# Bank Consolidation and Bank Risk Taking Behaviour: A Panel Study of Commercial Banks in Nigeria

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## Abstract

This paper investigates the impact of bank recapitalization on the risk taking attitude of commercial banks in Nigeria. We employed panel data model in the analyses and the results show that increase in bank capital promotes bank stability. The results also reveal that excessive provisions for bad loans may be an indication that a large part of bank credit is nonperforming and this affects bank's stability adversely. The results further indicate that growth in size is an important determinant of credit risk alongside large capital, although growth in size of banks has a nonlinear effect on bank stability. We found that the consolidation period was followed by abnormal increases in bank lending, indicating the existence of moral hazard problem. Our findings suggest that increase in capital base should also be matched with effective regulations to prevent moral hazard problem from dampening the positive effect of capital reforms on bank stability.

**Keywords:** recapitalisation, merger, consolidation, reforms, risk-taking

## 1.0. Introduction

The Nigerian banking industry has passed through different phases of reforms since the introduction of Structural Adjustment Programme (SAP) in the country in 1986, at least to make the industry compatible with international standards and to ensure financial stability. The first phase of reform in the industry was the financial systems reforms of 1986 to 1993 which led to deregulation of the banking industry which was before then dominated by indigenous ownership with over 60 per cent Federal and State governments' stakes. Credit, interest rate and foreign exchange policy reforms were also part of the reforms in this phase. The massive bank failures of 1993 let to the second phase of reforms which covers the period 1993-1998. The third phase began with the return to civilian rule in 1999 which reintroduced liberalization of the financial sectors, accompanied with the adoption of distress resolution programmes. This era also saw the introduction of universal banking which empowered the banks to operate in all aspect of retail banking and non-bank financial markets. The fourth phase is the consolidation which began in 2004 (called the big bang) to date and it is informed by the Nigerian monetary authorities who asserted that the financial system was characterized by structural and operational weaknesses and that their catalytic role in promoting private sector led growth could be further enhanced through a more pragmatic reform (Balogun, 2007).

In terms of performance, the banking industry in Nigeria witnessed a remarkable growth, especially since the de-regulation of the financial services sector in the last quarter of 1986. For example, the number of banks increased by about 154.8% from 42 in 1986 to 107 in 1990. It further increased by about 12% to120 in 1992. By 2004, however, the number had reduced to 89 as many banks that could not cope with the increasing competition for funds and increasing cost of operation had to liquidate. The number of bank branches also rose from 1,394 in 1986 to 2,013 in 1990, 2,391 in1992 and by 2004 in spite of the reduction in number of banks, it had reached 3,100. This translates to inter-temporal increases of 44%, 18.8 percent and 29.7 percent, respectively (CBN, 2005; Ebong, 2007). Also, banks deposit mobilization between 1990 and 2004 increased drastically. For example, total deposits in the banking industry increased by 3,687.3 percent from N43.87 billion in 1990 to N1,661.5 billion in 2004. Due to the structure of the industry, however, the bulk of these deposits was held by a few banks. For instance, of the eighty-nine banks in existence in 2004, only ten accounted for 55.3 percent and 55.4 percent of the total deposits in 2003 and 2004, respectively (CBN, 2005). The rate of growth of aggregate bank credit (net) to the domestic economy ranged from 13.5 percent in 1997 to 60.1 percent in 1999. This declined to a low of 22 percent in 2004 and rose again to 30 percent in 2004 during the consolidation period.

Due to the lending habit of banks in the 1990s and early 2000s, it was found that the asset quality deteriorated progressively at the beginning of 2000. According to CBN(2005) the ratio of non-performing credit to

total credit declined from 45 percent in 1992 to 19.35 percent in 1998, and by 2000, the ratio of nonperforming to total loans rose to 21.5 percent and again to 23.08 percent in 2004. These bad accounts represented 567.7%, 419.8% and 105.3% of shareholders' funds in 1994, 1996 and 2004, respectively. Indeed, in the years 1990 to 1997, the shareholders' funds had been impaired by non-performing risk assets in several multiples. The banks adjudged to be sound was consistently less than 15% of the total number for the four-year period. In addition, those whose performance was considered satisfactory represented as high as 70% of the total in 2001. By 2004, however, this group represented only 58.6% of the total number of banks covered by the exercise (CBN, 2005).

## 1.2. Research Problem

In response to the continuing deterioration in the financial health of the banking industry in Nigeria and in order to ensure a reliable and sound banking system, the CBN in July, 2004 rolled out a 13 point reform agenda aimed at consolidating the banking sector and preventing the occurrence of systemic distress. Two major elements in the reform package were the requirement that the minimum capitalization[1] for banks should be N25 billion with effect from end of December, 2005 and the consolidation of banking institutions through mergers and acquisitions should be initiated. The exercise resulted in 25 banks through mergers, acquisitions and equity finance after the revocation of the banking licenses to 14 banks which as at 31st December 2005 had failed to meet the minimum regulatory capital requirement of N25 billion.

The 2004 banking reform was not the first time banks in Nigeria were required to recapitalize. For example prior to 1992, the minimum paid up capital requirement for banks in Nigeria was N12 million for merchant banks and N20 million for commercial banks. A review that year moved the requirements to N40 million and N50 million respectively. This level lasted till 1997 when a uniform N500 million minimum capital was introduced. In 2000, the minimum capital was moved to N1 billion for new banks while existing banks were expected to meet this level by December 2002. N2 billion minimum paid up capital was introduced for new banks in 2001 while existing banks were given until December 2004 to comply. Unfortunately however, the upward review of minimum capital base to N50 million in 1992 and again to N500 million in 1997 or to N1 billion in 2000, could not prevent systemic distress that plagued the industry between 1993 and 2002 during which 51 banks were distressed in 1995, and 22 others in 1998. Moreover, five banks were liquidated between 1994 and 1995, and 26 others in 1998 (CBN, 2000). In 2002, five more commercial banks were liquidated. This trend suggests that adjusting or raising the minimum capital base of banks has not guaranteed a stable banking industry in Nigeria and it is not known whether raising the capital base of banks increases or decreases their risk taking incentives.

Following the 2005 consolidation, there have been some worrisome developments in the banking sector. For example, total credit of the banking sector recorded a growth rate of 23.83 percent in 2004, 30.36 percent in 2005, 40.89 percent in 2006, 82.7 percent in 2007 and 62.82 percent in 2008. Non-performing credits increased from N0.4 trillion in 2007 to N0.5 trillion in 2008, although there were improvements in the ratio of non-performing credits to total credits. These ratios were 21.8 percent, 18.12 percent, 8.77 percent, 8.44 percent and 6.26 percent in 2004, 2005, 2006, 2007 and 2008 respectively. The provision for bad and doubtful debts grew from N0.2 trillion in 2004 to N0.4 trillion in 2008. The ratio of bad debts provision to total credit declined from 22.6 percent in 2004 to 6.1 percent in 2008. Earnings volatility, rising non-performing credits, declining ratio of provision for bad and doubtful debts and increases in off-balance sheet activities such as lending money to customers to purchase shares in the stock market as well as bursting of the bubble in the Nigerian Stock Exchange were indications of increasing risks observed in the banking industry in Nigeria in the post consolidation period (CBN, 2008)

This study is therefore motivated by some important issues in the literature. The first is that few empirical works (see Murinde and Zhao, 2009) have investigated the effect of minimum capital regulation and mergers on bank risk-taking behavior in Nigeria following the recent consolidation exercise. Our study will depart from Murinde and Zhao paper in different ways. First, the measure of risk adopted. While they use loan loss provision as a measure of bank risk we use the z-score and other measures of bank risk such as volatility of returns and loan growth. Adopting alternative measures of risk in the study will shield more light on how capital structure is related to alternative measures of bank risk. Also, the advantage of z-score measure over the loan loss provision, which existing literature has pointed out is that the z-score measures the number of standard deviations by which bank returns have to fall to wipe out bank equity (Boyd and Runkle, 1993). It can also be used to measure systemic risk by computing system wide z-score. This indicator has been widely used in recent analyses due to its suggestive distance-to-insolvency interpretation (Demirgüç-Kunt and Enrica Detragiache, 2010; and Laeven and Levine, 2008; among others).

The second motivation for this study is that the disagreements in the theoretical banking literature on the effect of minimum capital regulation and mergers on bank risk taking behaviour require empirical investigation using country specific datasets. Our study would therefore attempt to fill the above gaps in the Nigerian domestic literature by addressing the following research questions: How does recapitalization and mergers affect risk taking behavior of

Nigerian commercial banks? And Are there other bank specific factors other than capital that affect risk-taking behavior of commercial banks in Nigeria?

## 2.0. Methodology and Data

### 2.1.1. Conceptual Issues

*Risk measure*: we adopted various measures of bank risk in the study. One is the Z score measure of bank level risk adopted by Laeven and Levine (2008) defined as sum of return on assets plus capital-asset ratio divided by the standard deviation of asset returns. That is , and this is the inverse of the probability of insolvency. ROA is return on assets defined as $\pi/A$ where $\pi$ is net profit and A is total assets, and CAR is the capital-asset ratio defined as E/A, where E is shareholders equity. According Laeven and Levine, the Z score indicates the number of standard deviations that a bank's ROA has to drop below its expected value before equity is depleted. This is used as a composite measure of bank stability. A higher z-score indicates that the bank is more stable. Since the z-score is highly skewed, we use the natural logarithm of z-score (which is normally distributed) in our estimations. Besides studying the z-score which is a composite measure of risk, we separately examined alternative measures of bank risk such as volatility of asset returns, , and leverage, , volatility of equity returns and volatility of earnings. Volatility of earnings equals the standard deviation of the ratio of total earnings before taxes and loan provisions to average total assets, while volatility of equity returns is the annualized value of volatility of weekly equity returns for each year (Laeven and Levine, 2008). Other measures of risk that have been used in the banking literature which we adopt includes credit growth which captures credit risk and liquidity risk which is the ratio of liquid assets to deposits and short-term funds. One reason why we adopt this approach to bank risk analysis is that over the years Nigerian banking industry has witnessed a high wave of instability even after the bank consolidation exercise of 2005. One measure of bank risk may not be sufficient to obtain a comprehensive analysis for good policy prescriptions.

**Bank Level control variables**: in order to control for bank level heterogeneity, have shall introduce a set of control variables both time variant and time invariant represented in our model by the vector . These are as defined below.

*Log of total assets* (LOGASSET) measures the size of the bank. Banks in Nigeria have grown in size measured by the total assets. Most banks now use their assets as advertising technique to gain customers from their rivals. This has been adopted in many studies to control for the effect of size on bank performance as well as on bank risk taking behavior (Naceur, 2003; Clarke *et al*., 2004). The relative efficiency hypothesis presupposes that larger banks are more efficient than smaller ones, and are more profitable as a result of this superior efficiency. Larger banks have better risk diversification opportunities and thus lower cost of funding than smaller ones. We have no apriori assumption on the sign of coefficient of assets (as a measure of bank size) on bank stability. This sign of the coefficient will depend on asset quality, loan portfolio, and probability the measure of risk adopted. If the banks have high quality assets, we expect this to increase bank stability.

*largebank* (MKTSHARE) is a variable that measures the percentage of total deposits of the banking industry controlled by a bank i at time t. A bank that has 10 percent or more of the market share is considered a large bank (Laeven and Levine, 2008). We shall use the growth of deposits to measure public confidence in bank i at time t. However, due to asymmetric information, deposit growth in Nigeria may not actually be due to the fact that the bank takes minimal risk. This might be caused by marketing approach and deposit drives by banks and extensive advertising which are likely to misinform depositors.

**Merger** takes the value one if bank consolidated by merger and zero otherwise. The effect of merger on bank risk taking is ambiguous and depends on similarity and dissimilarity of risk taking behavior of merging banks D'Souza and Lai (2006).

*Loanprov* is the ratio of Loan Loss Provision to Total Loans and captures the amount of provisions for bad loans bank i makes at time t. The sign of this coefficient is ambiguous in the sense that higher loan loss provision than the previous year could serve as a buffer or precautionary reserve building as well as a provision for rising amount of nonperforming loan.

**Reform_dummy** is a reform dummy variable that takes the value 1 in the post-consolidation and zero otherwise. These will help to capture structural break due to massive reforms that occurred in the industry since 2004.

### 2.1.2. Model Specification

Following the works done by Fraser and Anderson (1999), Laeven and Levine (2008) among others, and the nature of our dataset, we shall employ panel data technique in our study in order to account for possible serially related component or cross-sectionally related component or both of the disturbance term. Hence we specify a time-series cross-sectional (TSCS) regression analysis as follows.

Where $Z_{it}$ is the risk measure of bank i at time t (log_ z-score, loangrowth, loanprov), $Z_{it-k}$ is the $K^{th}$ lag of risk. $CAR_{it}$ is the capital of bank i at time t, the other variables are bank-level control variables, y wide variables and dummy variables as we defined in table 12 in the appendix such that denotes unobservable bank specific effect, denotes unobservable time effect, and is the remainder stochastic disturbance. It should be noted that is

bank-invariant and accounts for any time specific effect that is not included in the regression. According to Fraser and Anderson (2000), "the TSCS procedure adds the individual and time-specific random effects to the variance-covariance matrix of the disturbance term. As a result, the variance-covariance matrix of the disturbance term is no longer a diagonal matrix with the same value at each diagonal element as with OLS, but a full matrix in which each element can assume a unique value.

We apply two different techniques to estimate the model: Pooled Ordinary least squares (POLS) estimator and a dynamic two-step system GMM panel estimator, as proposed by Blundell and Bond (1998) with Windmeijer's (2005) finite sample correction. Since panel is unbalanced and given the autoregressive regression model, we use the orthogonal deviations transformation of instruments, which makes them also exogenous to possible bank-level fixed effects. Standard errors are robust regarding potential problems from heteroskedasticity and clustering of observations within banks using the Huber-White correction in the OLS specification, and using the Windmeijer correction in our GMM models. By adopting a panel and dynamic panel analysis, we would be able to capture most of the dynamics that underlie adjustments in capital structure of banks both before and after the 2004/2005 "big bang." In order to investigate if bank capital has a non-linear effect on risk-taking behavior we shall introduce the square of capital as one of the regressors.

### 2.1.3. Data

Data for the analysis are bank level panel data covering all 25 consolidated banks in Nigeria for the period 2001 to 2008. Data sourcesl include CBN Annual Report on Bank Supervision and Performance, banks' annual reports and financial statements various years, among others. The challenge of gathering bank level data in Nigeria is very enormous considering the fact that banks do not adopt uniform standards in reporting their final accounts in Nigeria. However, we were able to gather substantial information from the annual reports published by the banks and also the Banking Supervision report published by the central bank of Nigeria each year. We were able to obtain most of the bank reports from the Nigerian Securities and Exchange Commission Abuja as well as from bank headquarters. From the data collected from these sources we calculated other measures such as the z-score, loan growth, volatility of earnings and Capital to Asset Ratio (CAR).

### 3.0. Empirical Results, Discussions and the Policy Implications

The following section shows the empirical results as well as our interpretation of the results and their policy implications. Table 1 shows the summary statistics of the variables used in the model estimations. The merger variable shows that about 37 percent of the banks that emerged after the consolidation occurred through mergers, while the remaining 63 percent acquired other banks. We consider banks that have more than 10 percent of the total industry deposit at any time large banks and about 48 percent of the sample consists of large banks since they account, on the aggregate, for largest concentration of banking industry's deposits. The reform dummy captures the period after the consolidation of 2004. The dummy takes the value 0 for periods before 2004 and takes the value 1 otherwise. Hence about 50 percent of the sample period was collected in the post 2004 consolidation. The mean of capital adequacy ratio was 15 percent for the industry over the entire sample period although the lowest over the sample was 2.3 percent implying severe undercapitalization and the peak of 41 percent implying capital adequacy. The average return on assets was 2.2 percent although it was lowest at 0.6 percent at some point in the sample and the peak was as high as 38 percent, this was not generally bank for the industry in terms of performance.

The average total assets for the banking industry was N210.53 billion with the peak of N1.68 trillion for some bank at some point in the sample. The deposit accumulation follows almost the same course as total assets although assets are slightly higher on the average. For example, the deposit for the industry as a whole reached a peak of N1.26 trillion. Both have been used interchangeably by empirical studies to measure the size of individual banks. However, the volatility of deposits is higher than that of assets. In our estimations, both of them produced identical results. The logarithm of z-score is used instead of standard z-score because the log is approximately normally distributed and the average z-score over the sample period is about 2.7. The average loans and advances over the sample period was N67.6 billion this reached a peak of N447.1 billion. Share of provision for bad and doubtful loans to total loans (loanprov) reached a high of 47 percent and on the average was 11 percent over the study period and most of the increase occurred after the consolidation of 2004 and 2005. Loan growth over the study period was 31 percent on the average and it reached all-time high of about 85 percent after the consolidation. This, combined with increasing provision for bad loans, shows that a substantial proportion of the loans were expected to be nonperforming, an indication of increasing risk-taking by commercial banks in Nigeria following the recapitalization exercise.

Table 2 shows the pooled OLS estimates of determinants of bank risk using z-score (aggregate risk) and loan growth (proxy for credit risk). Pooled OLS estimator is appropriate since Hausman's test suggests random effect model is preferred over fixed effect estimator. Table 3 shows similar results but with Hausman-Taylor estimator which is an instrumental variable (IV) estimator that additionally enables the coefficients of time invariant regressors

to be estimated. It does so by making the stronger assumption that some specified regressors are uncorrelated with the fixed effect (Cameron and Trivedi, 2009). The Pooled OLS estimates and Hausman-Taylor results show positive and statistically significant impact of bank capital (CAR) on bank stability (z-score). For example a unit increase in CAR increases bank z-score by two standard deviations. In other words, increase in capital adequacy ratio reduced significantly the probability of bankruptcy among commercial banks in Nigeria. The OLS results show that increase in CAR has positive impact on loan growth but this is only statistically significant at the 10 percent level. This suggests that the recapitalisation increased moral hazard problem because it caused banks to lend more and the possible adverse selection effect caused nonperforming loans to increase, hence commercial banks were exposed to high credit risk.

The reform dummy variable shows that there was structural break in 2004 in bank risk model following the bank consolidation. The dummy shows negative impact of the post-consolidation on bank stability which was contrary to expectations. This result is consistent with the events that unfolded after the consolidation in which banks were bailed out and are being forced to merge and some of them taken over by the monetary authorities. The results, on the other hand, show positive and significant impact of the consolidation on credit growth. There was substantial credit growth and increase in margin lending by commercial banks in Nigeria following the consolidation exercise. This was due to moral hazard problem created by large capital. It was through this channel that the consolidation period led to lower z-score or increase in the probability of insolvency. The lagged z-score has positive and significant impact on the current z-score which implies that capital buffers built up in the past increases bank stability in the subsequent periods.

The variable merger has positive effect on bank z-score and significant negative impact on bank credit growth suggesting that weeding out of weaker banks in the system is consistent with bank stability. This is because merged banks are more cautious with lending and with large capital are better able to deal with short-term liquidity problems than the smaller banks. The results show that earnings volatility, that is, the volatility of ROA has significant negative impact on bank z-score or bank stability. The loan growth model shows that size matters and has significant nonlinear effect on bank credit risk. The quadratic pattern shows a minimum which means as banks become larger credit risk reduces until at the turning point when increase in size (deposits) increases credit risks.

Table 4 shows Arellano-Bond dynamic two-step system GMM panel estimates with Windmeijer's finite sample correction. The table shows the results for zscore measure of aggregate bank risk and the results for alternative measures of bank risk we adopted in this study namely, loan growth (loangrowth), and in table 10 we show the results for loan loss provision alternative definition of bank risk-taking for robustness checks. The dynamic panel model is informed by that fact that previous state of bank stability or bank z-score could have effect on the current values or previous level of bank risk taking behaviour could also affect the current level of bank risk having observed the consequences over time. In order to account for this dynamics we estimated dynamic panel model using the method suggested by Arellano and Bond (1991) and Windmeijer (2005). We reported the dynamic panel specification or post-estimation tests on the foot of the results in table 4 and table 5. The statistics show we do not have any specification problem. For example, the test of overidentifying restrictions show that the null of validity could not be rejected and there is no autocorrelation of the residuals at the chosen lags as shown by the high probability values in parentheses.

The results in table 4 show that there is significant persistence as exhibited by the significance of the lags of the logarithm of z-score up to the third lag. The previous z-scores up to lag 3 have significant positive effect on the current z-score implying that capital buffers built up in the past have a long lasting effect on the current level of bank stability. Similar results are seen with loan growth variable as proxy for bank credit risk. In column 3 of table 4, we see a significant negative impact of previous values of loan growth on the current value up to lag 2. This implies that banks became more cautious with lending having been exposed to substantial credit risk after the consolidation. They learnt from experience although regulatory factors may have contributed partly to cautious lending by commercial banks.

Corroborating OLS results, the dynamic panel results in table 4 show that capital adequacy has strong positive impact on bank stability measured by the z-score and on the other hand, has significant positive impact on credit growth. In other words, large capital is central to achieving a stable banking industry in Nigeria if commercial banks could manage the moral hazard problem resulting therefrom. We found that merger has positive and significant impact on bank stability. It reduces the probability of bankruptcy as merged banks become more efficient with large capital and with more diversified management. Merging of banks has negative impact on credit growth thus reducing the probability of incurring large amounts of nonperforming loans. The reform dummy has negative and significant impact on bank z-score and at the same time has positive and significant impact on loan growth. This means that as banks became more consolidated with large capital they increased margin lending due to moral hazard problem. Eventually, most of these loans turned bad and exposed the banks to substantial amount of credit risk and

hence increases the probability of bankruptcy. Thus large amount of capital could be a double-edge sword if not supported by effective regulation to control the lending pattern of commercial banks.

Consistent with OLS estimates and some theoretical literature, the dynamic panel estimates show a significant nonlinear effect of size (measured by either total assets or total deposits) on credit growth. This is shown by the significance of both the log of total assets (or total deposits) and the squared log of total assets and total deposits. This implies that increase in size reduces risk up to a point and then increases risk taking. Again, we see a strong negative impact of volatility of asset returns (ROA) on bank stability. This means that banks with more variable earnings are more likely to be unstable and sooner or later may be weeded out of the industry.

The result for loan growth model shows a significant negative impact of loan loss provisions on credit growth. This is expected because as banks make higher provisions for bad loans, the less the amount they would lend and hence the lower the amount of debts that will turn bad in the subsequent periods. Therefore, large provision for bad loans is desirable as it reduces banks' exposure to credit risk but less desirable because it reduces earnings and thus decreases bank stability.

Table 5 shows the results for ratio of loan loss provision to total loans as alternative measure of bank risk. The results are similar to the results with obtained using the loan growth as a measure of credit risk in table 9. The results show that CAR has positive and significant impact on loan loss provision. Hence CAR increases bank appetite for increase in lending as well as increase in provision for losses, other things being equal. Merger of banks in Nigeria was characterised by significantly higher provisions for loan losses. This might due to the fact that merged banks became very cautious by making excessive provisions or became reckless with lending thereby increasing provision for losses. The reform dummy has negative and significant impact on loan loss provisions while increase in size (total assets) has significant positive impact on loan loss provisions but this effect is nonlinear due to the negative and significant impact of the coefficient of log of total assets in the regression. The positive and nonlinear impact of size on risk means that as banks growth larger in size they become reckless depending on whether increasing provision for losses could be interpreted as increasing risk. But at a certain size the bank reduces margin loans and hence decreases provision for losses. The asset structure variable shows positive and significant impact on loan loss provisions which means that the potential to make larger profits by lending more out of the total assets exposes the bank significantly to credit risk.

### 3.1.    Policy Implications of the Results and Conclusion

Our results have important policy implications on how to ensure safe and stable commercial banking industry in Nigeria. First, capital adequacy matters and thus is fundamental to ensuring the stability of the banking industry in Nigeria. Again, the merging of banks to create large banks was very fundamental to reducing systemic distress in the Nigerian banking industry. Hence bank recapitalization exercise through mergers and acquisitions in the country was a step in the right direction towards achieving a stable financial environment and should be pursued with rigor. Therefore capital-based reforms should also be matched with effective regulations to prevent moral hazard problem from dampening the positive effect of capital on bank stability. Second and important policy implication of our findings is that the Central Bank of Nigeria (CBN) should closely monitor banks that make large provisions for bad loans because this might be an indication of potential high degree of non-performing loans instead of serving as a cushion for absorbing the risk of bankruptcy. Increasing provision for loan losses might serve as early warning signal of impending credit risk crisis. If such excessive provisions are not monitored on time, they are likely to increase the probability of bankruptcy in the future. This was the main reason why about five banks were at the brink of collapse before the CBN intervened with bank bail-out with over N420 billion (about $280 million). The CBN failed to effectively supervise banks pattern of lending and scrutinize the provision for bad loans properly immediately after the 2004/2005 bank consolidation.

The third policy implication of our results is that banks learn overtime and as a result of high risk exposure in the past. This was evident in the significant negative impacts of the previous risk on the current level of risks. By incurring huge loses banks are likely to reposition themselves in subsequent periods. This will be the case if the regulatory authorities impose adequate checks and penalties for contraventions of the frameworks within which banks should operate. Moreover, the significant positive values of the lagged z-scores on the current z-score means that a stable banking industry has a lasting effect on the future stability of the industry but this is not likely to last forever. Therefore regulatory and operational environment of the industry should be reviewed at all times to suite the macroeconomic environment. The fourth policy implication of our findings is that growth in size is likely to result in inefficiencies unless there is expansion of managerial and regulatory capacity to deal with the complexities of managing such large financial institutions. Again, correct valuation of banks' assets at all times especially with respect to risky nature of the assets will be necessary to avoid overblowing assets.

Finally, the post-consolidation period is characterized by increase in risk-taking by banks and thus has negative impact on bank stability. Hence, the recapitalization process introduced moral hazard problems in the

banking industry. Therefore deposit insurance should be adequately priced to reduce moral hazard problems and the Central Bank of Nigeria needs to increase its surveillance and monitoring of banks operations to be able to detect early warning signals of possible future crisis and take steps to mitigate them without sending negative messages to depositors.

### 3.2. Conclusion

The 2004 bank reforms in Nigeria with major emphasis on recapitalization and bank mergers as a way of consolidating the banking industry was a step in the right direction towards achieving a stable and sustainable financial services industry that meets global standards. Our findings suggest that capital adequacy plays a crucial role in the stability of the banking industry as a whole. However, it does have other problems associated with such as moral hazard and adverse selection problems which may lead to excessive and reckless lending respectively. Therefore, banks should be strictly monitored and they should adopt uniform format for presenting the financial statements and thus be compelled by law to display important information to shareholders and depositors in order to minimize adverse selection problems. There is still room for more research into this area as data have started emerging in the post-consolidation period. The focus of the research should be in the area of moral hazard problems and bank consolidation and the role of the regulatory institutions in mitigating the problems of moral hazard and adverse selection.

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**Results Appendix**

Table 1 Summary Statistics of the Variables

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Shareholders fund | 174 | 30418.94 | 50721.73 | 656 | 339847 |
| total assets | 174 | 210527.9 | 299521.2 | 2130 | 1680302 |
| loans | 174 | 67592.09 | 91969.48 | 585 | 447061 |
| provision | 174 | 5892.201 | 7355.234 | 6 | 39002 |
| deposits | 174 | 141462.9 | 213557.6 | 237 | 1258035 |
| merger | 174 | 0.373563 | 0.485146 | 0 | 1 |
| large bank | 174 | 0.482759 | 0.501145 | 0 | 1 |
| reform dummy | 174 | 0.477012 | 0.500913 | 0 | 1 |
| CAR | 174 | 0.1489 | 0.072178 | 0.023258 | 0.412954 |
| ROA | 174 | 0.03954 | 0.040719 | -0.1216 | 0.421155 |
| std_ROA | 174 | 0.021549 | 0.03451 | 9.38E-05 | 0.381615 |
| log_totasset | 174 | 11.42782 | 1.335882 | 7.663877 | 14.33448 |
| log_deposit | 174 | 10.88795 | 1.563169 | 5.46806 | 14.04506 |
| log_zscore | 174 | 2.690091 | 1.317838 | -0.36348 | 8.146577 |
| loangrowth | 151 | 31.85497 | 22.58204 | -32.3257 | 84.98151 |
| loanprov | 174 | 0.11192 | 0.094496 | 0.009639 | 0.470284 |

Table 2 Pooled OLS Estimates of Determinants of Bank Risk in Nigeria

| | (1) zscore | (2) loangrowth | (3) zscore2 | (4) loangrowth2 |
|---|---|---|---|---|
| CAR | 2.175*** | 19.18+ | 1.682** | 19.11+ |
| | (3.39) | (1.81) | (2.71) | (1.79) |
| L.log_prov | -0.203* | -5.416*** | -0.188* | -5.407*** |
| | (-2.16) | (-3.76) | (-2.36) | (-3.73) |
| L.log_zscore | 0.303*** | 0.256 | | 0.262 |
| | (4.78) | (0.24) | | (0.25) |
| L.log_totasset | 0.122 | | | |
| | (0.98) | | | |
| reform_dummy | -0.355 | 10.49** | -0.177 | 10.37* |
| | (-1.09) | (2.65) | (-0.55) | (2.52) |
| merger | 0.0867 | | 0.116 | |
| | (0.29) | | (0.38) | |
| std_ROA | -19.48*** | | -12.13*** | |
| | (-7.56) | | (-4.59) | |
| L.log_deposit | | -15.98*** | | -15.87*** |
| | | (-4.93) | | (-4.70) |
| log_deposit | | | 0.0919 | |
| | | | (1.09) | |
| logdepsq | | 0.881*** | | 0.881*** |
| | | (6.22) | | (6.19) |
| log_zscorelag | | | 0.355*** | |
| | | | (6.30) | |
| largebank | | | | -0.506 |

|  | | | | (-0.12) |
|---|---|---|---|---|
| _cons | 2.334$^*$ | 123.5$^{***}$ | 3.153$^{***}$ | 122.6$^{***}$ |
|  | (2.33) | (7.05) | (3.84) | (6.41) |
| $N$ | 149 | 149 | 149 | 149 |
| chi2 | 88.43 | 92.16 | 111.0 | 91.53 |
| r2_b | 0.693 | 0.371 | 0.294 | 0.371 |
| r2_w | 0.301 | 0.403 | 0.467 | 0.403 |
| sigma_u | 0 | 4.286 | 0.367 | 4.304 |
| sigma_e | 1.067 | 16.56 | 0.935 | 16.56 |
| rho | 0 | 0.0628 | 0.134 | 0.0633 |

$t$ statistics in parentheses
$^+ p < 0.10$, $^* p < 0.05$, $^{**} p < 0.01$, $^{***} p < 0.001$

Table 3 Hausman-Taylor Estimates of Determinants of Bank Risk in Nigeria

|  | (1) zscore | (2) zscore1 | (3) loangrowth |
|---|---|---|---|
| L.log_prov | -0.186$^*$ | -0.218$^*$ | -8.249$^{***}$ |
|  | (-2.14) | (-2.01) | (-4.32) |
| log_zscorelag | 0.377$^{***}$ |  |  |
|  | (6.76) |  |  |
| reform_dummy | -0.111 | -0.476 | 10.82$^{**}$ |
|  | (-0.33) | (-1.33) | (2.61) |
| merger | 0.138 | 0.168 |  |
|  | (0.43) | (0.52) |  |
| CAR | 1.526$^*$ | 2.240$^{***}$ | 22.90$^*$ |
|  | (2.45) | (3.47) | (2.17) |
| std_ROA | -10.12$^{***}$ | -19.63$^{***}$ |  |
|  | (-3.75) | (-7.29) |  |
| log_deposit | 0.0440 |  |  |
|  | (0.40) |  |  |
| largebank | 0.205 | -0.0815 | -0.572 |
|  | (0.67) | (-0.29) | (-0.10) |
| L.log_zscore |  | 0.279$^{***}$ | -0.0576 |
|  |  | (4.30) | (-0.05) |
| L.log_totasset |  | 0.179 |  |
|  |  | (0.99) |  |
| logdepsq |  |  | 0.922$^{***}$ |
|  |  |  | (6.42) |
| L.log_deposit |  |  | -14.38$^{***}$ |
|  |  |  | (-4.35) |
| _cons | 3.508$^{***}$ | 1.923 | 123.3$^{***}$ |
|  | (3.52) | (1.33) | (6.32) |
| $N$ | 149 | 149 | 149 |
| chi2 | 109.6 (0.000) | 78.11 (0.000) | 90.46 (0.000) |
| sigma_u | 0.497 | 0.261 | 9.163 |
| sigma_e | 0.908 | 1.037 | 16.16 |
| rho | 0.231 | 0.0594 | 0.243 |

$t$ statistics in parentheses
$^+ p < 0.10$, $^* p < 0.05$, $^{**} p < 0.01$, $^{***} p < 0.001$

Table 4 Arellano-Bond Dynamic Panel Two-step GMM Estimates of Bank Risk in Nigeria

| | (1) 2stepzscore1 | (2) 2stepzscore2 | (3) 2steploangrowth1 | (4) 2steploangrowth2 |
|---|---|---|---|---|
| L.log_zscore | 0.197** | 0.135* | 0.830 | 0.719 |
| | (2.86) | (2.20) | (1.05) | (0.78) |
| L2.log_zscore | 0.180*** | 0.143*** | | |
| | (4.03) | (3.53) | | |
| L3.log_zscore | 0.0802* | 0.0559+ | | |
| | (2.29) | (1.86) | | |
| L.log_prov | 0.156*** | 0.176*** | -13.54*** | -11.70*** |
| | (3.39) | (3.30) | (-5.83) | (-3.37) |
| reform_dummy | -1.592*** | -1.244** | 0.594 | 1.552 |
| | (-4.15) | (-3.12) | (0.08) | (0.27) |
| merger | 0.842+ | 0.756+ | -3.344 | -6.334 |
| | (1.79) | (1.76) | (-0.54) | (-1.18) |
| std_ROA | -56.81*** | -54.85*** | | |
| | (-9.53) | (-10.63) | | |
| CAR | 7.134*** | 7.260*** | 91.49*** | 66.95* |
| | (8.72) | (7.34) | (4.18) | (2.41) |
| log_deposit | -0.0177 | | | |
| | (-0.25) | | | |
| log_totasset | | -1.523 | | |
| | | (-1.30) | | |
| logtotassq | | 0.0599 | | 1.615*** |
| | | (1.21) | | (7.12) |
| L.loangrowth | | | -0.161* | -0.111 |
| | | | (-2.03) | (-1.20) |
| L2.loangrowth | | | -0.303*** | -0.176** |
| | | | (-5.90) | (-2.70) |
| L.log_deposit | | | -13.11*** | |
| | | | (-3.80) | |
| logdepsq | | | 1.441*** | |
| | | | (8.49) | |
| L.log_totasset | | | | -22.01** |
| | | | | (-2.66) |
| _cons | 1.048 | 10.26 | 92.29*** | 145.0** |
| | (0.94) | (1.42) | (3.45) | (2.88) |
| N | 76 | 76 | 77 | 77 |
| chi2 | 8779.0(0.000) | 3420.2(0.000) | 16557.6(0.000) | 8229.2(0.000) |
| Instruments | 25 | 26 | 22 | 22 |
| Autocorrelation | at lag: | | | |
| 1 | -.25304 (0.8002) | -.13531 (0.8924) | -2.2616 (0.2237) | -2.0214 (0.4432) |
| 2 | -.48801 (0.6255) | .10211 (0.9187) | -.62413 (0.5325) | .0561 (0.9553) |
| Overidentifying | restrictions | | | |
| valid: Chi2 | 14.1121 (0.5170) | 12.1961 (0.6641) | 11.3753 (0.4971) | 10.8220 (0.5442) |

$t$ statistics in parentheses
$^+ p < 0.10$, $^* p < 0.05$, $^{**} p < 0.01$, $^{***} p < 0.001$

Table 5 Arellano-Bond Dynamic Panel Two-step GMM Estimates of Bank Risk Behaviour

|  | (1) loanprov1 | (2) loanprov2 | (3) loanprovpooled |
|---|---|---|---|
| L.loanprov | 0.443*** | 0.628*** | 0.769*** |
|  | (6.93) | (14.34) | (9.75) |
| L2.loanprov | -0.0710*** | -0.0294 | -0.0490 |
|  | (-4.83) | (-0.64) | (-0.66) |
| CAR | 0.329*** | 0.396*** | 0.123+ |
|  | (13.74) | (6.84) | (1.85) |
| merger | 0.0653* | 0.0938** | 0.0284* |
|  | (2.30) | (2.77) | (2.56) |
| reform_dummy | -0.108*** | -0.152*** | -0.0557** |
|  | (-3.67) | (-4.02) | (-3.13) |
| log_totasset | 0.283*** | 0.435*** | 0.218** |
|  | (4.97) | (4.08) | (3.05) |
| logtotassq | -0.0118*** | -0.0177*** | -0.00914** |
|  | (-4.95) | (-4.11) | (-3.08) |
| std_ROA |  | -0.0224 | -0.0909 |
|  |  | (-0.73) | (-0.81) |
| asset_struct |  | 0.0337** | 0.0604*** |
|  |  | (3.12) | (4.59) |
| _cons | -1.640*** | -2.629*** | -1.279** |
|  | (-4.97) | (-4.01) | (-3.00) |
| N | 99 | 99 | 124 |
| chi2 | 34929.9(0.000) | 84280.1(0.000) | 568.1(0.000) |
| Instruments | 26 | 28 | - |
| Autocorrelation: |  |  |  |
| 1 | -1.979 (0.4478) | -2.0964 (0.0360) | - |
| 2 | 1.4866 (0.1371) | 1.627 (0.1037) | - |
| Overidentifying |  |  |  |
| Restrictions Chi2: | 17.346(0.4995) | 15.541 (0.6246) | - |

$t$ statistics in parentheses
$+$ $p < 0.10$, $*$ $p < 0.05$, $**$ $p < 0.01$, $***$ $p < 0.001$

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[1] There are several options open to Nigerian banks to meet the stipulated minimum capital base requirement. These include: approaching the capital market for funds through an Initial Public Offer (IPO), Private Placement or Rights Issue; through merger with like-minded and synergy-producing banks; acquiring another bank or be available for acquisition; and to close shop and surrender the banking license (CBN, 2005).

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