Research Journal of Finance and Accounting
ISSN 2222-1697 (Paper) ISSN 2222-2847 (Online)
Vol.6, No.12, 2015

Supervision and Survival of Banks: Evidence from the Nigerian Banking Industry

Michael O. Ndugbu, PhD. and Emeka Ochiabuto (ACIB)*
Banking and finance Department, Imo state university, P.M.B 2000, Owerri Imo State, Nigeria

Abstract
The paper establishes a relationship between supervisionand survivability of banks. The study employs EVIEW statistical software using the two stage least square method to evaluate a set of factors which affect bank survivability. Data for the study were extracted from the Central Bank of Nigeria's (CBN) statistical bulletin and bureau of statistics publications (1981 – 2013). The results confirm positive significant relationship amongcapital protection, earnings strength and bank liquidity while cash reserve ratio and bank strength had negative impact on bank liquidity. These variables were found to be inelastic due to time lag banks may take to adjust to supervision patterns, reforms and finding alternatives. A short time frame given by the supervisory authority to implement a new regulation by banks resulted to inelastic bank liquidity. The strength-supervision model showed positive significant relationship among bank liquidity, asset quality and bank strength. The supervisory authority as a watch dog cannot be an umpire and a player,but rather would prefer giving a fitting burial to banks that have failedrather than jeopardize the whole system. It is therefore worthwhile to devote considerable resources to the establishment of effective supervision and inspection.
Keywords: Bank supervision, Bank liquidity, Bank strength, cash reserve ratio, earnings strength.

1. Introduction

One principal objective of the Central Bank is to promote monetary stability and soundness in the financial system. To achieve this, monetary authority must improve the regulatory processes and pursue policies and standards that would enhance the safety, soundness and efficiency of the financial system.

Supervision entails not only the enforcement of rules and regulations, but also some judgment regarding the quality of financial institutions assets (bank strength). Instability in the banking sector could lead to bank failures, loss of public confidence, as well as adverse macroeconomic environment with negative impact on real income, employment and output (Keeley:1990) The major source of bank funding is deposits. Hence depositors need protection, primarily because they do not have the means to determine the extent of risks taken by banks in the use of their money. The supervisory and regulatory framework must therefore ensure that banks operate within prescribed prudential limits and standards in a safe manner and uphold high standards of professional conduct that would sustain continuing confidence in the banking system (Estrella:1998)

The banking industry has become very dynamic. This more competitive and dynamic environment may not be compatible with traditional regulatory structures. The key question is how to adapt the supervisory framework to the increasing competitive environment of banking. In a less orthodox terminology: how do we regulate and supervise a moving target?

One of the operational requirementsof supervision and inspection is the analysis of bank survivability (bank strength and bank liquidity).

Against this backdrop the paper represents among others an effort to establish the relationship between bank survivability and central banks pattern of supervision in order to provide a framework for improvement in the process.

2. Synopsis of related and empirical literature

The overriding objective of CBN's financial sector surveillance function is to promote stability and soundness that would engender public confidence in the system (CBN Brief: 2008-2009 editions). Pointedly, Imala (2004) explicates that a poorly regulated financial sector or one with insufficient capital for the risks it takes, can increase a country's vulnerability to financial crisis.

Glenn Tasky (2008) noted that bank supervision aims at a single comprehensive informed opinion about the condition and performance of a bank and taking appropriate actions. Oni (2004) perceived bank supervision purpose as ascertaining that affairs of banks are conducted in a safe and sound manner with respect to:**Adequacy of capital, Asset quality, Board of management, Earnings, Liquidity, Adequacy of internal control, Adequacy of accounting system and record keeping, Compliance with both individual bank's internal policies and prudential regulations.**

Bank examination focuses on six components of bank safety and soundness known as CAMELS. C-capital protection, A- Asset quality, M-management competence, E-earnings strength, L-liquidity risk exposure S-

Table 1: Current regulatory and supervisory framework for Nigeria's financial institutions

Type of institution	*Legal framework*	*Licensed by*	*Supervised by*	*Examined by*	*Insured by*
Bank	*CBN act 1991Bofia act 1998 CAMA 1990*	*CBN*	*CBN and NDIC*	*CBN and NDIC*	*NDIC*
Other non-bank financial institution	*CBN act 1991 and Bofia act 1991*	*CBN*	*CBN*	*CBN*	---
Capital market operators	*SEC act 1979 CAMA 1990*	*SEC*	*SEC*	*SEC*	---
Insurance companies	*CAMA 1990 And Insurance act 1992*	*NAICOM*	*NAICOM*	*NAICOM*	----

Source: CBN Bullion vol. 28 No. 1 January-March 2004, pp 28.

Sensitivity to market risk.Rationale for supervising and regulating the financial system concerns stability, meaning the ability of financial markets and institutions or intermediaries to provide the time key services-risk sharing, liquidity and information in face of economic disturbances. Second, most financial assets are held by banks. Lastly, government can advance economic policy by interacting with the financial sector. Actions of the central bank for example affect the banking system and promote monetary policy.

Bank supervision does not prevent failure, as CBN cannot play the role of an umpire and a player. Survival is the responsibility of the board and management of a bank (Frederick: 2000).

2.1The pattern of bank supervision

Schematically, Charles (2004) explicates the current regulatory and supervisory framework for Nigerian financial institutions with information on table 1. The supervisory function is played by Central Bank of Nigeria (CBN) and Nigerian Deposit Insurance Corporation (NDIC) complementing. NDIC acts as a financial safety net in the regulation of the banking system.

Bank supervision has two broad divisions namely onsite and offsite (see table 2). CBN Banking supervision department carry out onsite supervision. This involves essentially the appraisal of banks return. Offsite surveillance serves as “early warning device” accomplished by analyzing key bank financial ratios and other financial data generated from periodic financial reports submitted to the supervisors. EFASS is the module through which banks send rendition reports to CBN (50 years of central banking 2009:33). The returns look at interest rate, spread, margins, capital adequacy, and liquidity ratio.

Table 2: Pattern of Bank supervision

Bank supervision	
Onsite	*Offsite*
Maiden	*EFASS*
Routine ❖ *Corporate governance issues* ❖ *Ethics* ❖ *Capital adequacy issues* ❖ *Liquidityrequirements* ❖ *Credit policies insider* o *Performing* o *Doubtful* o *Lost* o *Credit to watch* ❖ *Single obligor limits* ❖ *ownership*	*Returns* ❖ *Spread* ❖ *Capital adequacy* ❖ *Liquidity ratio* ❖ *Interest rate*
Target/special check	
Spot check	

Onsite supervision entails physical visits to banks for on the-spot review of bank records by CBN bank examination department. Onsite examination includes maiden examination, routine examination, target/special examination, investigation/spot checks aimed at determining risk exposure, with emphasis on capital, asset quality, strength of earnings and adequacy of liquidity. Routine checks are based on the returns received from banks. Routine examination examines corporate governance issues, ethics, capital adequacy issues, liquidity requirement, credit policies/insider credit, and single obligor limits.

Bank supervision is team based. Unlike the former ad hoc team arrangement to visit banks,the new arrangement is permanent team designated to particular banks. In aggregate there are eight teams. The essence is for each team to study, know specifics, and have in-depth knowledge of banks assigned to them. This forestalls haphazard supervision, leading to continuity in examination in order to be in the best average position to suggest problem solving options.

General theories of government regulation provide a spontaneous framework for assessing bank supervision.The first theory, the “supervisory power view” postulates that strong official supervision of banks can improve their corporate governance. This theory holds that private agents frequently lack the incentive and capabilities to monitor powerful banks. It assumes that government has both the expertise and incentives to ameliorate market imperfections and improve the governance of banks. When information costs, transaction costs, and government

policies interfere with the incentives and abilities of private agents to monitor banks, strong official supervision of banks can improve the corporate governance of banks (Stigler, 1971).

An alternate theory, the "political/regulatory capture view", argues that politicians and supervisors do not maximize social welfare; they instead maximize their own private welfare (Hamilton, et al., 1788; Buchanan and Tullock, 1962; Shleifer and Vishny, 1998). Thus if bank supervisory agents have the power to discipline non-compliant banks, then politicians and supervisors may use this power to divert the flow of credit to politically connected firms (Becker and Stigler, 1974; Stigler, 1975; Haber et al., 2003). Under these conditions, banks do not only allocate capital based on risk-return criteria.

Finally, the "private empowerment view" argues that bank supervisory policies should focus on enhancing the ability and incentives of private agents to overcome information and transaction costs, so that private investors can exert effective governance over banks. Consequently, the private empowerment view seeks to provide supervisors with the responsibility and authority to induce banks to disclose accurate information to the public, so that private agents can monitor banks more effectively (Hay and Shleifer, 1998). Thus, the private empowerment view holds that corruption of bank officials will be less of a constraint on corporate finance in countries that foster public information disclosure and have well-functioning legal institutions than in countries that rely on powerful official supervisors.

Dissatisfaction with the old risk-based capital requirement led to a new theory emphasizing market discipline. The "market discipline view" by William et al (2001) postulates that financial market discipline preserves bank safety and soundness by helping supervisors directly penalize undue risk.

Philip and Ugochi (2003) explored the relationship between risk indicators for individual banks and the different approaches to banking supervision adopted around the world. They carried out empirical investigations in a panel data framework and found wide-ranging effects of design features of banking supervision on risk taking which raise important policy issues. Thierry and thiery (1990) writing on Optimal Prudential Regulation of Banks and the Political Economy of Supervision, considered how moral hazard economy in banks and how incentives forrisk taking are affected by the quality of supervision. Their results showed that low interest rates maygenerate excessive risk taking. Because of a pecuniary externality, the market equilibriummay not be optimal and there is a need for prudential regulation.

3.Methodology

The duration consideration, along military and democratic dispensation policies differential was cushioned with the assumption that duration is considered as being continuous (Davidson and Mackinon, 2004)

The population is finite but composed of all banks operated in Nigerian banking industry. The data of study is extracted from CBN statistical bulletin and bureau of statistics publications. The sample size for analysis was done judgmentally,but encompasses times of major reforms ranging for a period of 31 years from 1981 to 2013. The data analysis techniqueis the econometric procedure applying the two stage least square (TSLS) method.

Towards achieving the research aforementioned objectives a structural model was estimated. Functionally stated as:

$BL = a_0 + a_1ES + a_2InCA + a_3InCRR + a_4BS + u_1$……1

$BS = b_0 + b_1SEN + b_2AQ + b_3BL + u_2$……2

Where:

BL – bank liquidity risk exposure
AQ – asset quality or loan quality
BS – bank strength
CA – capital protection/adequacy
ES – earnings strength
MD – market discipline
SEN – sensitivity to market risk

Bank liquidity risk exposure is proxied by the loan deposit ratio.

The bank strength is proxied by the total commercial banks assets. Because it could be conjectured that when the base of banks is strong the banks would be able to meet their obligations and hence the better the possibility of survival (Egwakhe and Osabuohien: 2009). In addition Soludo (2006) Observed that the total asset of Nigeria commercial banks increased by 79.7% between 2003 and 2006 even though the number of banks drastically reduced from 90 to 25 within the same period. Thus the use of banks total asset as a measure of their strength appears better than the number of banks.

Earning strength is proxied by the ratio of banks loan to their total asset. The logarithm to base ewas added to capital protection and cash reserve ratio as they increase more slowly than bank liquidity, perhaps giving credence to Engels law.

Banks sensitivity to market risk as a measure of relative risk measurement tool is measured using the capital asset pricing model beta coefficient and risk exposure that is: $b(Km-R_f)$

Where

b = beta coefficient $K_m - R_f$ = Risk exposure $b(km-R_F) = b_1SEN$

Asset quality as a measurement of the credit risk associated with it is proxied as the lumpsum of banks claim on the central government as such loans have high quality.
The cash reserve ratio as a proxy for market discipline. Implies for commercial banks to play fair they need to stay by the rules or discipline of the market in which they exist.
The stochastic error term encompasses vagueness of theory, intrinsic randomness, and behavioral culture of individual banks and principle of parsimony.
The table array for variables needed for this analysis is presented at appendix A Table 7. The reduced form and identification of the structural equation is presented at appendix B. Sufficiently shows that equation (1) and (2) are over identified.

3.1 Unit root test

A series is stationary if it has mean reversion { $E(y_t) = \mu$}, variance are constant over time { $Var(Y_t) = \delta^2$} and if the covariance between two values from the series depends only on the length of time separating the two values, not on the actual times at which the variables are observed $Cov(Y_t, Y_{t+s}) = Cov(Y_t, Y_{t-s}) = Y_s$ (covariance = f (s not t). The results of the three standard tests for unit roots in the variables of the model are reported in table 3.The table shows that the variables are stationary only at first difference.

Table 3: the unit root test statistics

Variables	ADF test statistic		Phillips-perron		Kwiatkowski-phillips-schmidt-shin
	1st difference		1st difference		1st difference
	No intercept and no trend	With Intercept and no trend	No intercept and no trend	With Intercept and no trend	With Intercept and no trend
BL	-5.485703 *		-5.485775*		0.104224****
ES	-5.571479*		-5.686520*		0.377844****
InCA	-4.981131*		-4.981131*		0.149591****
BS		-3.600082*****			
InCRR	-3.202747***		-4.934944*		0.113857****
SEN	-5.793554*		-6.051956*		0.153912****
AQ				-5.549859*	0.254233****

* Significant at 5% level. ADF and Phillips-perron critical value at first difference without intercept and trend = -1.952066.
** Significant at 5% level. ADF critical value at level with intercept and trend = -3.603202.
*** Significant at 5% level. ADF critical value at first difference without intercept and trend = -1.953858
**** Significant at 5% level. Kwiatkowski-Phillips-Schmidt-shin at first difference with intercept and no trend = 0.463000
***** Significant at 5% level. ADF at first difference with intercept and no trend = -2.998064

3.2 Cointegration

Table 4 presents results of the Johansen cointegration tests for the liquidity-strength-supervision model. Shows that the variables are cointegrated as indicated by trace and eigenvalue statistic greater than the critical value at 5% level.

Table 4: johansen cointegration test result

For Liquidity-supervision model

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.760686	99.92257	76.97277	0.0003
At most 1 *	0.561633	55.59320	54.07904	0.0364
At most 2	0.483700	30.02755	35.19275	0.1622
At most 3	0.188919	9.534469	20.26184	0.6853
At most 4	0.093511	3.043475	9.164546	0.5726

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.760686	44.32937	34.80587	0.0027
At most 1	0.561633	25.56565	28.58808	0.1160
At most 2	0.483700	20.49308	22.29962	0.0876
At most 3	0.188919	6.490994	15.89210	0.7310
At most 4	0.093511	3.043475	9.164546	0.5726

For strength-supervision model

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.873012	107.6140	54.07904	0.0000
At most 1 *	0.614011	43.64058	35.19275	0.0049
At most 2	0.312168	14.13025	20.26184	0.2805
At most 3	0.078363	2.529732	9.164546	0.6716

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.873012	63.97344	28.58808	0.0000
At most 1 *	0.614011	29.51033	22.29962	0.0041
At most 2	0.312168	11.60052	15.89210	0.2104
At most 3	0.078363	2.529732	9.164546	0.6716

3.3 Simultaneity test

Table 5: test for simultaneity, exogeneity and endogeneity

Variable	Coefficient	Std. Error	t-Statistic	Prob.
V1	-27488.31	46824.95	-0.587044	0.5621
V2	-4.75E-07	8.15E-07	-0.583209	0.5648

From the liquidity-supervision model perspective Simultaneity problem does not exist. The endogenous regressors are mutually independent. Same conclusion is reached from the strength-supervision model perspective.

3.4 Exogeneity test

The endogenous regressors in the liquidity-supervision model are truly exogenous with disturbance of the reduced form (-0.587044) being insignificant at 5%. The endogenous regressors are not correlated with the disturbances using ols estimator is not biased and inconsistent. The estimators will converge to the true values or

zero. Using IV its estimators will be consistent but not efficient (i.e. smaller variance) while OLS estimators are consistent and efficient. Same conclusion is reached from the strength-supervision model perspective.

3.5 Endogeneity test

From the liquidity-supervision model perspective the endogenous regressors are not truly endogenous at 5% as the p-value was above it by 0.5571. OLS estimators performs better here than IV estimators. Same conclusion is reached from the strength-supervision model perspective.

3.6 Weak instrument diagnostic

Using canonical correlation to test whether any relationship between the instruments and the endogenous variables is sufficiently strong for reliable econometric inferences.

Cragg-donald F= $[(N-G-B)/L]*[r^2_B/(1- r^2_B)]$

Where N denote the sample size, B the number of RHS endogenous variables, G the number of exogenous variables included in the equation (including the intercept), L the number of "external" instruments that are not included in the model, and r_B the minimum canonical correlation.

The first equation under maximum relative bias is not available for models with less than 3 instruments. While based on the maximum test size criterion at stock-yugo critical value of 10%and L=2 instumental variables. The instruments are strong as cragg-donald (225.1847) is greater than stock-yugo (19.93). The second equation under maximum relative bias size at 10% and L=3 instumental variables, The instruments are strong as cragg-donald (9.467803) is greater than stock-yugo (9.08)

3.7 Regression results and interpretation

Table 6: Regression result

	Variable	Coefficient	Standard error	t-Statistic	Prob.
Dependent Variable: BANK_LIQUIDITY	C	3.972916	9.120273	0.435614	0.6666
Adjusted R-squared=0.780828	LOG(CAPITAL_PROTECTION)	0.897467	0.430870	2.082919	0.0469
F-statistic=28.70818	LOG(CASH_RESERVE_RATIO)	-6.851208	1.632030	-4.197967	0.0003
Durbin-Watson stat=1.961306	BANK_STRENGTH	-1.17E-06	1.95E-07	-6.007131	0.0000
	EARNINGS_STRENGTH	224497.5	26301.20	8.535637	0.0000
Dependent Variable: BANK_STRENGTH	C	-7861600.	3609289.	-2.178158	0.0380
Adjusted R-squared=0.947293	BANK_LIQUIDITY	108666.6	48434.77	2.243565	0.0330
F-statistic=188.8539	SENSITIVITY_TO_MARKET_RI	-136354.4	89087.52	-1.530567	0.1371
Durbin-Watson stat=2.324146	ASSET_QUALITY	7464.185	319.0401	23.39576	0.0000

With cointegration confirmed for the liquidity-supervision and strength-supervision models, the long run model was estimated with output extract in table 6.

Liquidity-supervision model supervision variables had expected signs and no autocorrelation between the disturbances as the Durbin-Watson tends to 2. The model is plausible as 78% variation in bank liquidity is explicated by supervision variables. Without supervision, liquidity over the period autonomously averages 3.972916per annum absolutely. Table 6 shows significant positive association between capital protection at its natural log and bank liquidity.The magnitude of the capital protection at its natural log impact on bank liquidity is large. For an increase in the ln(capital protection) of 1percent, on average leads to about 0.0089 (constant semi-elasticity)percent growth rate in bank liquidity but .00265 absolutely. Deviating by 0.0711 capital adequacy category of banks adequately capitalized (fulfilling minimum requirement) total capital to risk-weighted assets of 8%. The ln capital protection elasticity of bank liquidity is inelastic as epsilon 0.0128 is below 1. This may be due to time lag banks may take to adjust to supervision patterns and reforms and finding alternatives. A shorter time frame given by the supervisory authority to implement a new regulation by banks result to inelastic bank liquidity.Significant negative association between cash reserve ratio at its natural log and bank liquidity. The magnitude of the capital protection at its natural log impact on bank liquidity is large. For an increase in the ln(capital protection) of 1percent, on average leads to about 6.8512 (constant semi-elasticity)percent anti-growth rate in bank liquidity but 1.0889 absolutely. Cash reserve ratio serve as threat or discipline to liquidity management and risk exposure. The ln cash reserve ratio elasticity of bank liquidity is inelastic as epsilon 0.0976

is below 1. This may be due to time lag banks may take to adjust to supervision patterns and reforms and finding alternatives. The shorter the time lag for adjustment then the more inelastic bank liquidity.

Significant negative association between bank strength and bank liquidity. Bank strength and liquidity may be conflicting objective requiring trade-off. For an increase in the bank strength of 1percent, on average leads to about 0.00000117decreases in bank liquidity absolutely.The bank strength elasticity of bank liquidity is inelastic as epsilon 0.071 is below 1. Bank strength impacts effectively when bank store greater proportion of strength in liquid asset. The converse argument leads to inelastic bank liquidity.Significant positive association between earnings strength and bank liquidity. The magnitude of the bank strength impact on bank liquidity is large. For an absolute increase in the bank strength of 1percent, on average leads to about 224497.8increases in bank liquidity absolutely. The earnings strength elasticity of bank liquidity is elastic as epsilon 1.1293 is above 1. This may be due to emphasis of profit as a measure of management performance. The slower the time lag between bang per buck, then the more elastic bank liquidity.

In reality macroeconomic variables are not mutually exclusive or substitutes rather the compliment another to have reinforcing effect. Jointly the supervision variables affect and related to bank liquidity at fisher 28.70818.

For the Strength-supervision model, supervision variables had expected signs and no autocorrelation between the disturbances as the Durbin-Watson tends to 2. The model is plausible as 95% variation in bank strength is explicated by supervision variables. Without supervision bank strenth over the period autonomously decreaases by 7861600.per annum absolutely.

Table 6 shows significant positive association between bank liquidity and bank strength. The magnitude of the bank liquidity impact on bank strength is large. For an increase in the bank strength of 1percent, on average leads to about 108666.6increases in bank strength absolutely. The bank liquidity elasticity of bank strength is elastic as epsilon 1.79 is above 1. This may be due to time lag banks may take to adjust to supervision patterns, reforms, and finding alternatives. The farther the lag then the more elastic bank strength.Significant positive association between asset qualityand bank strength. For an increase in the asset quality of 1percent, on average leads to about 7464.185 absolute change in bank strength. This may be due to high claims of banks loan on central government. The beta coefficient of the sensitivity to market risk is not significantly less than zero.Shows the higher the risk to justify the risk of investors expecting higher returns on securitieslowers the bank strength.

In reality macroeconomic variables are not mutually exclusive or substitutes rather the compliment another to have reinforcing effect. Jointly the supervision variables affect and related to bank strength at fisher 188.8539.Generally the fisher test being significant aligns with Stigler's conclusion under the "supervisory power view" which postulates that strong official supervision of banks can improve their corporate governance.

4. Policy lessons and conclusion

Regulating and supervising a moving target is a function of a consistent and efficient scheme for supervision variables barring earnings strength (As each management board spontaneously gears towards higher earnings) to be elastic. The time lag banks may take to adjust to supervision patterns, reforms, and finding alternatives should be increased judiciously, the shorter the time frame given by the supervisory authority to implement a new regulation by banks result to inelastic bank liquidity.

Supervision and inspection are not panacea for preventing all in banking industry. There are other measures that can be applied to ensure complete framework. The question is: how should the supervisory authority supervise a moving target? One of many ways is using moving variables. Variables that are functions of economic conditions at a point in time. The essence of using moving variables is that they have announcement effect, they are last resort tool, and they mitigate supervisory arbitrage. The supervisory authority as a watch dog cannot be an umpire and a player, but rather would prefer giving a fitting burial to banks that have failed than jeopardize the whole system. It is therefore worthwhile to devote considerable resources to the establishment of effective supervision and inspection.

Finally, the small sample on which the results are based implies that the policy lessons are suggestive and therefore should be taken with some caution.

Reference

Becker G. and G. Stigler (1974),"Law enforcement malfeasance and the compensation of enforcers", journal of legal studies 3, 1-18.

Buchanan, J.M. and G. Tullock (1962),"The calculus of consent", University of Michigan press.

Central bank of Nigeria: 50 years of central banking in Nigeria (2009).

Charles N.O. (2004), "Institutional framework for the regulation and supervision of the financial sector: CBN publication vol. 28 No.1 2004 pp.25".

Davidson, R. and Mackinon, J.G. (2004),"Econometric theory and methods", Oxford: oxford university press.

Egwakhe A.J. and Evans S.C.(2009),"Pakistan economic and social review volume 47, No.2 (winter 2009)".

Estrella, A. (1998), "Formulas for supervision? Remarks on the future of regulatory capital", FRBNY economic policy review, 191-200.

Fredrick Temple (2000),"financial institutions development project-project lense workshop", Bangladesh.
Glenn Tasky (2008),"publication on Jordan economic development program (SABEQ)", USAID Gov/pdf-des/PNADM 889.pdf USAID/Jordan economic growth office Eco June 25 2008.
Haber et al (2003),"The politics of property rights: political instability, credible commitments and economic growth in Mexico" (Cambridge university press).
Hamilton et al (1788),"federalist paper", (Inc. possiter, Ed. New York: New American library, 1961).
Hay J.R. and A. sheifer (1998), "Private enforcement of public laws: A theory of legal reform", American economic review papers and proceedings 88, 398-403.
Imal O.J. (2009),"The experience of banking supervision in financial sector surveillance".
Keeley, M.C. (1990), "Deposit insurance risk and market power in banking American economic review 80, 1183-1201".
Shleifer, A. and R.W. Vishny (1998),"The grabbing hand: government pathologies and their cures", Cambridge, MA: Harvard university press.
Soludo, C. (2006),"Nigeria financial system strategy 2020", Plan your dream FSS 2020 international conference, Abuja, 18thJune.
Strigler G (1971), "the theory of economic regulation", Journal of economics and management science. 2, 3-21.
Strigler G. (1975),"the citizen and the state: essays on regulation", University of Chicago press.
Michael O. Ndugbu: B.Sc. (Economics), MBA (Project management), M.sc/PhD (Financial management). He is a senior lecturer in the department of Banking and Finance, Imo State University, Owerri, Nigeria.
Emeka Ochiabuto, B.Sc. (Banking and Finance), ACIB.

Table array of exogenous and endogenous variables

Table 7: table array of data with dependent variables (bank liquidity and strength) with predictor and instrumental variables (asset quality, cash resrve ratio, sensitivity to market risk, capital protection and earnings strength)

year	Bank liquidity (ratio)	Asset quality (₦' billion)	Bank strength (₦ Million)	Cash reserve ratio (ratio)	sensitivity to market risk	capital protection (ratio)	Earnings strength (ratio)
1981	74.5	1.7739	19477.5	9.5	6.4	0.227250673	0.000423268
1982	84.6	2.8186	22661.9	10.7	4.8	0.270171533	0.00043604
1983	83.8	5.1404	26701.5	7.1	4.3	0.205766289	0.000384364
1984	81.9	8.7261	30066.7	4.7	1.9	0.184872084	0.000359594
1985	66.9	10.2549	31997.9	1.8	2.1	0.164988824	0.000366318
1986	83.2	4.422	39678.8	1.7	1.4	0.187646857	0.000374328
1987	72.9	7.5727	49828.4	1.4	-0.55	0.215418038	0.000348269
1988	66.9	7.3096	58027.2	2.1	-1.05	0.209875084	0.000335379
1989	80.4	3.614	64874	2.9	-5.8	0.218400747	0.00033681
1990	66.5	8.7024	82957.8	2.9	-5.5	0.328889751	0.000310791
1991	59.8	6.8135	117511.9	2.9	-4.6	360.742	0.000254368
1992	55.2	5.8812	159190.8	4.4	-14	615.226	0.000253994
1993	42.9	29.8468	226162.8	6	-20.4	892.83	0.000196277
1994	60.9	39.1842	295033.2	5.7	-4.1	1053.072	0.000294584
1995	73.3	20.7885	385141.8	5.8	-4.6	1219.782	0.000326457
1996	72.9	47.5212	458777.5	7.5	-2.65	1422.702	0.000341624
1997	76.6	39.6224	584375	7.8	-3.3	163.771	0.000371947
1998	74.4	49.1424	694615.1	8.3	-6.35	173.3182	0.00035391
1999	54.6	188.5764	1070019.8	11.7	-9.2	301.0264	0.000293617
2000	51	278.1301	1568838.7	9.8	-4.5	420.4904	0.00027895
2001	65.6	208.2705	2247039.3	10.8	-5.65	784.0124	0.000332248
2002	62.8	467.5217	2766880.3	10.6	-8.08	838.0334	0.000299543
2003	61.9	378.2045	3047856.3	10	-4.52	953.6984	0.000341038
2004	68.6	609.0753	3753277.8	8.6	-4.31	998.545006	0.000348273
2005	70.8	630.8482	4515117.6	9.7	2.5	27.3931968	0.000366903
2006	63.6	993.5304108	7172932.1	2.6	1.8	32.88018602	0.000306397
2007	70.8	1960.407759	10981693.6	2.8	-1.61	30.9490423	0.000359814
2008	80.9	1717.149882	15919559.8	3.0	-0.1	41.48464974	0.000390429
2009	85.7	1826.681096	17522858.2	1.3	0.67	23.4134904	0.000449066
2010	74.2	2377.945278	17331559	1.0	-4.45	24.99302615	0.000395317
2011	44.8	3162.43154	19396633.8	8.0	-12.78	48.66579994	0.000347444
2012	42.3	2527.449458	21288144.4	12	-11.97	73.11425511	0.000364916
2013	36.3	2655.662946	22361800	12	-8.47	126.7215062	0.000428996

Source: CBN statistical bulletin and bureau of statistics, December 2013

Note	Ratio	
Bank liquidity	Loan to deposit ratio	Measure the liquidity exposure risk of Nigeria banks
Asset quality	Claims on central government =treasury bills + treasury certificate + development stocks + loans and advances to central government	Is an evaluation of asset to measure the credit risk associated with it
Capital adequacy	Prior to 1990 calculated as = adjusted capital / Total loans and advances outstanding from 1991 calculated as = $\frac{T_1 + T_2}{a}$ X 100 % Where T_1= Tier 1 capital T_2 = Tier 2 capital A= national regulators minimum total Capital requirement	Measures risks associated with bank capital
Earnings strength	Calculated as = Bank loans / Total assets	Measure the rate at which money knocks the door of banks on average
Bank strength	Calculated using Banks total assets	
Cash reserve ratio	Set by the supervisory authority	
Sensitivity to market risk	Measured using the cap[ital asset A pricing model (CAPM) functionally stated as: Required retrun = Beta ($Km - R_f$) where $Km-R_f$ = Risk exposure Beta =beta coefficient	Measures relative risk in the market in which banks operate.

Identification and reduced form of equation

$BL = a_O + a_1 ES + a_2 INCA + a_3 BS + a_4 INCRR + U_1 \ldots.(1)$

$BS = b_0 + b_1 SEN + b_2 AQ + b_3 BL + U_2 \ldots. (2)$

From equation (2)

$BS = b_0 + b_1 SEN + b_2 AQ + b_3 BL + U_2 \ldots. (2)$

Substitute BL in equation (2)

$BS = b_0 + b_1 SEN + b_2 AQ + b_3 (a_0 + a_1 ES + a_2 INCA + a_3 BS + a_4 INCRR + U_1) + U_2$

$BS = b_0 + b_1 SEN + b_2 AQ + b_3 a_0 + b_3 a_1 ES + a_2 b_3 INCA + a_3 b_3 BS + a_4 b_3 INCRR + b_3 U_1) + U_2$

Collect like terms

$BS - a_3 b_3 BS = b_0 + b_1 SEN + b_2 AQ + b_3 a_0 + b_3 a_1 ES + a_2 b_3 INCA + a_4 b_3 INCRR + b_3 U_1 + U_2$

$BS (1- a_3 b_3) = b_0 + b_1 SEN + b_2 AQ + b_3 a_0 + b_3 a_1 ES + a_2 b_3 INCA + a_4 b_3 INCRR + b_3 U_1 + U_2$

$BS = (b_o/ 1- a_3 b_3) + (b_1/ 1- a_3 b_3)SEN+ (b_2/ 1- a_3 b_3)AQ + (a_O b_3/1- a_3 b_3) +(a_1 b_2/1- a_3 b_3)ES+ (a_2 b_3/1- a_3 b_3)INCA+ (a_4 b_3/1- a_3 b_3)INCRR + (b_3 U_1/1- a_3 b_3)+ (U_2/1- a_3 b_3)$

From equation (1)

$BL = a_0 + a_1, ES + a_2 INCA + a_3 BS + a_4 INCRR + U_1 \ldots.(1)$

substitute Bs in equation (1)

$BL= a_0 + a_1 ES + a_2 INCA + [a_3] (b_0 + b_1 SEN + b_2 AQ + b_3 BL + U_2) + a_4 INCRR + U_1)$

$BL = a_0 + a_1 ES + a_2 INCA + a_3 b_0 + a_3 b_1 SEN + a_3 b_2 AQ + a_3 b_3 BL + a_3 U_2 + a_4 INCRR + U_1)$

Collect like term

$BL = a_3 b_3 BL + a_0 + a_1 ES + a_2 INCA + a_3 b_0 + a_3 b_1 SEN + a_3 b_2 AQ + a_3 b_3 BL + a_3 U_2 + a_4 INCRR + U_1)$

$BL (1 - a_3 b_3) = a_0 + a_1 ES + a_2 INCA + a_3 b_0 + a_3 b_1 SEN + a_3 b_2 AQ + a_3 b_3 BL + a_3 U_2 + a_4 INCRR + U_1)$

$BL =(a_0/1- a_3 b_3)+ (a_1/ 1- a_3 b_3)ES + (a_2/1- a_3 b_3)INCA + (a_3 b_0/ 1- a_3 b_3) + (a_3 b_1 /1- a_3 b_3) SEN+ (a_3 b_2/1- a_3 b_3)AQ + (a_3 U_2 /1- a_3 b_3)+(a_4/ 1- a_3 b_3) INCRR + (U_1/1- a_3 b_3)$

Putting equation in a more compact form

$BL = \pi_{11} + \pi_{12} + \pi_{13} ES + \pi_{14} INCA + \pi_{15} SEN + \pi_{16} AQ + \pi_{17} INCRR + V_1 \ldots..(1)$

$BS = \pi_{21} + \pi_{22} + \pi_{23} ES + \pi_{24}INCA + \pi_{25}SEN + \pi_{26}AQ + \pi_{27}INCRR + V_2$…..(2)

Where

$\pi_{11} = a_0/1-a_3b$ $\pi_{21} = b_0/1-a_3b_3$ $\pi_{12} = a_3b_0/1-a_3b_3$ $\pi_{22} = a_0b_3/1-a_3b_3$ $\pi_{13} = a_1/1-a_3b_3$

$\pi_{23} = a_1b_2/1-a_3b_3$ $\pi_{14} = a_2/1-a_3b_3$ $\pi_{24} = a_2b_3/1-a_3b_3$ $\pi_{15} = a_3b_2/1-a_3b_3$ $\pi_{25} = b_1/1-a_3b_3$

$\pi_{16} = a_3b_2/1-a_3b_3$ $\pi_{26} = b_3/1-a_3b_3$ $\pi_{17} = a_4/1-a_3b_3$ $\pi_{27} = a_4b_3/1-a_3b_3$ V_i = disturbances

V_2= disturbances

Identification of equation

Identifying the equation is done by order and value equation

Order condition for identification

Given as $R - r \geq g-1$

Where r= number of predetermined variable in the model

g = number of ingenious variable in the ith equation

n= number of predetermined variables in the ith equation under consideration.

A = number of actual equation / number of indigenous variable

Decision rule $\geq$: over identified

$\leq$: under identified

= : exactly indentified

For equation 1:

$BL = a_O + a_1ES + a_2INCA + a_3 BS + a_4 INCRR + U_1$

R= 5 G =2 r_i= 3 g_i =2

$R- r \geq g-1$

$5-3 \geq 2-1$

$2 > 1$

This necessary not sufficient to conclude that equation is over identified.

For equation 2

$BS = b_0 + b_1 S\varepsilon N + b_2 AQ + b_3 BL + U_2$ ….(2)

R = 5 r = 2 g = 2 G = 2

$R-r \geq g-1$

$5-2 \geq 2-1$

$3 > 1$

This necessary not sufficient to conclude that equation is over identified.

Rank order for identification

Put model in standard form.

$-Bl + a_1\varepsilon s + a_2INCA + a_3 BS + a_4 INCRR\ 0S\varepsilon N\ \ 0AQ = -U_1$

$b_3BL + 0\varepsilon s + 0INCA - BS + 0\ INCRR\ b_1SEN\ \ b_2AQ = -U_2$

	BL	ES	INCA	BS	INCRR	SEN	AQ
1	-1	a_1	a_2	a_3	a_4	0	0
2	b_3	0	0	-1	0	b_1	B_2

Number of determinant to form will be oforder G-1= 2-1 = 1

For equation 1

Strive out equation one and strive vertically parameters z of equation one which are non zero i.e

	BL	ES	INCA	BS	INCRR	SEN	AQ
1	-1	a_1	a_2	a_3	a_4	0	0
2	b_3	0	0	-1	0	b_1	b_2

We have matix $[b_1b_2]$ given that determinant to be formed is G-1 =1

$|b_1| \neq 0$ and $|b_2| \neq 0$ thus equation (1) is over identified.

For equation 2:

	BL	ES	INCA	BS	INCRR	SEN	AQ
1	-1	a_1	a_2	a_3	a_4	0	0
2	b_3	0	0	-1	0	b_1	b_2

We have matrix $[a_1\ a_2\ a_4]$ given that determinant to be formed isG-1 =1

$[a_1] \neq 0$ $[a_2] \neq 0$ and $[a_4] \neq 0$ thus equation (2) is over identified.

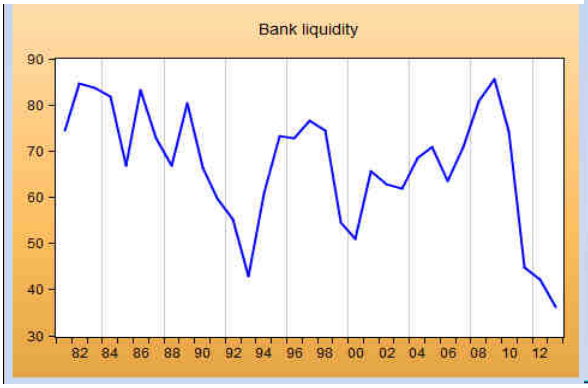


Figure 1: Trend of Bank liquidity

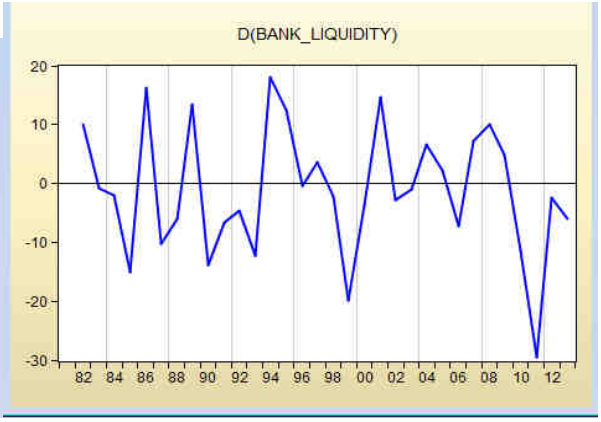


Figure 2: Trend of first difference of Bank liquiditY

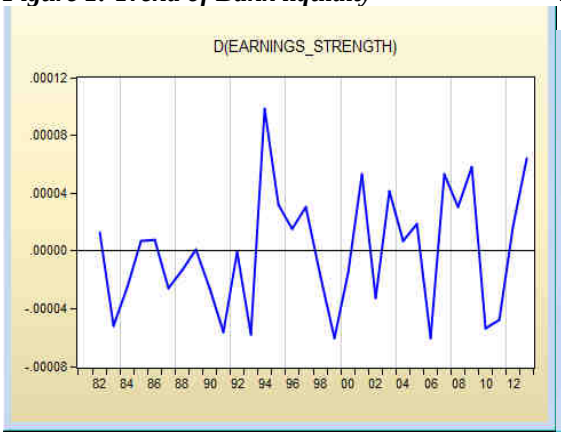
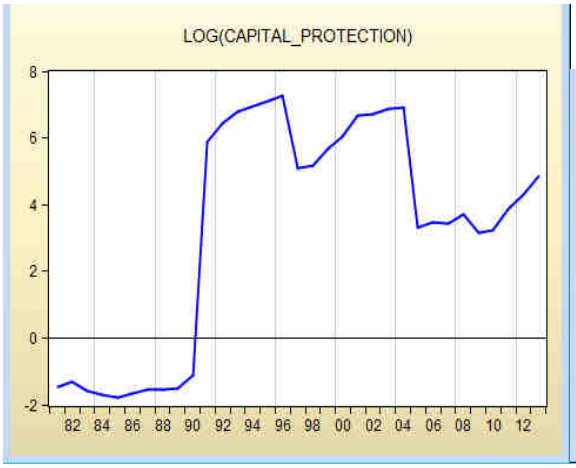


Figure 3: Trend of Earnings strength

Figure 4: Trend of first difference of Earnings strength



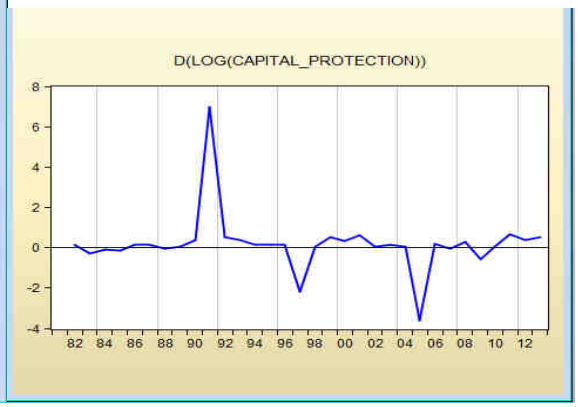


Figure 5: Trend of natural log of Capital protection ***Figure 6: Trend of the first difference of Capital protection to base e***

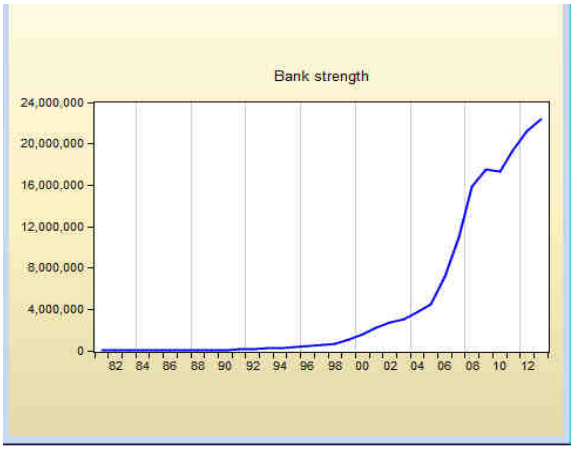


Figure 7: Trend of Bank strength

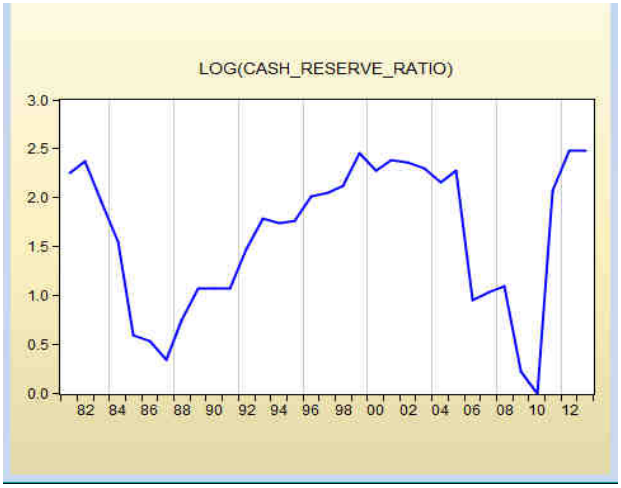


Figure 8: Trend of Cash reserve ratio to base e

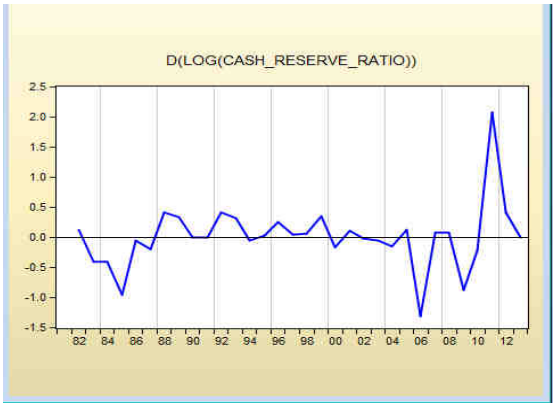


Figure 9: Trend of first difference of Cash reserve ratio to base e

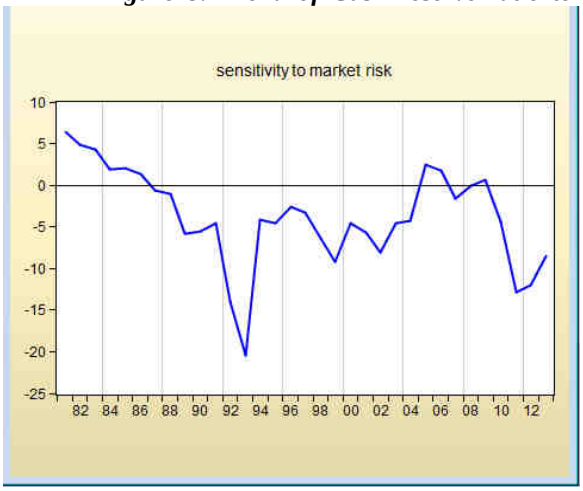


Figure 10: Trend of sensitivity to market risk

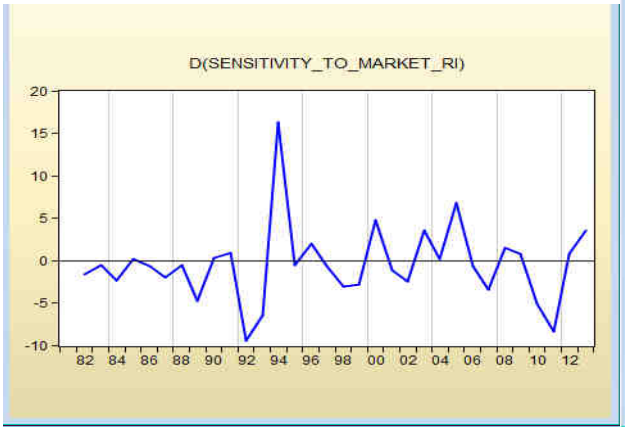


Figure 11: Trend of first difference of sensitivity to market riskFigure 12: Trend of Asset quality

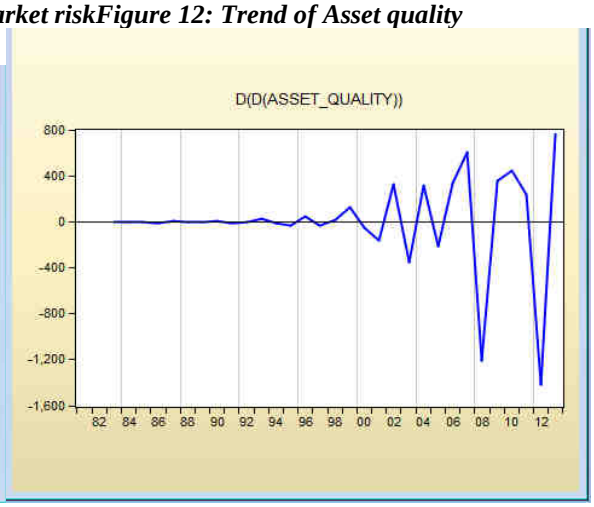


Figure 13: Trend of first difference of Asset quality ***Figure 14: Trend of second difference of Asset quality***

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

Academic conference: http://www.iiste.org/conference/upcoming-conferences-call-for-paper/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar