profitability. Data for the study was an obtained through the administering structured questionnaires, which was answered by respondents. Correlation coefficient was used to decide whether credit risk management has an impact on profitability. The results revealed that credit risk reduces the profit and therefore management of credit risk should be of great importance to management of bank in Lagos state.

Brown and Wang (2002) investigated the credit risk management in Interstate bank corporations. The sample of this study is from the first Interstate bank corporation. The result showed that hedging duration and credit spreads have considerable impact on risk management practices. Hedging option reduces credit risk. The study provided that credit risk management in the banking sector is very important because banks play an important role in the economy of the country. Barnhill et al., (2002) found that the credit risk factor is a key issue in case of financial stress. However, the organizations can overcome this issue by appropriate portfolio management techniques for getting economies of scale and better results in case returns.

Lehar (2005) concentrated on measuring systematic risk in Austria. Data was collected from a sample of the largest 149 international banks from 1988 until 2002. Systematic risk was measured by using correlation and regression analysis and found that the high systematic risks in the banking sector will result in high variations in the expected deficit. He used the stock market information and found the joint dynamics of the Bank's asset portfolio to a sample of international banks. Increases in equity, resulting in a significant decrease in systematic risk well capitalized banks further reduce equity not the systematic risk. The study extend this stream of literature on foreign exchange risk and operational risk along with credit risk pioneer by Al-Tamimi and Al-Mazrooei (2007) as they studied the banking risk by taking the sample of 17 banks of UAE and used a primary source of data through questionnaires and Pearson correlation and regression model. They investigated operational risk, credit risk and foreign risk that is faced by the United Arab Emirates commercial banks.

Thomas and Dimirovic (2007) who studied the credit risk management of the United Kingdom listed companies. The sample of this study was United Kingdom listed companies over the period from 1990 to 2002. To test the data Regression analysis was used and the result indicated that for measuring the credit risk important factor is the size of the firm and all other factors remain the same or no effect on the credit risk. In case of non-financial firms in Pakistan the derivatives are considered as proper risk management practices (Chaudhry et al., 2014a). The logical implications and mechanism in case of credit and operational risk are defined by Crook et al., (2007) concluded that for commercial banks risk management is of considerable importance because the financing of these institutions is associated with many of the other businesses and hence have a meaningful effect on business terms in any country.

## Dynamic of Risk Management and Intermediate Functions of Commercial Banks: The Supply Side Evidence from Nigeria

Yusaff and Ho (2009) studied credit risk management on selected domestic and foreign organizations in Malaysia. Data was collected from domestic and international firms. The sample size of this study was. The survey method was used for data collection. The study found that the reduction of non-systematic risk of loan services, employee career related training and risk reduction are important strategies for managing credit risk.

Khizer, et al. (2011) found the factors that affect the liquidity risk. The target population of this study was Islamic and conventional banks of Pakistan. Data were collected from a sample of 6 Islamic banks and 6 conventional banks from 2006 to 2009. To test the data Regression analysis was used. They found that bank size, net working capital ratio and ROA are positively correlated, whereas in both conventional and Islamic banks have insignificant relation with liquidity risk. ROE is negatively associated but insignificant in conventional banks and significant in Islamic banks. They analyzed that the conventional banks in Pakistan considered the long term financing projects.

### METHODOLOGY

This study adopted ex-facto research design to examine the effect of risk management on the domestic credit of quoted commercial banks in Nigeria. Given that the entirety of the population is actually used for the study, a census of 13 banks is used, thus there is no need for considering a sample. Secondary panel data were collected from the annual reports and various databases of the banks for financial statement for the period 2009 to 2018.

#### Method of Data Analysis

The method of data analysis to be used in this study was the panel data multiple linear regressions using Ordinary Least Square (OLS) method. This approach, which is a quantitative technique, includes tables and the test of the hypotheses formulated by using ordinary least square regression analysis at 5% level of significance. In order to undertake a statistical evaluation of our analytical model, so as to determine the reliability of the results obtained and the coefficient of correlation (r) of the regression, the coefficient of determination ( $r^2$ ), the student T-test and F-test will be employed.

**Coefficient of Determination ( $r^2$ ) Test** –This measures the explanatory power of the independent variables on the dependent variables. Implying that it is an expression of the variation the endogenous variable(s) exert on the exogenous variable. As a rule of thumb, the  $R^2$  should be at least 60% for the endogenous variables to possess appreciable and acceptable predictive power on the exogenous variable.

**F-Test:** This measures the overall significance of a given regression model. It presents the extent to which the aggregation of the endogenous variables (where a multiple regression model is used) influence or relate with the exogenous variable. Conventionally, its probability is used, where the decision criteria hinges on whether or not the probability or p-value is greater or less than the  $\alpha$  or significant level, which in this study is 0.05. Therefore, the null hypothesis is rejected where the p-value is less than 0.05, or not rejected where the p-value is greater than 0.05.

**Student T-test:** measures the individual statistical significance of the estimated independent variables at 5% level of significance.

**Durbin Watson Statistics:** This measures the colinearity and autocorrelation between the variables in the time series. The results range from 0 to 4, where 2 depicts a perfect absence of serial correlation. However, due to the near impossibility of obtaining a DW score of 2, values that are close enough (to 2) are permissible.

**Regression coefficient:** This measures the extent in which the predictor variables affect the dependent variables in the study.

**Probability Ratio:** It measures also the extent in which the predictor variables can explain change to the dependent variables given a percentage level of significant.

#### Model Specification

The study adopts the panel data method of data analyses, which involve the pooled effect, fixed effect, the random effect, likelihood test and the Hausman Test.

#### Pooled Effect Model

$$DC_{it} = f(\beta_1 RD + \beta_2 BC + \beta_3 TR + \beta_4 CS + \beta_5 RR + . + \beta_6 RE + . \varepsilon_{it} \quad (1)$$

#### Fixed Effect

The fixed effects strives to establish if differences will be observed by the application of a fixed or constant intercept value for the different variables that constitute cross-sectional structure.

The dummy variables are expressed as follows: if  $j = i$ , then  $Di = 1$ ; otherwise  $Di = 0$ .<sup>2</sup>

# Dynamic of Risk Management and Intermediate Functions of Commercial Banks: The Supply Side Evidence from Nigeria

Thus, we have:

$$DC_{it} = f(\beta_1 RD + \beta_2 BC + \beta_3 TR + \beta_4 CS + \beta_5 RR + \beta_6 RE + \varepsilon_{it}) \quad (2)$$

## Random Effects

Random effects focus on the relationship with the study sample as a whole; thus, the samples are randomly selected, as opposed to using the entire population. The total sample regression (a function of the random effect) can be expressed as:

$$DC_{it} = \sum_{j=1}^N \beta_0 + f(\beta_1 RD + \beta_2 BC + \beta_3 TR + \beta_4 CS + \beta_5 RR + \beta_6 RE + \varepsilon_{it}) \quad (3)$$

If this is represented with random variables, then  $\beta_{oj} = \bar{\beta}_0 + \mu_j$ , which indicates that the difference occurs randomly, and the expectation value of  $\beta_{oj}$  is  $\bar{\beta}_0$ .

Where

DC = Domestic Credit of the commercial banks

RD = Risk diversification proxy by value of sectoral credits

BC = Basel Compliance proxy by risk weight assets to total capital

TR = Risk transfer proxy by insurance in deposit insurance corporate

CS = Credit securitization proxy value of insured non-performing loans

RR = Risk retention proxy by value of nonperforming loans

RE = Risk Evaluation proxy dummy variable

## A-Priori Expectations of the Variables

$RD_{it} > 0 =$

$BC_{it} > 0 =$

$RR_{it} > 0 =$

$CS_{it} > 0 =$

$RE_{it} > 0 =$

$RT_{it} > 0 =$

This implies that we expect positive relationship between risk management and domestic credit of commercial banks.

**Table 1: Operational Measures of the Variables**

Variable	Notation	Measurement
Domestic Credit	DC	Log of total credit of the commercial banks
Risk diversification	RD	value of sectoral credits
Basel Compliance	BC	risk weight assets to total capital
Risk transfer	TR	insurance in deposit insurance corporate
Credit securitization	CS	value of insured non-performing loans
Risk retention	RR	value of nonperforming loans
Risk Evaluation	RE	dummy variable 1 and 0

Source: Authors Research Desk 2021

## Hausman Test

The Hausman test (1978) is the most commonly used method for evaluating fixed and random effects. Generally, autocorrelation of data violates the principal assumption of OLS, thus the Hausman test is used to decide the choice between fixed effect and random effect given the state of data as regards the assumption. The idea is that as a rule of thumb, the random effect estimate is used, unless the Hausman test rejects it, in which case the fixed effect estimate is used. However, a failure to reject implies either that the random effect or fixed effect estimates are insufficiently close as to making such choice immaterial.

# Dynamic of Risk Management and Intermediate Functions of Commercial Banks: The Supply Side Evidence from Nigeria

## RESULTS AND DISCUSSION

Table 1: Panel Unit Root

Method	Statistic	Prob.**	Cross-section	Obs	Remark	Statistic	Prob.**	Cross-section	Obs	Remark
<b>DID</b>	Panel Unit Root At Level				Panel Unit Root At 1 <sup>st</sup> difference					
										Stationary
Levin, Lin & Chu t*	-2.30993	0.0104	13	104	Stationary Not Stationary	-19.5510	0.0000	13	78	Stationary
Im, Pesaran and Shin W-stat	1.16325	0.8776	13	104	Not Stationary	-3.58773	0.0002	13	78	Stationary
ADF - Fisher Chi-square	17.7728	0.8839	13	104	Stationary	56.3171	0.0005	13	78	Stationary
PP - Fisher Chi-square	54.3685	0.0009	13	117		102.992	0.0000	13	91	Stationary
<b>CS</b>					Stationary					Stationary
Levin, Lin & Chu t*	5.57828	0.0000	13	104	Not Stationary	-3.81371	0.0001	13	91	Stationary
Im, Pesaran and Shin W-stat	1.47513	0.9299	13	104	not Stationary	-3.80032	0.0001	13	91	Stationary
ADF - Fisher Chi-square	23.5140	0.6037	13	104	Stationary	66.7930	0.0000	13	91	Stationary
PP - Fisher Chi-square	49.6009	0.0035	13	117		96.5662	0.0000	13	104	
<b>RE</b>					Not Stationary					Stationary
Levin, Lin & Chu t*	5.1E+16	1.0000	13	104	Stationary	8.06226	0.0000	13	91	Stationary
<b>RR</b>										Stationary
Levin, Lin & Chu t*	-5.62161	0.0000	13	104	Stationary	-11.4660	0.0000	13	91	Stationary
Im, Pesaran and Shin W-stat	-1.23695	0.1081	13	104	Not Stationary	-3.04063	0.0012	13	91	Stationary
ADF - Fisher Chi-square	41.9582	0.0248	13	104	Stationary	56.1211	0.0005	13	91	Stationary
PP - Fisher Chi-square	26.1525	0.4547	13	117	Not Stationary	66.9697	0.0000	13	104	
<b>TR</b>					Stationary					Stationary
Levin, Lin & Chu t*	-5.11504	0.0000	13	91	Not Stationary	-8.88220	0.0000	13	78	Stationary
Im, Pesaran and Shin W-stat	-0.85614	0.1960	13	91		-2.71095	0.0034	13	78	

## Dynamic of Risk Management and Intermediate Functions of Commercial Banks: The Supply Side Evidence from Nigeria

					Not Stationary				Stationary
ADF - Fisher Chi-square	37.2186	0.0714	13	91		53.4071	0.0012	13	78
					Stationary				Stationary
PP - Fisher Chi-square	74.0302	0.0000	13	104		137.465	0.0000	13	91
<b>BRD</b>					Not Stationary				Stationary
Levin, Lin & Chu t*	-1.12963	0.1293	13	104		-16.3128	0.0000	13	91
					Not Stationary				Stationary
Im, Pesaran and Shin W-stat	0.60320	0.7268	13	104		-4.49758	0.0000	13	91
					Not Stationary				Stationary
ADF - Fisher Chi-square	20.2254	0.7808	13	104		71.0321	0.0000	13	91
					Not Stationary				Stationary
PP - Fisher Chi-square	31.5601	0.2081	13	117		111.354	0.0000	13	104
<b>BC</b>					Stationary				Stationary
Levin, Lin & Chu t*	-5.51959	0.0000	13	104		-10.5227	0.0000	13	91
					Stationary				Stationary
Im, Pesaran and Shin W-stat	-3.04147	0.0012	13	104		-3.83207	0.0001	13	91
					Stationary				Stationary
ADF - Fisher Chi-square	55.4629	0.0007	13	104		63.7304	0.0001	13	91
					Stationary				Stationary
PP - Fisher Chi-square	47.7859	0.0057	13	117		98.8215	0.0000	13	104

Source: Extracted by Researcher from E-View 9.0 (2021)

The test of stationarity between risk and domestic credit decision of 13 quoted commercial banks was presented in the table above; the results of panel unit root tests in the first difference indicate that all variables are become stationary after first difference. In other words, data series are integrated of order one I (1). From the above unit root test, we present the multiple regression results.

**Table 2: Regression Results and Hausman Test**

Variable	Pooled OLS Result	Fixed OLS Result	Random OLS Result
RE	-7.751502, -1.057480*, 0.2924**	-7.040856, -0.952423*, 0.3430**	-7.751502, -1.053394* 0.2942**
RR	0.268352, 0.048316*, 0.9615**	-0.421673, -0.065328*0.9480**	0.268352, 0.048130*, 0.9617**
TR	3.183458, 0.454841*, 0.6500**	3.275933, 0.294866* 0.7686**	3.183458, 0.453084*0.6513**
CS	0.604870, 0.168251*, 0.8667**	7.521337, 6.113005*, 0.0001**	0.604870, 0.167601*, 0.8672**
BRD	-5.774876, -0.832868*, 0.4065**	-0.134756, -0.015909*0.9873**	-5.774876, -0.829650*0.4083**
BC	1.093915, 0.523138*, 0.6018**	-2.082057, -4.770316*0.0007**	1.093915, 0.521117*, 0.6032**
C	21.13414, 0.944949*, 0.3465**	-27.66586, -0.447208*, 0.6556**	21.13414, 0.941298*0.3484**
R2	0.319332	0.708128	0.319332
ADJ R2	0.228506	0.536500	0.228506
F-Statistics	0.404108, 0.875140**	15.77627, 0.000000***	0.404108, 0.875140**
D.W	2.035032	2.003279	2.035032
Hausman Test	15.745086, 0.0000**		
Cross-section random effects test comparisons:			
Variable	Fixed	Random	Var(Diff.) Prob.
RE	-7.040856	-7.751502	0.501134, 0.3154

## Dynamic of Risk Management and Intermediate Functions of Commercial Banks: The Supply Side Evidence from Nigeria

RR	-0.421673	0.268352	10.576125	0.8320
TR	3.275933	3.183458	74.062357	0.9914
CS	7.521337	0.604870	32.641512	0.2261
BRD	-0.134756	-5.774876	23.300928	0.2426
BC	-2.082057	1.093915	2.898906	0.0621

Source: Extracted by Researcher from E-View 9.0 (2020)

In determining the effect of the independent variables (risk) on the domestic credit decision of the quoted commercial banks, three functional forms of estimation techniques were used; the pooled ordinary least squares (OLS). The fixed effect model (FEM) and the Random Effect Models Estimation. Table 2 presents the results of the pooled OLS, fixed effects and random effect estimation for domestic credit decision of the quoted commercial banks. The analysis of the capital investment under pooled OLS reveals a series of coefficients that are significant at one per cent (1%) level and five per cent (5%) level.

The results of the fixed effects for the domestic credit suggest that the explanatory power of the regressions is higher. The adjusted  $R^2$  is satisfactory in all the cases. The adjusted  $R^2$  is 0.228506 under pooled OLS, it is 0.536500 under fixed effect model and 0.228506 under the random effect model. The F-values are also significant in all the models. Both fixed and random effects specifications of the model were estimated and subsequently, the Hausman specification test was conducted to determine the appropriate specification. The report of the Hausman test as presented in is significant at 5%, suggesting that the fixed effects model is preferred over the random effects. Thus, the null hypothesis was rejected and the alternative hypothesis is accepted.

The cross-section random effects test comparisons proved there is significant difference between the fixed and the random effect as the probability coefficient were all greater than 0.05, this implies that the null hypothesis is not rejected. The computed Durbin Watson is 2.003279 from the fixed effect results shows that at 5% level of significance with four explanatory variables, there is no evidence of serial correlation. This is so as the DW normally ranges between 0 and 4, with 2 indicating the absence of serial correlation. However since it is rare to have 2, results that slightly deviate from 2 are permissible, consequently, the DW is within acceptable threshold and signifies the absence of auto-correlation.

**Table 3: Presentation of Panel Cointegration Test**

	Statistic	Prob	Weighted Statistics	Prob.	
Panel v-Statistic	-1.147743	0.8745	-3.026875	0.9988	
Panel rho-Statistic	4.843830	1.0000	4.943499	1.0000	
Panel PP-Statistic	-16.94648	0.0000	-8.267022	0.0000	
Group rho-Statistic	6.686741	1.0000			
Group PP-Statistic	-12.85499	0.0000			
Phillips-Peron results (non-parametric)					
Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
ACCESS	-0.551	0.000725	0.000129	6.00	9
ECOBANK	-0.136	0.012491	0.002728	8.00	9
FCMB	-0.477	0.045680	0.015098	6.00	9
FIDELITY	-0.504	0.412250	0.057631	8.00	9
GTB	-0.053	0.001353	0.000502	8.00	9
FIRSTBANK	-0.506	0.018394	0.007833	5.00	9
STANBIC	-0.297	0.667069	0.157115	8.00	9
STERLING	-0.222	0.002713	0.001041	8.00	9
UBA	-0.181	0.043808	0.006383	8.00	9
UNIONBANK	-0.372	1723.941	256.5775	8.00	9
UNITYBANK	0.143	0.017608	0.004584	6.00	9
WEMABANK	0.065	0.002873	0.001100	8.00	9
ZENITHBANK	-0.618	0.000951	0.000153	8.00	9

Source: Extracted by Researcher from E-View 9.0 (2020)

Table 3 presented the results of Pedroni panel cointegration tests and reveals the existence of cointegration relationship between risk and domestic investment decision of the 13 commercial banks within the periods covered in this study. The results of Kao panel cointegration test also support the existence of cointegration between the series.

# Dynamic of Risk Management and Intermediate Functions of Commercial Banks: The Supply Side Evidence from Nigeria

**Table 4: Presentation Panel Causality Test**

Null Hypothesis:	Obs	F-Statistic	Prob.
RE does not Granger Cause DC	104	NA	NA
DC does not Granger Cause RE		NA	NA
RR does not Granger Cause DC	104	0.03574	0.9649
DC does not Granger Cause RR		3.63905	0.0299
TR does not Granger Cause DC	104	0.05668	0.9449
DC does not Granger Cause TR		0.21693	0.8054
CS does not Granger Cause DC	104	0.06685	0.9354
DC does not Granger Cause CS		0.11273	0.8935
BRD does not Granger Cause DC	104	0.32305	0.7247
DC does not Granger Cause BRD		0.95171	0.3896
BC does not Granger Cause DC	104	2.51299	0.0862
DC does not Granger Cause BC		0.03083	0.9696

**Source:** Extracted by Researcher from E-View 9.0 (2020)

From the results, there is uni-directional causality from domestic credit to risk retention while there is no causality among other variables in the model. This implies that the null hypothesis of no causality was rejected in favour of the alternate.

## Discussion of Findings

The result in Table 2 found that risk diversification has an inverse relationship with domestic credit decision of listed commercial banks in Nigeria. Specifically, it is seen that a unit increase in risk diversification will lead to a 0.1 unit laxity in domestic decision making by commercial banks in Nigeria. This clearly negates the a priori expectation of this study. Basel compliance is seen to have a negative relationship with domestic credit decision of commercial banks in Nigeria. In terms of magnitude, the results show that a unit increase in Basel compliance will culminate in, 2.08 unit contraction in domestic credit decision respectively. Clearly, this contract with the a priori position this work is predicated on. The result also shows different results as regards the relationship between risk management and credit allocation. For instance, a positive relationship is established between risk transfer and domestic credit. Similar to the results in risk transfer, credit securitization is seen to have positive relationship with domestic credit decision. The extent is measured to show that a unit increase in credit securitization will culminate in a 0.012, enhancement of domestic credit decisions. The results obtained from the analyses show that there is a negative relationship between risk retention on domestic credit decision in Nigeria. The results show that a unit increase in risk retention will culminate 0.04 percent fall on domestic credit.

This scenario can be rationalized by the fact that the risk elements that shape domestic or local investment decision should be within the knowledge of management, thus effort would have been made to implement a system that automatically screens and scans risk. However, the application of other stringent risk management protocols could be inimical to the framing and execution of domestic investment decision. This is in tandem with the empirical position of Yimka, et al (2019) and Nawaz and Munir (2012) who observed that a preponderance of risk management mechanisms would ultimately be antithetical to making timely and productive investment decision making by financial institutions. Conversely, Saeed and Zahi (2016) provide evidence that risk management is positively related to domestic investment decision. The finding further contradicts modern portfolio theory which postulates that for the minimization of risk, a portfolio should be composed of different categorize of stocks with different tenures.

## CONCLUSION AND RECOMMENDATIONS

### Conclusion

The estimated results, 22.8 percent under pooled OLS, 53.6 percent under fixed effect model and 22.8 percent under the random effect model variation on domestic credit decisions of the commercial banks can be traced to variation on the risk management strategies as formulated in the regression model. From the Hausman test the study validates the use of fixed effect model, thus, the null hypothesis was rejected and the alternative hypothesis is accepted. the cross-section random effects test comparisons conclude that there is significant difference between the fixed and the random effect as the probability coefficient were all greater than 0.05, this implies that the null hypothesis is not rejected.

the study concludes that there is significant relationship between risk retention and domestic credit decisions of commercial banks in Nigeria, that there is significant relationship between risk retention and domestic credit decisions of commercial banks in Nigeria, that there is significant relationship between risk retention and domestic credit decisions of commercial banks in Nigeria, that there is no significant relationship between risk retention and domestic credit decisions of commercial banks in Nigeria,

## Dynamic of Risk Management and Intermediate Functions of Commercial Banks: The Supply Side Evidence from Nigeria

Nigeria, that there is no significant relationship between risk retention and domestic credit decisions of commercial banks in Nigeria and that there is no significant relationship between risk retention and domestic credit decisions of commercial banks in Nigeria.

### Recommendations

1. To mitigate the riskiness of banking operations, more avenues for risk diversification should be explored. Although Basel compliance enhances portfolio investment decisions, its implementation should be done cautiously and in consideration of the intricacies and peculiarities of the Nigerian banking space, as it impinges on most investment decisions.
2. Beyond the statutory and regulatory enactments that propel risk transfer by way of insurance, commercial banks should voluntarily seek insurance. Given that most commercial banks have subsidiary insurance firms, it is advised that risk should be transferred to firms where commercial banks do not have significant interest.
3. To bolster credit securitization, commercial banks should collaborate with the Assets Management Company of Nigeria (AMCON). The quest for perfectionism should be jettisoned, as it is merely utopian. Thus, reasonable and intelligent investment choices within the banks risk threshold should be accepted. Finally, management should be proactive as regards risk diversification.

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