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Regulation of Bank Capital Requirements and Bank Risk-Taking Behaviour: Evidence from the Nigerian Banking Industry

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Abstract

This study examines how the regulation of bank minimum capital base in Nigeria interacts with the bank risk-taking behavior of the bank operators. Adopting the ex-post-facto researchdesign the study presented in this paper ascertained the effect of the regulation of bank capital on bank risk-taking behavior utilizing post financial crises annualreports of quoted banks from years 2009-2013. Simultaneous linear regressions were used to ascertain the behaviour of banks to regulatory capital requirements from time to time. The panel least squares result suggests that risk, size, and interest margin (spread), and capital adequacy relate positively with changes in risk thus implying that an increase in size and capital, increases bank risk taking appetite. Conclusively, therefore, regulation pressure has a negative correlation with capital adequacy and risk taking appetite but does not significantly affect the capital adequacy as well as risk taking appetite of Nigerian banks.

Keywords: bank regulation, capital adequacy, bank risk-taking, interest margin

1. Introduction

The Nigerian Central Bank was instituted in 1958 with objectives to issue currencies in Nigeria, safe keep Nigeria's international value through the maintenances of external reserves, maintain monetary stability as well as a stable financial system function as a banker to Federal Government and play financial advisory role to the Federal Government. A sound financial system is indeed devoid of bank runs and failures. Capital regulation has been a policy tool in Nigeria to ensure a stable financial sector. The minimum share capital requirement for banks In Nigeria has been a regulatory policy tool and as such the prescribed requirement has continued to be on the increase over time. The Nigerian Banking Ordinance promulgated in 1958 increased minimum share capital requirement for foreign banks in Nigeria from £100,000 to £200,000 while that of the wholly owned Nigerian banks of £12,500 remained unchanged (Ogewewo & Uche, 2006). In 1962, the minimum capital for banks in Nigeria was reviewed and increased to £250,000 for indigenous banks, while foreign owned banks were mandated to retain funds equal to the minimum of £250,000 in Nigeria. A new banking decree promulgated in 1969 repealed the Banking Ordinance of 1958 and increased the share capital for wholly owned Nigerian banks to £300,000 and that of foreign owned banks to £750,000. In 1988, minimum share capital for banks in Nigeria was increased to 6 million naira for investment banks and 10 million naira for commercial banks. Ogewewo and Uche (2006) pointed out that uncontrolled inflation in the country brought about an increase in minimum share capital for banks again within two years to 12 million and 20 million for investment and commercial banks respectively. In 1991, the Banks and Other Financial Institutions act came into existence and repealed the Banking Decree of 1969. This thus raised bank share capital to 40 million and 50 million for investment banks and commercial banks respectively. In 1997, banks in Nigeria were required to raise minimum share capital to 500 million and in 1999 the capital requirement for new banks was stipulated to be 1 billion naira. In 2004 the bank share capital was increased to 2 billion naira for new banks while banks already operating in the Country were given up to the end of 2005 to achieve the new stipulated required capital. Yet, in the same 2004, banks minimum required capital was increased to 25 billion naira and the end of 2005 still remained the required deadline. Given this history of changes in capital requirement, the question thus, is how do banks react to catching up with minimum capital requirement?

Banking firms are levered magnanimously and this stems from the notion that a sizeable make up of bank

liabilities are deposits that also forms a major part of an economy's payments system (Ali, Chawki, & Fouad, 2011). Also, banks play an important role in financial intermediation. These result in their serving as providers of the payment systems and loans, acceptors of deposits and providers of information. Consequently, regulators of banks monitor and constrain their risk-taking appetites as well as limiting their investment activities. Bank regulation process is aimed at safeguarding deposits and the maintenance of a stable payment system. The bank regulation process also safeguards the insurers of bank deposits which ensure the safety, soundness and the payment system continuity. These are why the banking sector is the most regulated sector while stipulating the minimum share capital for banks is the most important aspect of regulation. Seemingly, the objective of this study is thus to ascertain how the regulation of minimum share capital for banks interacts with bank risk-taking appetite and for banks in the Nigerian banking sector. Given this introduction, the section two of the study reported in this paper reviews the related literature while the third section describes the methodological framework (data, model issues etc). Section four presents the results and findings while section five concludes the study.

1.1 Bank Capital Stipulations and Behavior: Theory and Empirical Studies

Theoretically, the stability effect of capital stipulations for banks is strengthened on the premise of the option-pricing model. In the option-pricing model, unregulated banks could undertake excessive risks so as to maximize the value of its stockholder but risking deposit insurance (Rime, 2000; Benston et al., 1986; Furlong & Keeley, 1989; Keeley & Furlong, 1990). Bank regulation through the stipulation of minimum required capital could reduce bank moral hazard intents by ensuring that bank owners absorb a mojor part of the losses if and when they occur. The effect of the availability of more capital and low risk-taking is clearly a shrink in bank's default probability (Rime, 2000). However, availability of more capital necessarily may not imply more safety. Whether the availability of massive capital decreases default risk depends on what happens to their asset combination when fresh capital is introduced (Ogewewo & Uche, 2006). Furthermore, given that the raising of capital is costly, banks would be pressured into generating higher returns thereby forcing them to undertake greater risks (Ogewewo & Uche, 2006).

Studies on the capability of capital stipulations to engender stability in the banking system have yielded various findings. Nafis (2012) investigated the linkages between bank regulatory and supervisory structures associated with Basel III's pillars and various segments of banks' efficiency and risk. His results suggest that regulatory and monitoring powers of regulators increases and decreases the technical efficiency of Islamic and conventional banks efficiency respectively. Frank, Daniel, and Stephanie (2004) assessed the adjustment of capital and risk under capital regulation for savings banks in Germany. Estimating a modified model of Shrieves and Dahl (1992) they noted evidence that the coordination of capital and risk adjustments lies on the quantum of capital available for the bank in excess of the stipulated capital. Delis, Molyneux, and Pasiouras (2008) examined the relationship between regulatory and supervision framework and the productivity of banks using a sample of 22 countries and covering 1999-2006. Applying a semi-parametric two-step approach the results indicate that regulations and restrictions on banks' activities have positive impacts on bank productivity

In Nigeria, Agbeja (2013) studied trends and changes in the capital levels and efficiency utilizing data covering 1992 and 2007 for commercial banks in Nigeria. The results indicated that capital stipulations were ineffective in eliminating distresses in the Nigerian banking industry. Ezirim and Muoghalu (2002) drawing evidence from the Nigerian banking industry investigated the effect of legal and regulatory environments on financial intermediation. Utilizing annual time-series data (1970-2000), the results of the regression analysis shows that the financial intermediation operations of commercial banks in Nigeria are significantly affected by legal and regulatory environments. Okpala (2013) using a sample of commercial banks in Nigeria examined the effect of bank recapitalization exercises on bank lending using a regression analysis and Correlation co-efficient. The study utilized data from structured questionnaires administered. The questionnaires were administered to two top echelons selected from 22 banks in Nigeria that were recapitalized successfully. Results from the study revealed that bank recapitalization has affected the ways and manners banks react to lending.

Ediz, Michael, and Perraudinwe (1998) utilizing confidential supervisory data as well as detailed information from the balance sheet and profit and loss of banks in Britain over 1989-1995 period and concludes that capital stipulations do seem to affect bank behavior over and above the influence of the banks' own internally generated capital targets. Naceur and Kandil (2008) using a multiple regression analysis investigated the effect of capital regulations on cost of intermediation and profitability in Egypt and the overall results support the enforcement of capital regulations by Central Bank's for the improvement of the performance of the banking sector in Egypt.Using a sample of Middle East and North Africa (MENA) countries Naceur and Omran (2008) examined the effect of bank regulations on commercial bank margin and profitability. Utilizing data spanning across a

period of 1989-2005 while controlling for a wide array of bank characteristics, the regression analysis results empirically indicates that bank capitalization and credit risk positively and significantly affects banks' net interest margin, cost efficiency and profitability. Porter (2009) noted inconsistencies on empirical studies concerning the relationship between bank capital regulation and risk and that the inconsistency problem rises from the basic endogenous relationship between risk and capital and to regress risk on capital there is the need for an instrument for capital, but it is difficult to find an instrument that is related to a bank's capital that is not also related to the bank's risk. Porter (2009) thus proposed a solution using stochastic frontier analysis that developed an exogenous instrument for capital that is closely correlated with capital but not correlated with risk.

Blum and Hellwig (1995) opining that bank capital adequacy regulation may reinvent macroeconomic fluctuations cautioned regulators on fairly rigid requirements of capital adequacy. Gual (2011) empirically argue the theories behind the increase in capital requirements proposed by the Basel III regulations and suggests that the new regulations of capital are unlikely to decrease bank risk taking while increased requirements of capital has a high likelihood of increasing costs of fund in the banking sector with severe consequences on the real economy.Roy (2008) applied a simultaneous-equations model in the investigation of the adjustment of bank capital and risk-weighted assets given the passage of the 1988 Basel Accord for banks from six G-10 countries. Roy (2008) analysis suggests that the United States banks that are weakly capitalized increased their capital ratios faster than well-capitalized banks but however failed to modify their risk-weighted assets at different rates from other U.S. banks.Mbizi (2012) determined the importance of minimum required capital on commercial bank performance in Zimbabwe. To carry out his analysis, Mbizi (2012) grouped sampled banks into undercapitalized, fairly capitalized and well-capitalized accordingly in line with the country's minimum capital levels of US$12.5 million as prescribed for commercial banks. Mbizi (2012) reports a significant and a positive relationship between the capitalization of commercial banks and the performance of commercial banks.

Gudmundsson, Ngoka-Kisinguh, and Odongo (2013) in Kenya examined minimum capital requirement and its implications on bank competition using two empirical measures of competition. Relating the Lerner index, an indicator of competitiveness to a number of variables, they found that regulatory efficiency enhances competition in the banking sector. Gudmundsson, Ngoka-Kisinguh, and Odongo (2013) also found evidence that capital has a nonlinear effect on competition. The benefits of increasing capital requirements on competitiveness are realized once consolidation starts to take place (captured by core capital squared). Bank structure was also found to have a significant and important effect on banking performance.Bridges, Gregory, Nielsen, Pezzini, Radia, and Spaltro (2014) in their study examined how changes in micro-prudential guidelines affect capital ratios and lending behaviors of banks. Bridges et al. (2014) estimated the variations in individual bank capital requirements in the United Kingdom between 1990-2011 and reported two findings. Firstly, regulatory requirements of capital affect the ratio of capital held by banks. Secondly, regulatory requirements of capital affect lending with heterogeneous responses in different sectors of the economy.

Naceur and Kandil (2013) investigated the linkage between the implementation of the Basel I Accord and lending activities for banks in Egypt, Jordan, Lebanon, Morocco, and Tunisia. Using annual bank level data spanning over 1989-2004 findings from the analysis of data supported a significant increase in credit growth given the implementation of capital regulations. Rime (2000) exposed the reaction of Swiss Banks to constraints arising out of the regulation of capital. Using a simultaneous equations model Rime (2000) reports that capital regulatory pressure induce banks to increase their capital but however does not affect bank level of risk. Also using a simultaneous equation model Ali et al.(2011) analysed the impact of capital requirements on bank risk-taking for Lebanese banks. Using a panel data set for 41commercial banks for periods between 1996 and 2008, they found that higher capital requirement increases bank risk. The positive relationship between bank profitability and increase in capital which they found suggest that Lebanese banks rely more on retained earnings in meeting capital requirements. Their findings indicated also that larger banks tend to hold lower capital and controls risks better through diversification.

2. Method

Design, Sampling, and Data Issues: The study used bank-level data in the post financial crises years of 2009-2013. Data for the study were gathered from balance sheet and income statement of publicly owned banks whose shares are quoted and traded on the Nigerian Stock Exchange, hence publicly owned banks constitute the research sample which is arrived at using a judgmental sampling technique. The income statements and balance sheets were obtained from the financial reports of each bank as exhibited on their webpages. The period of analysis includes years for which banks in the Nigeria were forced by the regulatory authority to recapitalize. All variables for the sampled banks are observed for each cross-section and each time period, resulting in a total number of 55 (fifty five) bank-year.

The Model: Studies on capital requirement and bank risk taking as empirically reviewed above use simultaneous linear regressions to evaluate the response of banks to regulators imposition of capital requirements. The model contains two equations with dependent variables of bank capitalisation and risk taking. These two interdependent variables vary simultaneously such that changes in bank capitalisation brings about an adjustment in risk-taking. Seemingly, changes in risk level cause the bank to adjust its capitalisation level. In line with Ali, Chawki and Fouad (2011) who noted two components (discretionary endogenous and random shock) in changes in capitalisation and risk takin, the equations are specified thus:

$$\Delta CAR_{it} = \Delta^{d} CAR_{it} + U_{it} \quad (1)$$

$$\Delta RISK_{it} = \Delta^{d} RISK_{it} + U_{it} \quad (2)$$

where $\Delta CAR_{i\,t}$ and $\Delta RISK_{i\,t}$ are the observed changes in capital and risk respectively of bank *i* at time *t* and $\Delta^{d} CAR_{i\,t}$ and $\Delta^{d} RISK_{i\,t}$ represent the discretionary of changes in capital and bank risk taking *i* at various times *t*. U_{it} *is* the random errors. The optimal levels of capitalisation * *CAR* and risk-taking * *RISK* that bank management maintains are assumed to linearly depend on a set of external factors that form the decision process in the bank. It is assumed that the bank aims to achieve–in the long run–these optimal levels by taking a discretionary adjustment of capital and risk. To adequately approximate the targeted levels of capital and risk (* *CAR* and * *RISK*) presented in equations (1) and (2) the study incorporated factors that influence either bank capital or bank risk-taking at the same time thus including:

Risk and Capital: Banking risk is traditionally captured by loans and advances to total assets ratio. Regarding capitalisation level, this study used the ratio of equity-to-total asset ratio (CAR).

Bank Profitability Bank profitability is measured by the net income-to-total asset ratio (*ROA*). Theoretical and empirical studies indicate a positive relationship between bank profitability and capital.

Size: Ali, Chawki, and Fouad (2011) indicate that the size of a bank influences the level of chosen capital. Additionally, diversification is better achieved in large banks than in small bank, which reduces its credit risk (*RISK*). Size in this study is proxied by the log of total assets and a negative relationship is expected between *SIZE* and *RISK*.

Provision for Loan Losses: Provisions for loan losses (*LLP*) are used either to cover the losses already recorded or written-off of total loans, or to cover (future) expected losses. This leads to a positive relationship between the amount of bad loans and the provisions for loan losses. LLP is captured as natural log of LLP and a positive relationship is expected between *LLP* and *RISK*.

Net Interest Margin: Net interest margin reflects the competitive circumstances of banks and the variable *SPREAD* capturing net interest-to-total assets was adopted. Net interest margins tightening could be caused by an increase in competition which undermines the competitiveness characteristics of the bank and reduces its franchise value. In these situations, banks may take a risky position that leads in a reduction in capitalisation and/or a decrease in the quality of loans granted.

Regulatory Pressure: Regulatory pressure is one of the most influential factors on capitalisation level and risk taking of banks. This variable decides whether banks subjected to minimum capital standards, feel "threatened" by regulatory constraints, which force them to boost their capital and/or reduce their risk. If at the end of year *t*, a bank *i* reports a solvency ratio (*CAR*) below the regulatory minimum (10%) *REG Min*, then it is likely that during the following year (*t*+1), the bank will be subject to disciplinary actions from its supervisor.

Precisely, in year *t* and for bank *i*, the variable *REG* is arrived at using a dichotomous variable of 1 where the CAR is greater than 10% and 0 where the CAR is less than 10%.

In sum, we estimated two simultaneous equations which are linked by the two variables *CAR* and *RISK*, with a set of exogenous variables. The ultimate model is specified thus:

$$\Delta CAR_{it} = a + {}_{b1}ROA_{it} + {}_{b2}SIZE + {}_{b3}SPREAD_{it} + {}_{b4}RISK_{it} + {}_{b5}CAR_{it} + {}_{b6}REG_{it} \quad (3)$$

$$\Delta RISK = a + {}_{b1}LLP_{it} + {}_{b2}SIZE + {}_{b3}SPREAD_{it} + {}_{b4}CAR_{it} + {}_{b5}RISK_{it} + {}_{b6}REG_{it} \quad (4)$$

3. Results

In the effort to determine the effect of capital stipulation on bank behavior in Nigeria, thirteen (13) banks whose shares are quoted on the Nigerian Stock Exchange constituted our sample. The findings from the simultaneous equation of change in capital and risk taking of banks are as presented in Tables 1 and 2 below:

Table 1. Regression result

Dependent Variable: CHANGECAR				
Method: Panel Least Squares				
Date: 10/07/14 Time: 07:15				
Sample: 2009 2013				
Periods included: 5				
Cross-sections included: 11				
Total panel (unbalanced) observations: 53				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
REG	-34.44403	43.54138	-0.791064	0.4347
RISK	0.225751	1.062815	0.212408	0.8331
ROA	3.327823	1.864921	1.784431	0.0838
SIZE	30.51485	20.60758	1.480759	0.1485
SPREAD	4.963737	7.024471	0.706635	0.4849
CAR	1.969208	1.895299	1.038995	0.3066
C	-270.7754	177.0466	-1.529402	0.1360
	Effects Specification			
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.478847	Mean dependent var		-8.577556
Adjusted R-squared	0.153127	S.D. dependent var		69.57444
S.E. of regression	64.02637	Akaike info criterion		11.44436
Sum squared resid	131180.0	Schwarz criterion		12.22505
Log likelihood	-282.2756	Hannan-Quinn criter.		11.74458
F-statistic	1.470117	Durbin-Watson stat		3.094990
Prob(F-statistic)	0.161323			

Table 2. Dependent variable: Changerisk

Method: Panel Least Squares				
Date: 10/07/14 Time: 07:10				
Sample: 2009 2013				
Periods included: 5				
Cross-sections included: 11				
Total panel (unbalanced) observations: 52				
White diagonal standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGLLP	91.24400	94.50654	0.965478	0.3418
REG	-539.1414	413.7704	-1.302997	0.2022
RISK	12.12167	6.789748	1.785290	0.0840
SIZE	105.8310	136.2216	0.776903	0.4431
SPREAD	18.72614	41.65343	0.449570	0.6561
CAR	10.75125	9.518736	1.129483	0.2674
C	-504.5640	804.6037	-0.627096	0.5352
	Effects Specification			
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.452706	Mean dependent var		67.55472
Adjusted R-squared	0.099613	S.D. dependent var		394.3276
S.E. of regression	374.1724	Akaike info criterion		14.97775
Sum squared resid	4340154.	Schwarz criterion		15.76575
Log likelihood	-368.4214	Hannan-Quinn criter.		15.27985
F-statistic	1.282116	Durbin-Watson stat		3.184517
Prob(F-statistic)	0.260890			

Source: Author's Eviews Output.

4. Discussion

The result of the estimated equation of $\Delta CAR_{it} = a + {}_{b1}ROA_{it} + {}_{b2}SIZE + {}_{b3}SPREAD_{it} + {}_{b4}RISK_{it} + {}_{b5}CAR_{it} + {}_{b6}REG_{it}$ in a total panel (unbalanced) fifty three (53) observations have change in capital adequacy ratio (CAR) have profitability, size, spread between interest income and expenses, credit risk, capital adequacy, and element of regulation. The result shows that increase in capital requirement relates positively with bank risk, profitability, size, spread, and capital adequacy ratio. This implies that regulatory changes in capital requirement increases bank appetite for risk, enhances bank profitability through improved net interest margin as well as increase in size. This finding corroborates the report of Ali et al. (2011) who found that higher capital requirements are associated with increasing risk taking and also a positive correlation with bank profitability. However, the element of regulatory capital (REG) relates negatively with changes in capital adequacy implying that tightening of regulation negates increased changes in capital adequacy.

In determining the effect of variations in bank risk taking, the equation $\Delta RISK = a + {}_{b1}LLP_{it} + {}_{b2}SIZE + {}_{b3}SPREAD_{it} + {}_{b4}CAR_{it} + {}_{b5}RISK_{it} + {}_{b6}REG_{it}$ which has provision for loan losses, size, net interest margin (spread) capital adequacy, credit risk and element of regulation was estimated and the result presented in Table 2 below.

The panel least squares result suggests that risk, size, net interest margin (spread), and capital adequacy relates positively with changes in risk thus implying that that an increase in size and capital increases bank risk taking appetite. Also, the result suggests that an increase in credit risk increases loan loss provisions or expenditure. The negative coefficient of the element of regulation (REG) indicates that improved regulation brings about a reduction in banks risk taking appetite. Even though a negative correlation exists between regulatory stipulations and bank risk behavior the effect is not statistically significant. This finding is in consonance with the findings of Rime (2000) whose result indicates that regulatory pressure does not affect the level of risk for Swiss banks.

The continuous dependence of bank regulators on capital requirements as a regulatory tool and option raises lots of questions. These questions include: do the penalties for failing to adhere to required capital stipulations induce banks to adhere to capital requirement regulations? Increases in capital requirements does it induce banks to raise or lower the riskiness of their portfolio? With economic theory and past studies disagreeing over these questions, this study empirically examined the effect of stipulation of required capital on banks' behavior for Nigerian banks. Stemming from the findings of the study presented in this research paper, regulation pressure has a negative correlation with capital adequacy and risk taking appetite but does not significantly affect the capital adequacy as well as risk taking appetite of Nigerian banks.

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