Risk Management and Capital Investment Decisions of Commercial Banks: Evidence from Nigeria

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Abstract
This study investigated the relationship between risk management and capital investment decisions of quoted commercial banks in Nigeria. Panel data were sourced from the Nigeria Stock Exchange for a period that spans 2009 to 2018. Capital investment 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 co-integration 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 capital investment decision, of the quoted commercial banks. The panel co-integrations 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 capital investment decisions of the commercial banks. We recommend Bank management should ensure risk diversification among investments to reduce the risk associate with different investment strategies. There should be strict compliance to Basle risk specifications such as risk to total risk assets, risk to total capital and that management of the commercial banks should formulate risk management strategies that can cushion the effect of retained risk in commercial bank investment decisions.

Keywords: *Risk Management, Capital Investment Decisions, Commercial Banks, Risk Diversification, Basel*

Introduction

Risk is inherent in every business, but organization that have the right risk management strategies into business planning and performance management are more likely to achieve their strategies and operational objectives. Risk takes many forms, each affecting the agents economic activity on a lesser or greater extent. Management of risk is an integrated part of planning and financial control submitted to strategic and tactical decisions for a continuous adaptation to inside and outside corporate conditions constantly changing (Nazir, Abdullah and Khan, 2012). In the financial world, risk management is the process of identification, analysis and acceptance or mitigation of uncertainty in investment decisions (Olalere and Ahmad, 2015). Essentially, risk management occurs any time an investors or fund manager analyzes and attempts to quantify the potential for losses in an investment and then takes the appropriate action given his investment objectives and risk tolerance (Ofosu-Hene and Amoh, 2016). Risk management is the quality control of finance. Risk analysis involves the consideration of the source of risk, the consequence and likelihood to estimate the inherent or unprotected risk without controls in place.

Taking risk is core to the banks business and risks are inevitable consequences of being in business. Commercial banks aim is to achieve an appropriate balance between risk and return and maximize potential adverse effects on its performance. Investment decision making improved significantly if emphasis are placed on asking the appropriate strategic questions such as risk inherent of a particular investment and formulating strategic measures to manage such risk.

In the banking sector, it is inevitable and imperative to solidify the mechanisms of identifying, profiling, assessing and measuring of risks that may arise due to the dynamism of the business environment (Musyoki and Kadubo, 2012). Indeed, theoretical and empirical evidence suggest that Capital Asset Pricing Model (CAPM), Efficient Market Hypothesis (EMH) and other rational financial theories are quite apt in the prediction of certain economic occurrences nevertheless,

through the years, anomalies and empirically incoherent and inexplicable behaviours emerged to question the utmost suitability of the conventional analytical paradigm

The behavioural finance scholars found out that investment decisions could be affected by unavoidable psychological and emotional factors. Better understanding of these factors help commercial banks to take an appropriate investment decision and to avoid repeating mistakes in future in extracting the best financial investment avenue. Commercial banks evaluate risk and return of an investment decisions. The decision-making behaviour of banks is affected by investment policy towards risk. At different levels of perception towards risk, commercial banks have different perception about investment and make decisions differently (Adeusi, Akeke, Adebisi & Oladunjoye, 2014). Commercial banks take risks according to their interpretation and perception, which ultimately affect their behaviour towards risky investment decisions. The effect of risk has well been studied, however significant proportion of the studies focused on the effect of risk management and corporate profitability (Wood and Kellman, 2013; Taiwo and Abayomi, 2013; Oluwafemi and Obawale, 2010; Olusanmi, Uwuigbe and Uwuigbe, 2015). This study examined the effect risk management on capital investment decisions of quoted commercial banks in Nigeria.

Literature Review
Theoretical Framework - 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 $Kt^* = \sigma Y$, where σ is the desired capital-output ratio which is assumed to be constant, Kt^* is the desired capital stock in period t, and Yt 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).

Concept of 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, 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.

Capital Investment Decision

Capital investment is little known, although it is a very important economic phenomenon. Investment decision-making takes up a very small space in micro and macroeconomic theories (Guerrien, 2002) as well as in empirical research. As noted by Jensen (1993). The finance profession has concentrated on how capital investment decisions should be made, with little systematic study on how they actually are made in practice. Financiers envisage the investment from a strictly

mechanical angle: evaluation, followed by decision. Most researchers in strategy do not even discuss it. Commercial banks reluctantly communicate about their investment policy. The term investment itself is rarely defined in the literature, although several approaches or definitions are possible. According to the dominant financial-economic perspective, the purpose of an investment is to increase a company's economic capacity and financial value.

When investment criteria are concerned, capital budgeting tools such as IRR and net present value (NPV) are often addressed, alongside the PB method. Despite its deficiencies, PB continues to be common in practice (Lefley, 1996). PB has been found as the third most common evaluation method following NPV and IRR in the United States and Canada (Graham and Harvey 2001) and the most common tool among Swedish groups, especially within the basic, engineering and the chemical and pharmaceutical industries (Sandahl & Sjögren 2003).

Capital budgeting tools such as the NPV and IRR are somewhat more common for strategic investments (Alkaraan and Northcott 2006). A use of a combination of capital budgeting tools has also been indicated (Cooremans 2012; Sandahl & Sjögren 2003), where PB may be used as a supporting measure (Lefley 1996). PB is often criticised in academia since it does not take into account the timing of the returns or the returns occurring after the PB period. It is used as a rule of thumb to examine investments and the use of short PB criteria assumes worst-case scenarios, favouring sure bets and applying short PB criteria then implies a higher required rate of return due to risk avoidance (Jackson 2010). It has in the literature been implied that firms consider energy-efficiency improving investments to be characterized by a higher risk than other investments. For instance, it has been indicated that firms apply stricter PB and other investment criteria for energy-efficiency improving investments than for investments in general (Cooremans 2012), which also has been found for small and medium-sized industrial firms.

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.

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 capital investment decision 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 α 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 depict 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

$$CBD_{it} = f(\beta_1 RD + \beta_2 BC + \beta_3 TR + \beta_4 CS + \beta_5 RR + . + \beta_6 RE + . \; \varepsilon_{it}$$

(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 $Di = 0$.[2]

Thus, we have:

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

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:

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

If this is represented with random variables, then $\beta_{oj} = \overline{\beta}_0 + \mu_j$, which indicates that the difference occurs randomly, and the expectation value of β_{oi} is $\overline{\beta}_0$[5].

$$(4)$$

Where

CID = Capital investment decision proxy by long term investment

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 investment decisions of commercial banks.

Table 1: Operational Measures of the Variables

Variable	Notation	Measurement
Capital investment decision	CID	Log of long term investment
Risk diversification	RD	value of sectorial 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 2020

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 suh choice immaterial.

Results and Discussion of Findings

Table 2: Panel Unit Root

Method	Statistic	Prob.**	Cross-section	Obs	Remark	Statistic	Prob.**	Cross-section	obs	Remark
CIDPanel Unit Root At Level					**Panel Unit Root At 1st difference**					
Levin, Lin & Chu t*	-2.25890	0.0119		104	Stationary	-5.76831	0.0000	13	91	Stationary
Im, Pesaran and Shin W-stat	-0.83247	0.2026	13	104	Not Stationary	-3.34930	0.0004	13	91	Stationary
ADF - Fisher Chi-square	41.9819	0.0247	13	104	Stationary	55.7882	0.0006	13	91	Stationary
PP - Fisher Chi-square	51.5518	0.0020	13	117	Stationary	97.2999	0.0000	13	104	Stationary
CS										Stationary
Levin, Lin & Chu t*	5.57828	0.0000	13	104	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	not Stationary	66.7930	0.0000	13	91	Stationary
PP - Fisher Chi-square	49.6009	0.0035	13	117	Stationary	96.5662	0.0000	13	104	Stationary
RE										
Levin, Lin & Chu t*	5.1E+16	0.1523	13	104	Not Stationary	8.06226	0.0000	13	104	Stationary
RR					Stationary					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	Stationary
RT										
Levin, Lin & Chu t*	-6.06322	0.0000	13	104	Stationary	-8.88220	0.0000	13	78	Stationary
Im, Pesaran and Shin W-stat	-2.77278	0.0028	13	104	Stationary	-2.71095	0.0034	13	78	Stationary
ADF - Fisher Chi-square	51.9791	0.0018	13	104	Stationary	53.4071	0.0012	13	78	Stationary
PP - Fisher Chi-square	79.2995	0.0000	13	117	Stationary	137.465	0.0000	13	91	Stationary
RD										
Levin, Lin & Chu t*	-16.3128	0.0000	13	91	Stationary	-5.77259	0.0000	13	78	Stationary
Im, Pesaran and Shin W-stat	-4.49758	0.0000	13	91	Stationary	-2.66598	0.0038	13	78	Stationary
ADF - Fisher Chi-square	71.0321	0.0000	13	91	Stationary	54.5310	0.0009	13	78	Stationary
PP - Fisher Chi-square	111.354	0.0000	13	104	Stationary	153.197	0.0000	13	91	Stationary
BC										
Levin, Lin & Chu t*	-5.51959	0.0000	13	104	Stationary	-10.5227	0.0000	13	91	Stationary
Im, Pesaran and Shin W-stat	-3.04147	0.0012	13	104	Stationary	-3.83207	0.0001	13	91	Stationary
ADF - Fisher Chi-square	55.4629	0.0007	13	104	Stationary	63.7304	0.0001	13	91	Stationary
PP - Fisher Chi-square	47.7859	0.0057	13	117	Stationary	98.8215	0.0000	13	104	Stationary

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

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 3;   Regression Results and Hausman Test

Variable	Pooled OLS Result	Fixed OLS Result	Random OLS Result
RD	0.033482, 0.313332* 0.7546**	0.009234, 0.075173*, 0.9402**	0.023022, 0.204945*, 0.8380**
BC	-0.001652, -0.051267* 0.9592**	0.030522, 0.778684*, 0.4378**	0.006950, 0.200367, 0.8415**
CS	0.199167 ,0.114851* 0.9088**	0.000377, 0.003852*, 0.9969**	0.151454, 2.233942* 0.0273**
RE	0.0129753,365522* 0.0010**	-0.004452, -0.041528*, 0.9669**	0.009635, 0.090167*, 0.9283
RR	0.2880754,198483* 0.0001**	0.312566, 3.339200* 0.0011**	0.310424, 3.544716*, 0.0006**
RT	0.452872, 0.107866* 0.0001**	0.274949, 1.706556*, 0.0907**	0.442897, 3.885494*, 0.0002**
C	1.409369, 0.344683* 0.0001	3.146024, 3.506758*, 0.0007**	1.593956, 3.660057*, 0.0004
R^2	0.768790	0.813815	0.594260
ADJ R^2	0.757511	0.783623	0.574468
F-Statistics	68.16390, 0.000000**	26.95459, 0.000000***	30.02503, 0.000000**
D.W	1.818324	1.965448	1.905227
Hausman test	31.151618, 0.0000**		

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
RD	0.009234	0.023022	0.002471	0.7815
BC	0.030522	0.006950	0.000333	0.1967
CS	0.000377	0.151454	0.005007	0.0828
RE	-0.004452	0.009635	0.000075	0.1047
RR	0.312566	0.310424	0.001093	0.9483
RT	0.274949	0.442897	0.012964	0.1402

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

*-T-Statistics **- Probability Value

In order to determine the effect of the independent variables on the capital investment 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 3 presents the results of the pooled OLS, fixed effects and random effect estimation for capital investment 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 capital investment decision 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 0.757511 under pooled OLS, it is 0.783623 under fixed effect model and the random effect is 0.574468. 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 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 that there is significant difference between the fixed and the random effect as the probability coefficients were all greater than 0.05. This implies that the null hypothesis is not rejected. The computed Durbin Watson is 1.965448 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. The F-probability is less than 0.05, being 0.000000 therefore there is a significant relationship between risk management and capital investment decision.

Table 4: Presentation of Panel Cointegration Test

	Statistic	Prob	Weighted Statistics	Prob.
Panel v-Statistic	-2.856674	0.9979	-2.586490	0.9952
Panel rho-Statistic	5.372062	0.0000	5.094897	0.0000
Panel PP-Statistic	1.208776	0.8866	-2.604308	0.0046
Group rho-Statistic	6.592479	0.0000		
Group PP-Statistic	-4.328978	0.0000		
Phillips-Peron results (non-parametric				
Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
ACCESS	-0.614	0.008288	0.007404	2.00	9
ECOBANK	-0.161	0.014245	0.002642	8.00	9
FCMB	-0.385	0.004181	0.000861	8.00	9
FIDELITY	-0.124	0.016503	0.002625	6.00	9
GTB	-0.360	0.003846	0.001960	7.00	9
FIRSTBANK	0.369	0.266904	0.174158	6.00	9
STANBIC	-0.139	0.015407	0.004329	8.00	9
STERLING	-0.154	0.699785	0.337668	5.00	9
UBA	-0.356	0.001075	0.000227	8.00	9
UNIONBANK	-0.259	0.001883	0.000705	6.00	9
UNITYBANK	-0.114	0.016278	0.017630	2.00	9
WEMABANK	0.007	0.009865	0.002055	8.00	9
ZENITHBANK	-0.539	0.003556	0.003606	1.00	9

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

Table 4 presented the results of Pedroni panel cointegration tests and reveals the existence of cointegration relationship between risk management and capital 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

Table 5: Presentation Panel Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
RD does not Granger Cause CID	104	0.77144	0.4651
CID does not Granger Cause RD		5.57925	0.0051
BC does not Granger Cause CID	104	0.02771	0.9727
CID does not Granger Cause BC		0.34125	0.7117
CS does not Granger Cause CID	104	7.61173	0.0008
CID does not Granger Cause CS		0.60289	0.5492
RE does not Granger Cause CID	104	NA	NA
CID does not Granger Cause RE		NA	NA
RR does not Granger Cause CID	104	0.84242	0.4337
CID does not Granger Cause RR		5.03267	0.0083
RT does not Granger Cause CID	104	0.15848	0.8537
CID does not Granger Cause RT		11.0344	5.E-05

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

The finding of cointegration implies that there exists a causal relationship between the series, but it does not indicate the direction of causality (Engle and Granger, 1987). From the results, there is uni-directional causality stemming from capital investment decisions to bank risk diversification. There is uni-directional causality from credit securitization and capital investment decisions of the commercial banks, uni-directional causality from capital investment decisions to risk retention and uni-directional causality from capital investment decisions to risk transfer of the quoted commercial banks. This implies that the null hypothesis of no causality was rejected in favour of the alternate.

Discussion of Findings
The results presented in table 2 risk diversification of the commercial banks within the study periods indicates that bank risk diversification has positive but no significant relationship with capital investment decision of the 13 quoted commercial banks within the periods covered in this study. From the estimated coefficient, it indicates that a unit increase on the risk diversification of the banks will increase capital investment by 0.009 per cent. The probability coefficient justifies that risk diversification is statistically not significant in determining capital investment decision of the commercial banks. The positive effect of risk diversification on commercial banks capital investment confirms our a-priori expectation. The findings is in line with the modern portfolio theory formulated by Harry Markowitz in 1952 which was based on the idea of portfolio optimization to maximize return based on a given level of market risk. The Modern Portfolio Theory, an improvement upon traditional investment models, is an important advancement in the mathematical modeling of finance. The theory encourages asset diversification to hedge against market risk as well as risk that is unique to a specific company. The positive relationship confirm the findings of Poudel (2012) that success of bank depends on risk management and the findings of Al-Khouri (2011) that the credit risk, capital risk and the liquidity risk are the main influencing factors on the performance of selected banks when it is symbolized by returns on assets. On the other hand, he reveals that only the liquidity risk has significant relationship with the second indicator of performance (return on equity).

The results further show in Table 4.6that risk diversification have positive but statistically insignificant relationship with portfolio investment decision of quoted commercial banks in Nigeria. This is informed by the estimated coefficient, which indicates that a percent increase in the risk diversification of the banks will increase capital investment by 0.09 per cent. This is in line with the study's a priori expectation which postulated that risk diversification will culminate in better portfolio investment decision for banks. It can therefore be deduced that having a well-diversified pool or portfolio of financial assets or instruments such as defensive stocks, cyclical stocks, and growth stocks with varied tenures or maturities will tend towards portfolio optimization and ultimately maximize return based on a given level of market or systemic risk. Consequently, the unsystemic risk will be neutralised, giving rise to a formidable position against systemic risks and shocks. This corroborates the findings of Alalade, et al. (2018) that credit risk management by financial institutions is pivotal to their business decisions and success. It however contrasts the empirical position of Yimka, et al. (2019) who provides evidence of a negative relationship between risk management and the financial performance of financial institutions in Nigeria.

The analysis also provide evidence that risk diversification enhances international investments decision of the quoted commercial banks in a manner that is not statistically significant. Specifically, as indicated by the random effect model, a unit increase on the explanatory variables - risk diversification, will culminate in a 0.1 unit increase or enhancement on international investment decision of the quoted commercial banks in Nigeria. This finding proved that proper risk diversification strategies adopted by the commercial banks determine the investment decision. This is consistent with the a priori expectation of this work. It is noteworthy that Selma, et al. (2012) and Taiwo, et al (2017) also provide similar findings noting that there exists a positive relationship between risk management and financial performance of banks in Nigeria. On the other hand Berrios (2013), backed with empirical evidence, argued that risk management is expensive and impinges on the financial and human capital resources of the organization thus jeopardize the attainment of the organization's nominated objective.

The findings also confirm the empirical findings of Musyoki and Kadubo (2012) that the credit risk management is a key predictor of Kenyan banks financial performances and the success of the selected banks performance significantly depends on risk management, that the banks in Kenya need to put more emphasis on risk management to minimize the credit risk and to improve the performance of banks. It is further seen from the results that risk diversification has positive and insignificant relationship with subsidiary investment decision of the quoted commercial banks within the period covered in this study. This is reflected in the results from the random effect model indicates that a unit increase on the risk diversification will ultimately culminate in a 0.1 unit enhancement of subsidiary investment of the quoted commercial banks. This finding proved that risk diversification strategies adopted by the commercial banks is directly associated with investment decision, and ultimately aligns with the a priori expectation this work is predicated on.

On the other hand, it is observed from the result in Table 4.18 that risk diversification has an inverse relationship with domestic investment 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.

This scenario cam be rationalised 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 categories of stocks with different tenures. It is further seen from the analytical output that risk diversification has positive and significant relationship with syndicated investment decision of the 13 commercial banks within the periods covered in this study. From the estimated coefficient, it indicates that a unit increase in the risk diversification of the banks will increase syndicated investment by 1.9 per cent. The probability coefficient justifies that risk

diversification is not statistically significant in determining syndicated investment decision of the commercial banks. The positive effect of risk diversification on commercial banks syndicated investment confirms our a priori expectation.

Conclusion and Recommendations
Conclusion
From the study, the estimated regression proved from the three models that 75percent under pooled OLS, 78.3 percent under fixed effect model while the random effect is 57.4percent variation on capital investment decision of the commercial banks can be traced to variation on the estimated risk management variables. 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 no significant relationship between bank risk diversification and capital investment decision of commercial banks in Nigeria, that there is no significant relationship between bank risk diversification and portfolio investment decision of commercial banks in Nigeria, that there is significant relationship between bank risk diversification and international investment decision of commercial banks in Nigeria, that there is significant relationship between bank risk diversification and domestic investment decision of commercial banks in Nigeria and that there is significant relationship between bank risk diversification and syndicated investment decision of commercial banks in Nigeria.

Recommendations
1. Bank management should ensure risk diversification among investments to reduces the risk associate with different investment strategies. This is because 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. Diversification include banks shifting their financial gain sources into non- intercession financial gain generating activities opposed to the normal inter-mediation financial gain generating activities.

2. There should be strict compliance to Basle risk specifications such as risk to total risk assets, risk to total capital. This because basel risk specifications places explicitly the onus on banks to adopt sound internal credit risk management practices to assess their capital adequacy requirements which affect investment decisions.

3. Management of the commercial banks should formulate risk management strategies that can cushion the effect of retained risk in commercial bank investment decisions. 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.

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