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INTERNAL CONTROL AND OPERATIONAL RISK OF QUOTED BANKS IN THE NIGERIAN STOCK EXCHANGE

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Abstract: *Banks are more likely to fail from operational risk than from credit risk, and internal control at banks create operational risk losses. This study investigates the effect of internal control on operational risk of quoted banks in Nigeria. 16 quoted banks were studied based on the 2012 banking reform on corporate governance by the then CBN governor Sanusi Lamido Sanusi's "Project Alpha Initiative" (PAI). The analysis carried out included pooled OLS regression, fixed and random effect and Hausman tests utilizing E-View 9 software. The findings shows that internal control activities have a negative correlation and internal control risk assessment has positive significant effect on operational risk. We recommend that internal check staff at banks should be sustained as there was an inverse relationship between internal check and operational risk at banks. Penalties should be spelt out for banking staff who are non-compliant with bank policies and guidelines especially in the area of breech in software codes. Banks should ensure that internal control unit personnel are qualified and adequately trained especially IT staff.*
Keyword: *Internal Control, Control Activities, Risk Assessment, Operational Risk*

INTRODUCTION

One of the main reasons for banking failures which results in major financial loss and even bankruptcy is high risks taken by bank management on an excessive scale and inability of controlling them. The lack of an internal control system which duty is to keep the risks or major breakdowns within an existing internal control system under control pose a threat against the success of the banking sector. This operational risk has risen drastically in recent times. According to Moosa, (2007) Banks are more likely to fail from operational risk than from credit risk, it is believed that internal control at banks create operational risk losses, and many institutions with such losses are repeat offenders (Chernobai, Deumes and Knechel 2011).

Due to recent financial scandals and economic crisis, banking sector all across the globe has become vulnerable to fraudulent actions, rising uncertainties and development of more instruments have

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pressurized the banking organizations to look for the appropriate internal measures to transform their business organization as risk and uncertainty proof.

The banking sector consolidation exercise of 2004/2005 had some salutary impact on the Nigerian economy and led to the emergence of bigger banks which, before the global financial crisis, created a general belief that the banking sector was sound and growth would be encouraged. However, this sentiment proved misplaced following the outbreak of the global financial and economic crises of 2008/2009 and some interdependent factors that led to the manifestation of an extremely fragile financial system. This was because the main downside effect of the consolidation programme on the system was the near total neglect of adherence to good corporate governance practice. Corporate governance in many banks failed because their boards ignored best practices for various reasons, ranging from being misled by executive management and participating in obtaining unsecured loans at the expense of depositors, to lack of capacity to enforce good governance on bank management. There were also the problems of the overbearing influence on the boards by the Chairmen/CEOs, lack of independence of some boards, failure to make meaningful contributions to safeguard the growth and development of the banks, weak ethical standards, inadequate training for employees, failure to adhere to well established policies and procedures and ineffective board committees. These Internal control weaknesses are revealed in operational losses in banks. Consequently, a lot of scholars, accounting institutes, investors, standard setters and other stakeholders clamor for disclosure of corporate risk in financial reports across the globe as inherited risk from contemporary business environment is on the increase. This risk has claimed the lives and property of stakeholders especially shareholders and creditors just like the case of savannah bank in Nigeria during the 25-billion-naira capital base for banks automaton by the Central Bank of Nigeria in 2005. This obstacle has also tempered with investors' confidence in the business world. Cabedo and Tirado (2004) are of the view that current practice of companies' external reporting is considered insufficient because it is lacking an adequate disclosure on corporate risk and uncertainties. Corporate organizations owe a duty to fully disclose matters concerning their operations so as to aid investors in making investment decisions.

METHODOLOGY

The ex-post factor design type was used in this research work because it deals with historical facts and is designed to test an event that has already taken place. (Asika 2006; Agbadudu, 2002 cited in Ordu, Enekwe and Anyanwaokoro, 2014; Onwumere 2009). Secondary data was used in this work. The data machinery adopted for secondary data was Panel data set from banks published annual reports, NDIC report, CBN statistical bulletin, CBN fact books and banks' Pillar III disclosure report was utilized for this study. The panel covers a time frame of 5 years from 2013-2017 and a cross section of 16 banks from the population of 23 commercial Banks quoted in the Nigerian Stock Exchange as at 28 September 2018. However, Heritage bank, Savannah bank, Sky bank, keystone bank, Enterprise bank, Rand bank and Jaiz bank were eliminated based on availability of data, commencement of operation and Islamic

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bank with different characteristics from commercial banks. The sample size is justified based on the theory of Mugenda and Mugenda, (2003), that a good sample covers at least 10%-30% of the representative population. Thus, at 67% coverage the sample is a fair representation of the population and sufficient for this study. Multiple regression analysis technique was used in this study. Panel data regression model was adopted in order to control for individual unobserved heterogeneity, obtain more accurate results because it provides more observations and information to work with, it allows a follow up on individual dynamics and before and after effect can be easily estimated (Temple, 1999; Woodridge, 2002; and Hsiao, 2003 as cited in Alajekwu, 2018). Cross-sectional and time series data are pooled in the regression to overcome the problem of insufficient degree of freedom. The Fixed Effects model (FEM) can be used to control the unobserved characteristics. Random effects model (REM) assumes that firm specific characteristics are not constant and the time effects are absent. The Hausman's specification test in Panel data models was conducted for fixed and random effects test of individual characteristics or time effect.

Table 1: Operational definition of variables

		Variables	Proxy variables
Dependent	Operational Risk:	3 years Gross income @ 15% divided by 3	**OPR**
Independent	Control Environment:	Internal and External	
	Internal Environment:	Bank strength Income diversification Liquidity Employee size	**BS** **ID** **LD** **ES**
	External Environment:	Technology Socio-environmental factors Economic factor Legal factors	**TEC** **SEF** **ECF** **LGF**
	Risk Assessment	Employee turnover Personnel Quality	ET PQ
	Control Activities	Internal check Compliance and Prudence Internal auditors	ICK CLP IAD
	Monitoring	Board size Board Independence Board internal audit size Board with expertise in finance	BDS BDI IAS BEF
	Information and Communication	Feedback Feedforward Time lag	FDB FDF TLG
Control Variables	Bank size		BS
	Leverage		LEV

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Source: Author's conception, 2019

We indicate that there are bank-specific and other variables which could affect the dependent variable in one way or the other and must be controlled. These variables are bank size and Leverage.

Table2: showing definition of Proxy variable

	Proxy Variables	Derivation	Source	Aproprari expectations
	OPR	3 years Gross income @ 15% divided by 3		
Model 1	BS ID LD ES	Capital Adequacy Ratio = total equity/total assets non - interest income/total operating income (EBIT) total loans/total customers' deposit yearly no of bank staff	Adapted from Afia 2015	Positive
Model 2	TEC SEG ECF LGF	Total amount in IT losses in the year Total amount of loss in fraud and forgeries reported by NDIC Non-performing loans in the year Litigation losses in the year	Adapted from Afia 2015	Positive
Model 3	ICK CLP IAD	No of internal check staff in the year Non adherence to accounting principles in the year No of internal audit department members		Positive
Model 4	ET PQ	%No of employee who have left %Employees at the beginning of the year + employee at year end/2 No of errors and bugs in software codes		Positive
Model 5	FDB FDF TLG	Dummy 1 after 48 hrs and 0 at 48 hrs. Dummy 1 after 72 hrs and 0 at 72 hrs. Duration of deviation in compliance		Positive
Model 6	BDS IAS BDI BEF	No of board members Internal audit size No of independent board members No of board members with expertise in finance	Adapted from Sadiq 2013, Ellis and Jordi 2006, Almazari 2014	Positive

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Model 7	BKS LEV	Total no of bank in the year Debt to total assets	Ellis and Jordi 2006; King'oo 2015	Negative

Source: Author's conception, 2019

3.9 Model Specification and Justification

Model 1: *opr = (bs, id, ld, es, bks, lev)* ----------*1*

$opr_{!t} = ao_{!t} + b_1 + bs_{!t}, b_2 + id_{!t}, + b_3 + ld_{!t}, + b_4 + es_{!t}, + b_5 + bks_{!t}, + b_6 + lev_{!t}, + \varepsilon r_{!t}$ ----------*2*

$opr!t = ao_{!t} + bs_{!t} * id_{!t} * ld_{!t} * es_{!t} * bks_{!t} * lev_{!t} + \varepsilon r_{!t}$ ----------*3*

β0, β1, β2, β3, β4, β5, β6= coefficients
εi = error terms.

Model 2: *opr = (tec, sef, ecf, lgf, bks, lev)* ----------*1*

$opr_{!t} = ao_{!t} + b_1 + tec_{!t}, b_2 + sef_{!t}, + b_3 + ecf_{!t}, + b_4 + lgf_{!t}, + b_5 + bks_{!t}, + b_6 + lev_{!t}, + \varepsilon r_{!t}$ ----------*2*

$opr!t = ao_{!t} + tec_{!t} * sef_{!t} * ecf_{!t} * lgf_{!t} * bks_{!t} * lev_{!t} + \varepsilon r_{!t}$ ----------*3*

β0, β1, β2, β3, β4, β5, β6= coefficients
εi = error terms.

Model 3: *opr = (ick, clp, iad, bks, lev)* ----------*1*

$opr_{!t} = ao_{!t} + b_1 + ick_{!t}, + b_2 + clp_{!t}, + b_3 + iad_{!t} + b_4 + bks_{!t}, + b_5 + lev_{!t}, + \varepsilon r_{!t}$ ----------*2*

$opr!t = ao_{!t} + ick_{!t} * clp_{!t} * iad_{!t} * bks_{!t} * lev_{!t} + \varepsilon r_{!t}$ ----------*3*

β0, β1, β2, β3, β4, β5= coefficients
εi = error terms.

Model 4: *opr = (et, pq, bks, lev)* ----------*1*

$opr_{!t} = ao_{!t} + b_1 + et_{!t}, b_2 + pq_{!t}, + b_3 + bks_{!t}, + b_4 + lev_{!t}, + \varepsilon r_{!t}$ ----------*2*

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$opr!t = ao_{!t} + et_{!t} * pq_{!t} * bks_{!t} * lev_{!t} + \varepsilon r_{!t}$ ----------3

β0, β1, β2, β3, β4= coefficients
εi = error terms.

Model 5: *opr = (fdb, fdf, tlg, bks, lev)* ----------1

$opr_{!t} = ao_{!t} + b_1 + fdb_{!t}, b_2 + fdf_{!t}, + b_3 + tlg_{!t}, + b_4 + bks_{!t}, + b_5 + lev_{!t}, + \varepsilon r_{!t}$ ----------2

$opr!t = ao_{!t} + fdb_{!t} * fdf_{!t} * tlg_{!t} * bks_{!t} * lev_{!t} + \varepsilon r_{!t}$ ----------3

β0, β1, β2, β3, β4, β5= coefficients
εi = error terms.

Model 6: *opr = (bds, ias, bdi bef)* ----------1

$opr_{!t} = ao_{!t} + b_1 + bds_{!t}, b_2 + ias_{!t}, + b_3 + bdi_{!t}, + b_4 + bef_{!t} + \varepsilon r_{!t}$ ----------2

$opr!t = ao_{!t} + bds_{!t} * ias_{!t} * bdi_{!t} * bef_{!t} * bks_{!t} * lev_{!t} + \varepsilon r_{!t}$ ----------3

β0, β1, β2, β3, β4= coefficients
εi = error terms.
The model is expected to be β0 > 0, β1 >0, β2> 0 β3 >0, β4 >0, β5 >0, β6 >0.
These variables which cover all the five broad domains of internal controls found in the conceptual framework constitute the independent variables for the study. We indicate that there are bank-specific and other variables which could affect the dependent variable in one way or the other and must be controlled. These variables are bank size and Leverage.

4.1 Descriptive Statistics

The summary statistics provided information about the means, Standard deviation, minimum and maximum of all the employed variables. Mean is the average value of the series; the maximum and minimum values of the series are the highest and the lowest values of the series, while the standard deviation measures dispersion in the series. The descriptive statistics for the core variables are explained to give insight into the nature and activities of the selected quoted banks.

4.1.1 Internal Control and Operational Risk

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The Dependent Variable: Operational risk (OPR) is measured as three (3) years Gross income at 15% divided by 3. Of the 80 observations, it can be seen that OPR was 5.38; with the highest value, lowest value and standard deviation of 6.87, 4.30 and 30.09 respectively.

The Independent Variable: internal Controls with it five (5) domain- (1) control environment, (2) control activities, (3) risk assessment, (4) information and communications and (5) monitoring are described as follows:

1. Control environment was sub divided into

(A) *Internal environment with proxy variables- (i) bank strength measured with capital adequacy ratio which demonstrates the internal strength of the bank to support losses during crisis periods. High of this ratio shows high profitability and lower ratio indicates the decrease of the profitability. Capital adequacy is computed as a ratio of total equity to total asset. It showed a maximum value of 223.00, minimum of 12.50 and standard deviation of 4252.00. (ii) Income diversification derived from non-interest income as a ratio of operating income (measured as earnings before interest and tax- EBIT) with an average value of 2.21, maximum value of 92.00, minimum of 0.84 and standard deviation of 8175.40. (iii) Liquidity measured as cash to asset ratio showed an average value of 19.48, maximum value of 86.29, minimum value of 1.65 and standard deviation of 2842.7 and (iv) Employee size measured as the total number of banking staff showing a mean value of 3.48, maximum value of 4.97, minimum of 2.74 and a standard deviation of 13.74.*

(B) *External environment with proxy variables- (i) Technology measured with total amount in IT losses which showed a mean value of 4.07, maximum value of 5.41, and minimum of 3.09 and standard deviation of 24.54. (ii) Socio-economic factor derived from total amount in fraud and forgeries reported by NDIC with an average value of 3.59, maximum value of 143.00, minimum of 6.00 and standard deviation of 3956.90. (iii) Economic Factor measured as non-performing loan in the year showed an average value of 3.59, maximum value of 8.45, minimum value of 3.10 and standard deviation of 7.49 and (iv) Legal factor measured as litigation losses in the year showing a mean value of 7.40, maximum value of 112.00, minimum of 6.08 and a standard deviation of 27.45.*

(2) Control Activities is represented by three (3) proxy variables ICK, CLP and IAD explained as follows:

(i) Internal Check measured as no of internal check staff showed a mean of 56.54, maximum value of 6.00, minimum of 23.00 and standard deviation of 40147.89. (ii) Compliance with Accounting Principles measured by number of times there was a deviation from accounting principles. It showed an average value of 0.99, maximum value of 776.00, minimum of 0.00 and standard deviation of 124.99. **(iii)** Internal Audit members measured by total number of audit staff showing an average value of 382.64, maximum value of 137.00, minimum value of 147.00 and standard deviation of 2428.09.

(3) Risk Assessment is represented by two (2) proxy variables ET and PQ explained as follows: (i) Employee turnover measured percentage number of employee who have left dived by the percentage

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number of employee at the beginning of the year plus percentage number of employee at the end of the year divided by two showed a mean of 68.85, maximum value of 14.10, minimum of 29.00 and standard deviation of 47670.20. (ii) Personnel Quality measured by number of errors and bugs in software codes showing an average value of 7.55, maximum value of 14.10, minimum of 4.40 and standard deviation of 314.10.

(4) Information and communications are represented by three (3) proxy variables FDB, FDF and TLG explained as follows: (i) Feedback measured by 0 and 1. 0 is used when it takes more than 48hrs for board decision to be communicated to management and more than two weeks to be implemented and 1 when information is timely. This showed a mean of 0.69, maximum value of 1.00, minimum of 0.00 and standard deviation of 17.19. (ii) Feedforward measured by 0 and 1. 0 is used when it takes more than 48hrs for management decision to be communicated to the Board and more than two weeks for board decision. This showed a mean of 0.61, maximum value of 1.00, minimum of 0.00 and standard deviation of 18.84. (iii) Time Lag measured by 0 and 1. 0 is used when there is no delay in feedback and feedforward and 1 when there is delay. This showed a mean of 0.67, maximum value of 1.00, minimum of 0.00 and standard deviation of 17.44.

(5) Monitoring with proxy variables- **(i)** Board size measured with Number of board members showed a mean value of 11.50, maximum value of 20.00, and minimum of 8.00 and standard deviation of 342.00. (ii) Board Independence with an average value of 3.38, maximum value of 10.00, minimum of 2.00 and standard deviation of 108.75. **(iii)** Board internal audit staff showed an average value of 6.53, maximum value of 9.00, minimum value of 4.00 and standard deviation of 165.95 and **(iv)** Board expertise in finance showing a mean value of 6.44, maximum value of 9.00, minimum of 6.99 and a standard deviation of 181.69.

(6) Control variables with proxy variables- (i) Bank size showed a mean value of 9.16, maximum value of 16.03, and minimum of 5.56 and standard deviation of 156.42. (ii) Leverage with an average value of 66.12, maximum value of 93.01, minimum of 5.56 and standard deviation of 89567.04.

Table 3: Descriptive Analysis for Internal Control variables and Operational Risk variable from 2013-2017

VARIABLES	COMMERCIAL BANKS				
		Mean	Max	Min	Std. Dev.
Dependent Variable	Operational Risk	5.38	6.87	4.30	30.09
Control Environment :	Internal and External				
Internal Environment :	Bank strength (BS) (Ratio)	23.58	223.00	12.50	4252.00
	Income diversification (ID)(ratio)	2.21	92.00	0.84	8175.40
	Liquidity (LD) (ratio)	19.48	86.29	1.65	2842.7
	Employee size	3.48	4.97	2.74	13.74

	(ES)				
External Environment:	Technology (TEC)	4.07	5.41	3.09	24.54
	Socio-environmental factors (SEF)	32.10	143.00	6.00	3956.90
	Economic factor (ECF)	3.59	8.45	3.10	7.49
	Legal factors (LGF)	7.40	112.00	6.08	27.45
Control Activities	Internal check (ICK)	56.54	6.00	23.00	40147.89
	Compliance and Prudence (CLP)	0.99	776.00	0.00	124.99
	Internal auditors (IAD)	382.64	137.00	147.00	2428.09
Risk Assessment	Employee turnover (ET) (%)	68.85	14.10	29.00	47670.20
	Personnel Quality (PQ)	7.55	14.10	4.40	314.20
Information and Communication	Feedback (FDB)	0.69	1.00	0.00	17.19
	Feedforward (FDF)	0.61	1.00	0.00	18.84
	Time lag (TLG)	0.67	1.00	0.00	17.44
Monitoring	Board size (BDS)	11.50	20.00	8.00	342.00
	Board Independence (BDI)	3.38	10.00	2.00	108.75
	Board internal audit (BIAS)	6.53	9.00	4.00	165.95
	Board with expertise in finance (BEF)	6.44	9.00	6.99	181.69

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Control Variables	Bank size (BKS)	9.16	16.03	5.56	156.42
	Leverage (LEV) (Ratio)	66.12	93.01	5.56	89567.04

Source: Output generated using Eviews 7

4.2 Normality Test

Jargue-Bera test of normality was used to identify the normality of error term. It is tested at 0.05 level of significance. The decision rule is to reject the null hypothesis, when P. value is less than 0.05 level of significance, otherwise, do not reject. The null hypothesis that error terms are normally distributed is rejected at 5% level of significance for all the variables. Thus, error term is not normally distributed. The variable used in the study lacks normality for selected commercial banks quoted in the Nigerian Stock Exchange.

Table 4: Result of Jargue- Bera Satistics for the test of normality

VARIABLES	COMMERCIAL BANKS		
		Jarque-Bera	Prob.
Dependent Variable	Operational Risk	1.59	0.35
Control Environment:	Internal and External		
Internal Environment:	Bank strength (BS) (Ratio)	15828.36	0.00
	Income diversification (ID)(Tobin's Q)	19681.30	0.00
	Liquidity (LD) (ratio)	215.47	0.00
	Employee size (ES)	29.47	0.00
External Environment:	Technology (IT)	1.90	0.39
	Socio-environmental factors (SEF)	264.01	0.00
	Economic factor (ECF)	4.58	0.10
	Legal factors (LGF)	3.66	0.16
Control Activities	Internal check (ICK)	8.09	0.01
	Compliance and Prudence (CLP)	57.48	0.00
	Internal auditors (IAD)	6.38	0.04
Risk Assessment	Employee turnover (ET) (%)	3.94	0.13
	Personnel Quality (PQ)	61.33	0.00
Information and Communication	Feedback (FDB)	14.76	0.00
	Feedforward (FDF)	13.29	0.01
	Time lag (TLG)	14.08	0.00
Monitoring	Board size (BDS)	122.36	0.00
	Board Independence (BDI)	2.80	0.00
	Board internal audit (BIAS)	454.70	0.24
	Board with expertise in finance (BEF)	3.50	0.17
Control Variables	Bank size (BKS)	469.96	0.00

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	Leverage (LEV) (Ratio)	18.08	0.00
	Number of Banks		16
	Number of Observation		80

Source: Output generated using Eviews 7

4.3 Test for Multicollinearity

The test is conducted to check for suitability of the of the control variables in each of the model. Model 1 to 6 are the theoretical model of the relationship between operational risk and internal controls. Bank size and Leverage being control variables were tested for the existence of multicollinearity between variable using correlation matrix as shown on table 8.the existence of collinearity shows that the regression cannot precisely intercept the influence of independent variable towards dependent variable (Gujarati and Porter, 2009). High pair wise correlation between two variables means there is a serious multicollinearity problem in the regression model. The level of high multicollinearity exists when the correlation between two variables exceed 0.8 (Gujarati and Porter, 2009). The result on table 8 showed correlation matrix for quoted banks. The highest pair wise correlation is 0.79 and the lowest is -0.21. Since it is not more than 0.8, the researcher conclude that the two variables do not suffer from serious multicollinearity and that the six model in which the five objectives are anchored are suitable for regression analyses.

Table 5: Correlation Matrix for test for multicollinearity in Operational Risk (OPR) and Control Variables (BKS and LEV) of the study.

	OPR	BKS	LEV
OPR	0.729393		
BKS	0.065918	0.798290	
LEV	-0.218296	-0.345518	0.747946

4.4 Goodness of Fit Test

This is a measure of how well the observed moments fit which is the covariance between all pairs of relationship. When all variables in the model are observed, there may not be a need for Goodness –of-

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fit statistcs but in order to account for the overly influence of sample size and correlation to the model and multivariant non-normality (Kline, 2011). Since the Incremental fit indices are less than 0.05% level of significance, we reject the null hypothesis and accept the alternate hypothesis that the baseline and hypothesis in the model have a good fit.

Table 6: Showing Goodness of Fit
Goodness-of-fit Summary
Factor: Untitled
Date: 07/14/19 Time: 23:09

	Model	Independence	Saturated
Parameters	3	3	6
Degrees-of-freedom	3	3	---
Parsimony ratio	1.000000	1.000000	---
Absolute Fit Indices			
	Model	Independence	Saturated
Discrepancy	0.373011	0.373011	0.000000
Chi-square statistic	29.46791	29.46791	---
Chi-square probability	0.0000	0.0000	---
Bartlett chi-square statistic	28.78405	28.78405	---
Bartlett probability	0.0000	0.0000	---
Root mean sq. resid. (RMSR)	0.296842	0.296842	0.000000
Akaike criterion	0.293349	0.293349	0.000000
Schwarz criterion	0.204023	0.204023	0.000000
Hannan-Quinn criterion	0.257535	0.257535	0.000000
Expected cross-validation (ECVI)	0.448961	0.448961	0.151899
Generalized fit index (GFI)	0.850174	0.850174	1.000000
Adjusted GFI	0.700347	0.700347	---
Non-centrality parameter	26.46791	26.46791	---
Gamma Hat	0.000000	0.000000	---
McDonald Noncentralilty	0.845761	0.845761	---
Root MSE approximation	0.334184	0.334184	---
Incremental Fit Indices			
	Model		
Bollen Relative (RFI)	0.000000		

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Bentler-Bonnet Normed (NFI)	0.000000
Tucker-Lewis Non-Normed (NNFI)	0.000000
Bollen Incremental (IFI)	0.000000
Bentler Comparative (CFI)	0.000000

4.5 Test of Hypotheses

The five objectives of the study were estimated for the effect of internal control on operational risk. The analyses were conducted for pooled OLS, fixed effect and random effect model. The results are shown on table 8-13 for internal and external control environment, control activities, risk assessment, information and communications and monitoring.

The analyses involved commercial 16 banks quoted in the Nigerian stock exchange for a period of five years (2013-2017) and consisting of 80 observations. They are presented as follows;

4.5.1 $H0_1$: Internal control environment system does not have significant effect on operational risk.

Four variables representing model 1 on the effect of internal control environment on operational risk were employed to test the hypotheses of this study. From the regression analysis result as shown on table 8, it is observed that r^2 for pooled OLS, fixed effect and random effect are 0.20 and 0.21 respectively and that of random effect is 0.90 that is, for each model used 20%, 21% and 90% of the dependent variable (OPR) is explained by the independent variables: BS, ID, LD and ES and control variable BKS and LEV. The coefficient value of the independent proxy variables: BS, ID, LD, and ES are positively correlated with the dependent variable OPR. This implies that any decrease in the independent variables will result in a decrease in the dependent variable. From the further test conducted, the fixed effect model showed a value of 166.954077 with a probability of 0.0000 and the random effect model showed a value of 4.125385 and a probability of 0.6597. The fixed effect is preferred because the probability of the Chi. Square is less than 0.05% level of significance. From the result obtained, we accept the alternate Hypotheses which states that internal control environment has a significantly positive effect on operational risk of quoted banks in Nigeria and reject the null hypothesis. The variables employed showed positive value that is, any increase/decrease in any of the independent variables will lead to an increase in the dependent value except for bank size that does not have a positively significant effect on operational risk.

Durbin Watson is close to 2.0 as such the variables are highly significant. Probability values of the coefficient at 0.1 – 0.7 implies that the regression parameters are significantly different from zero and the probability for the variables reveal a normal curve. The F-statistics is 1.766192 to show that the coefficient of explanatory variables has a significant effect on operational risk in the annual financial reports of quoted companies in Nigeria. From the result obtained, we accept the alternate Hypothesis

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which states that internal control environment has a significantly positive effect on operational risk of quoted banks in Nigeria and reject the null hypothesis.

Table 7: Result of the effect of internal control environment on operational risk of quoted banks in Nigeria

Independent Variables	Pooled OLS	**Fixed Effect *(Preferred Model)***	Random Effect
Constant (C)	3.599612*	**3.545422***	4.763952*
	(4.695850)	**(4.380025)**	(5.480358)
Bank Strength (BS)	0.002450*	**0.002862***	0.001704*
	(0.848119)	**(0.936542)**	(1.232416)
Income Diversification (ID)	0.130211*	**0.150099***	0.045398*
	(0.695367)	**(0.748953)**	(0.448589)
Liquidity (LD)	0.009810*	**0.009888***	-0.005624*
	(2.670924)	**(2.619871)**	(-1.282022)
Employee Size (ES)	0.403149*	**0.403026***	0.072616*
	(2.421923)	**(2.307828)**	(0.515052)
Bank Size (BKS)	-0.060530*	**-0.058434***	-0.055025*
	(-1.115413)	**(-1.032348)**	(-1.280855)
Leverage (LEV)	0.008291*	**0.008335***	0.013468*
	(3.455690)	**(3.371851)**	(1.508671)
R-Squared	0.201216*	**0.206182***	0.901387*
F-Statistics (Prob.)	0.010817	**1.766192(0.083838)**	24.81041(0.000000)
Durbin Watson (DW)	0.285333	**0.278861**	1.636648
Hausman Test (Prob.)		**166.954077(0.000000)** **	4.125385 (0.6597) **

4.5.2 $H0_1$: External control environment does not have significant effect on operational risk.

Four variables representing model 2 on the effect of external control environment on operational risk were employed to test the hypotheses of this study. From the regression analysis result as shown on table 9, it is observed that r^2 for pooled OLS, fixed effect and random effect are 0.25 and 0.26 respectively and that of random effect is 0.92 that is, for each model used 25%, 26% and 92% of the dependent variable (OPR) is explained by the independent variables: TEC, SEF, ECL and LGF and control variable BKS and LEV. The coefficient value of the independent proxy variables: SEF, BKS and

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LEV are positively correlated with the dependent variable OPR. While TEC, ECF and LGF are negatively correlated with the dependent variable OPR. This implies that any increase/decrease in the independent variables will result in an increase/decrease in the dependent variable. From the further test conducted, the redundant (Hausman) fixed effect model showed a value of 188.907070 with a probability of 0.0000 and the Hausman random effect model showed a value of 23.374523 and a probability of 0.0007. The fixed effect is preferred because the probability of the Chi. Square is less than 0.05% level of significance. From the result obtained, we accept the alternate Hypotheses which states that external control environment has a significantly positive effect on operational risk of quoted banks in Nigeria and reject the null hypothesis. The variables employed showed positive value that is, any increase/decrease in any of the independent variables will lead to an increase in the dependent value except for TEC, ECF and LGF that does not have a positively significant effect on operational risk.
Durbin Watson is close to 2.0 as such the variables are highly significant. Probability values of the coefficient at 0.1 – 0.7 implies that the regression parameters are significantly different from zero and the probability for the variables reveal a normal curve. The F-statistics is 2.474900 to show that the coefficient of explanatory variables has a significant effect on operational risk in the annual financial reports of quoted companies in Nigeria. From the result obtained, we accept the alternate Hypothesis which states that external control environment has a significantly positive effect on operational risk of quoted banks in Nigeria and reject the null hypothesis.

Table 8: showing the effect of external control environment on operational risk

Independent Variables	Pooled OLS	**Fixed Effect *(Preferred Model)***	Random Effect
Constant (C)	10.24404*	**10.48535***	-4.088791*
	(7.457786)	**(7.364314)**	(-1.850001)
Technology (TEC)	-0.013726*	**-0.001410***	-0.117646*
	(-0.085779)	**(-0.008421)**	(-1.330116)
Socio-economic	0.003575*	**0.004563***	0.000784*
Factor (SEF)	(0.875275)	**(1.034498)**	(0.399997)
Economic factor (ECF)	-0919117*	**-0.974016***	2.429391*
	(-3.291574)	**(-3.313844)**	(4.187763)
Legal factor(LGF)	-0.291641*	**-0.314992***	0.192742*
	(-2.492607)	**(-2.586460)**	(2.445534)
Bank Size (BKS)	0.001713*	**0.003191***	-0.058757*
	(0.030498)	**(0.055190)**	(-1.646174)
Leverage (LEV)	0.007905*	**0.008405***	0.004791*
	(2.493555)	**(2.503374)**	(0.688127)
R-Squared	0.252342*	**0.263992***	0.928226*
F-Statistics (Prob.)	0.001321	**2.474900(0.013521)**	35.71892(0.000000)
Durbin Watson (DW)	0.309938	**0.313080**	1.962402
Hausman Test		**188.907070 (0.0000) ****	23.374523(0.0007) **

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4.5.3 $H0_2$: Control activities does not have significant effect on operational risk.

Three proxy variables representing model 3 on the effect of control activities on operational risk were employed to test the hypotheses of this study. From the regression analysis result as shown on table 10, it is observed that r^2 for pooled OLS, fixed effect and random effect are 0.29 and 0.29 respectively and that of random effect is 0.89 that is, for each model used 29%, 29% and 89% of the dependent variable (OPR) is explained by the independent variables: ICK, CLP and IAD and control variable BKS and LEV. The coefficient value of the independent proxy variables: CLP, IAD and LEV are positively correlated with the dependent variable OPR. While ICK and BKS are negatively correlated with the dependent variable OPR. This implies that any increase/decrease in the independent variables will result in an increase/decrease in the dependent variable. From the further test conducted, the redundant (Hausman) fixed effect model showed a value of 157.193595 with a probability of 0.0000 and the Hausman random effect model showed a value of 2.042970 and a probability of 0.8432. The fixed effect is preferred because the probability of the Chi. Square is less than 0.05% level of significance. From the result obtained, we accept the alternate Hypotheses which states that control activities has a significantly positive effect on operational risk of quoted banks in Nigeria and reject the null hypothesis. The variables employed showed positive value that is, any increase/decrease in any of the independent variables will lead to an increase in the dependent value except for internal check and bank size that does not have a positively significant effect on operational risk.

Durbin Watson is close to 2.0 as such the variables are highly significant. Probability values of the coefficient at 0.1 – 0.7 implies that the regression parameters are significantly different from zero and the probability for the variables reveal a normal curve. The F-statistics is 2.474900 to show that the coefficient of explanatory variables has a significant effect on operational risk in the annual financial reports of quoted companies in Nigeria. From the result obtained, we accept the alternate Hypothesis which states that control activities have a significantly positive effect on operational risk of quoted banks in Nigeria and reject the null hypotheses.

Table 9: showing the effect of control activities on operational risk

Independent Variables	Pooled OLS	**Fixed Effect *(Preferred Model)***	Random Effect
Constant (C)	5.612601*	**5.615702***	4.870071*
	(12.99178)	**(12.50482)**	(6.234542)
Internal Check (ICK)	-0.009437*	**-0.009480***	-0.002051*
	(-2.806589)	**(-2.739738)**	(-0.354322)
Compliance Principle (CLP)	-0.052043*	**-0.053243***	-0.005497*
	(-1.033823)	**(-1.017637)**	(-0.234809)
Internal Audit Dept. (IAD)	0.002038*	**0.002037***	0.000942*
	(0.0000)	**(4.490175)**	(0.737127)
Bank Size (BKS)	-0.097963*	**-0.097874***	-0.052716*
	(0.0570)	**(-1.854999)**	(-1.269378)
Leverage (LEV)	0.007169*	**0.007167***	0.011460*
	(3.499688)	**(3.391316)**	(1.449637)

R-Squared	0.290638*	**0.292507***	0.899063*
F-Statistics (Prob.)	(0.000093)	**3.215653(0.002575)**	26.27619(0.000000)
Durbin Watson (DW)	0.252821	**0.248353**	1.577831
Hausman Test		**157.193595(0.0000)** **	2.042970(0.8432) **

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