

Does Bank Capitalization Lead to High Liquidity Creation? – Evidence from Nigerian Banking Sector Using Panel Least Square Method

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The study critically examines the impact of capitalization on bank liquidity creation in selected banks of Nigeria using the annual data of 10 banks for the period 2006 to 2010. The results of Levin, Lin and Chu unit root test show that all the variables are non-stationary at level. The results of Panel Least Square (PLS) regression reveal that bank size and capital asset ratio are positively related to bank capital but only bank size is significantly related to bank capital. In addition, the results show that bank liquidity and non-performing/assets ratio have a non-significant negative effect on bank capital. The implication is that better capitalized banks tend to create less liquidity, which supports the 'financial fragility-crowding out' hypothesis. This finding has important policy implications for emerging countries like Nigeria as it suggests that bank capital requirements, that is, recapitalization policy, implemented to support financial stability, may harm liquidity creation. The financial regulatory body needs to provide appropriate effective measures to adequately enhance transparent accountability. Measures such as relaxation or elimination of restrictions on profits and capital remittances, opening of formerly 'priority' sectors to investors, and provision of adequate security, among others, should be put in place.

Introduction

Over the last decades global financial markets have become interdependent. Changes in the market have given rise to new risks that have influenced the stability of the financial system. Banks as financial market's outlet are regarded as one of the important chains in the economy in performing resources distribution function which exposes it to liquidity risk arising from different terms of assets and liabilities maturity. According to the theory of financial intermediation, an important role of banks in the economy is to provide liquidity by funding long-term, illiquid assets with short-term, liquid liabilities. Through this function, banks create liquidity as they hold illiquid assets and provide cash and demand deposits to the rest of the economy. Liquidity

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creation is one of the pre-eminent functions of banks but it is also a major source of banks' vulnerability to shocks. However, as banks are liquidity insurers, they face transformation risk and are exposed to the risk of run on deposits. More generally, the higher is the liquidity creation, the higher is the risk for banks to face losses from having to dispose of illiquid assets to meet the liquidity demands of customers. The theoretical literature produces two opposite predictions on the link between capital and liquidity creation: 'Financial Fragility-Crowding Out' Hypothesis and 'Risk Absorption' Hypothesis. The former predicts that higher capital reduces liquidity creation, while the latter suggests that capital positively affects liquidity creation.

The potential effects of bank capital on liquidity creation raise important research and policy issues. The research issues include the question as to why banks generally have the lowest capital ratios of any industry, and why banks tend to fund loans with demand deposits, creating potentially fragile institutions that are subject to runs. The key policy issues include validating minimum capital requirements that may suppress the liquidity creation process, upholding the prudential supervision and maintaining adequate regulatory actions.

Despite these researches and policy concerns, there has not been any comprehensive empirical measurement of liquidity creation in the banking industry of Nigeria. However, only a relatively small number of researchers have tested the recent theories or examined the empirical relationship between bank capital and some of the components of liquidity creation in the Nigerian banking industry. Thus, the sign and magnitude of relationship between bank capital and liquidity creation remain largely unresolved. Therefore, the study tends to fill the literature vacuum by critically examining the impact of bank capital on liquidity creation in select banks of Nigeria.

Literature Review

The recent financial crisis provides a stark reminder of the substantial role banks play in liquidity creation. Yet, while the literature deals extensively with banks as risk transformers, their function in liquidity creation has largely been neglected. A recent paper by Berger and Bouwman (2007) attempts to correct this situation by offering a new method for measuring liquidity created by banks and investigating the role of bank capital in liquidity creation for the US banks. This issue is of great interest, particularly with respect to policy setting of bank capital requirements. The role of capital in minimizing the impact of losses has received considerable attention. However, how bank capital impacts liquidity creation should also be taken into account when assessing the role of capital on financial stability.

Berger and Bouwman (2009a) observe that two hypotheses largely frame the current discussion on the relationship between bank capital and liquidity creation. The 'risk absorption' hypothesis predicts that higher capital enhances the ability of banks to create liquidity (Allen and Gale, 2004), and the other is bank capital allows the bank to absorb greater risk (Repullo, 2004).

Roughly described, the financial fragility effect is the outcome of the following process. The bank collects funds from depositors and lends them to borrowers. Once the loan is issued, the bank's job is to monitor the borrower and collect loan payments. This helps the banks in

obtaining the private information of its borrowers that gives banks an advantage in assessing the profitability of its borrowers. This informational advantage, however, creates an agency problem, whereby the bank may be tempted to extort rents from its depositors by demanding a greater share of the loan income. If depositors refuse to pay the higher costs, the bank threatens to curtail its monitoring or loan collecting efforts. As depositors know that the bank may abuse their trust, they become leery about depositing their money with the bank. The bank is thus forced to demonstrate its commitment to depositors by adopting a fragile financial structure with a large share of liquid deposits. The consequence of this fragile financial structure is that the bank runs the risk of losing funds if it attempts to withhold depositors. As such, the threat of bank runs mitigates the holdup problem which arises after depositors have put their funds to the bank. Consequently, by allowing the bank to receive more deposits and finance more loans, financial fragility favors liquidity creation. As greater capital reduces financial fragility, it enhances the bargaining power of the bank and hampers the credibility of its commitment to the depositors. Thus, greater capital works to diminish liquidity creation.

The role of banks in liquidity creation and fostering economic growth was analyzed by many researchers, presenting agency theories and different opinions on liquidity ensuring. Diamond and Dybvig (1983) and Deep and Schaefer (2004) present the idea that banks' liquidity is created by financing non-liquid assets with liquid liabilities. However, Holmstron and Tirole (1998), Kashyap *et al.* (2002), and Berger and Bouwman (2007, 2009a, and 2009b) maintain the idea that banks create liquidity in non-balance accounts also. Berger and Bouwman (2007) define the importance of non-balance accounts such as loans' liabilities and state that size of the bank influences liquidity creation measures. Smaghi (2007) emphasizes the importance of global macro liquidity, stressing that financial globalization influenced global macro liquidity creation, weighted by high savings of developing countries, which increased the demand for liquid assets, and insufficient production of financial liabilities, because of slow adaptation of technologies in law and finance fields.

Diamond and Rajan (2000 and 2001) model a relationship bank that raises funds from investors to provide finance to an entrepreneur. More importantly, the bank may also withhold effort, which limits the bank's ability to raise financing. A deposit contract mitigates the bank's hold up problem because depositors can run on the bank if the bank threatens to withhold effort and therefore maximizes liquidity creation. Providers of capital cannot run on the bank, which limits their willingness to provide funds, and hence reduces liquidity creation. Thus, the higher a bank's capital ratio, the less liquidity it will create. Diamond and Rajan's model builds on Calomiris and Kahn's (1991) argument that the ability of uninsured depositors to run on the bank in the event of expected wealth expropriation by bank managers is an important disciplining mechanism. A related idea is proposed by Flannery (1994), who provides a rationale for maturity mismatching that does not focus on liquidity creation. Flannery's model focuses on the disciplining effect of depositor's ability to withdraw funds on demand, and thus prevent the bank from expropriating depositor wealth through excessively risky investments.

Madura and McDaniel (1989) show that an increase in loan loss provision has the potential to convey to the market a negative strong signal that is the poor management of banks' loan portfolio. Obviously, this bad news can weaken investors' confidence so that the bank is more likely to face the financing problem. From viewpoint of regulators, the more loan loss provisions are held, the more the bank is risky. However, Madura and McDaniel (1989) also recognize the possible positive stock market reaction to loan loss provision announcement. In other words, an increase in loan loss provision may raise banks' stock price and thus enhancing capitalization. Moreover, holding more loan loss provision can be considered as one of active risk management used by the bank to protect itself against credit risk.

Molyneux and Thornton (1992) found that the relationship between liquidity ratio and return on equity are negative.

Gorton and Winton (2000) show how a higher capital ratio may reduce liquidity creation through the crowding out of deposits. They argue that deposits are more effective liquidity hedges for investors than investments in bank equity capital. Thus, higher capital ratios shift investors' funds from relatively liquid bank deposits to relatively illiquid bank capital, reducing overall liquidity for investors.

Boyd and Runkle (1993) argue that there is a relation between bank size and the return on assets and leverage and thus large banks are more profitable but riskier by being highly leveraged. De Nicoló (2000) reports a positive and significant relationship between bank size and failure probabilities for the United States, Japan, and several European countries. Various researchers like Ramanauskas (2005), Lakstutiene *et al.* (2006), and Lakstutiene (2008) examine Lithuania's financial sector and economical development relationship.

Methodology and Data

In this study, a multivariate equation is developed and pool data estimation is constructed, consisting of 51 observations of 10 commercial banks' annual reports and accounting data for the period 2006-10. This period was selected because significant reforms like deregulation, consolidation, recapitalization and bailout policy were made during this period in Nigeria. The linear regression model on EViews applications was used to test the significance of variables on return on equity—it being the measure of the rate of return on shareholder's equity. Panel Least Square (PLS) econometric tool is employed to show the relationship between bank capital and liquidity creation in Nigerian banking industry.

Hypotheses

Two hypotheses are framed on the relationship between bank capital and bank liquidity creation.

Hypothesis 1

The first is the alternative 'risk absorption' hypothesis, which stipulates that higher capital enhances bank's ability to create liquidity. According to this hypothesis, liquidity creation exposes bank to risk and that the bank capital absorbs these risks which would in turn expand banks' risk-bearing capacity.

The null hypothesis states that bank capital does not have a significant impact on bank liquidity creation.

Hypothesis 2

The second is the ‘financial fragility-crowding out’ hypothesis. According to this hypothesis, higher bank capital reduces bank liquidity creation, implying that higher capital ratios shift investors’ funds from relatively liquid bank deposits to relatively illiquid bank capital, reducing overall liquidity for investors.

The null hypothesis implies that bank liquidity creation does not have significant impact on bank capital.

Model Specification

The empirical model used in this study is based on Berger and Bouwman (2009a) model. Explanatory variables used in the estimation are bank-specific variables. The most important explanatory variable here is the Capital-Assets Ratio (CAR), defined as the ratio of capital to total assets. This variable helps us uncover the relationship between bank capital which is proxied by return on equity and bank liquidity creation.

At the bank’s level, bank size (logarithm of total assets) and bank risk are taken into consideration. This is to examine the difference in the relationship of bank liquidity creation and bank capital. To control for bank risk, NPA is considered as the total amount of non-performing loans divided by total assets. As argued under the ‘risk absorption’ hypothesis (e.g., Bhattacharya and Thakor, 1993; Repullo, 2004; Von Thadden and Ernst-Ludwig, 2004; and Coval and Thakor, 2005), it is important to appropriately control for bank risk as the main reason for banks to hold capital to absorb risk. Also, in order to capture the relationship between bank capital and liquidity creation effectively, deposit liability is introduced.

$$\begin{aligned} ROE &= f(LIQCR) \\ &= \beta_0 + \beta_1 BASIZ + \beta_2 CAR + \beta_3 BALIQ + \beta_4 NPA + \varepsilon \end{aligned} \quad \dots(1)$$

where

- ROE = Return on shareholder’s equity
- BASIZ = Bank size, logarithm of total assets
- CAR = Ratio of capital to total assets
- BALIQ = Bank liquidity ratio, measured by bank’s current assets to current liabilities
- NPA = Non-Performing Loans/Total Assets

With regard to bank size (BASIZ), it is interesting to examine whether the bank size has direct or indirect effect on the bank profits. In this paper, we use the size of sampled banks relative to total balance sheets of MFIs in their domestic country to measure the impact of size on bank profits.

A Priori Theoretical Expectation

Here, we highlight the relationship between the dependent and explanatory variables.

It is clear that β_0 should be positive ($\beta > 0$) as there can be no negative value for *ROE*.

$\beta_1 > 0$; a positive change in *BASIZ* leads to a positive change in *ROE*.

$\beta_2 > 0$; a positive change in *CAR* leads to a positive change in *ROE*.

$\beta_3 < 0$; a negative change in *BALIQ* leads to a negative change in *ROE*.

$\beta_4 < 0$; a negative change in *NPA* leads to a negative change in *ROE*.

Results and Discussion

The summary of statistics is presented in Table 1. It is observed that *ROE* has the lowest mean value (0.021220), while *BASIZ* has the highest mean value (2,627,594). It is also observed that *ROE*, *CAR* and *NPA* are negatively skewed, while *BASIZ* and *BALIQ* are positively skewed.

Table 1: Descriptive Statistics					
	<i>ROE</i>	<i>BASIZ</i>	<i>CAR</i>	<i>NPA</i>	<i>BALIQ</i>
Mean	0.021220	2,627,594.0	17.54649	66.43429	51.42857
Median	0.020050	100,765.0	19.38710	66.90000	48.50000
Minimum	0.052600	31,298,175	20.97660	84.60000	94.50000
Maximum	-0.009900	23,542.00	13.01250	42.90000	29.10000
SD	0.011639	6,502,230.0	3.186699	10.81040	13.36496
Skewness	-0.071953	3.122033	-0.358499	-0.237643	0.951022
Kurtosis	4.067129	12.76903	1.254840	2.337360	4.278915
Probability	0.429364	0.000000	0.074602	0.615767	0.021697
No. of Obs.	35	35	35	35	35

Results of Levin, Lin and Chu Unit Root Test

Levin, Lin and Chu (LLC) test is carried out, employing EViews package, to determine the stationarity of the variables. LLC test is conducted to avoid a spurious regression. The results (Table 2) show that *ROE*, *BASIZ*, *CAR*, *BALIQ*, and *NPA* are non-stationary at level implying that they are of the same order of integration.

Results of Panel Least Square

Next, PLS regression model is conducted and the results are presented in Table 3. The results reveal that all the independent variables do not have a significant impact on the dependent variable, *ROE*. *BALIQ* and *NPA* are negative and do not have a significant impact on *ROE*, while *BASIZ* and *CAR* are positive indicating a significant impact on *ROE*. Therefore, this study shows that all the variables used to capture bank capitalization, that is, bank size,

Variables	LLC	Order of Integration	Probability
<i>ROE</i>	4.0633	I(0)	0.0098
<i>BASIZ</i>	-13.3896	I(0)	0.0000
<i>CAR</i>	4.25136	I(0)	0.0059
<i>BALIQ</i>	2.96018	I(0)	0.0015
<i>NPA</i>	2669.64	I(0)	0.0000

Note: The null hypothesis indicates the presence of unit root. Akaike Information Criterion was used to select lags automatically.

Variables	ROE	
	Coefficient	Probability
<i>BASIZ</i>	0.000220	0.0008
<i>CAR</i>	0.001607	0.2316
<i>BALIQ</i>	-0.000668	0.0184
<i>NPA</i>	-0.000351	0.6076
R^2	0.731209	
Adjusted R^2	0.556742	
F-Statistic	1.898401	0.024286
Durbin-Watson	1.899315	

capital asset ratio, bank liquidity and ratio of non-performing loan to total assets, followed a priori theoretical expectation.

Also, the results of the PLS regression reveal that the relationship is robust. The R^2 value (0.731209) suggests that at least 73% of change in the dependent variable (*ROE*) is caused by changes in the independent variables (*BASIZ*, *CAR*, *BALIQ* and *NPA*) when the degrees of freedom is taken into consideration. The adjusted R^2 is further reduced to 56%. Hence, the results obtained from the dynamic model indicate that the overall coefficient of determination (R^2) shows that the equation has a good fit.

As the Durbin-Watson statistic of 1.899315 is significantly within the benchmark, it is concluded that there is no autocorrelation or serial correlation in the model specification; hence the assumption of linearity is not violated.

Conclusion

This study has analyzed the impact of bank capital on liquidity creation in selected commercial banks of Nigeria using the annual data for the period 2006 to 2010. Empirical investigation of the stationarity properties and the order of integration of the employed variables are conducted using LLC test. The results show that all the variables are non-stationary at level.

The stated hypotheses of our model, when tested, are observed to capture the alternative 'risk absorption' hypothesis, specifying that higher capital enhances banks' ability to create liquidity. Liquidity creation exposes banks to risk and bank capital absorbs these risks, which would in turn expand banks' risk-bearing capacity. The capital asset ratio, being positively related to return on equity and also not significant in its influence, confirms with a priori expectation that efficiency of bank management measured by capital asset ratio is expected to be positively related to *ROE*.

The studies on bank capitalization and bank liquidity creation provide an answer to the soundness, safety, profitability, quality of loan portfolio, etc. in the Nigerian banking industry. The study also provides answer to the impact of cost of operation on bank capital.

Policy Recommendations

These empirical findings have significant implications for bank strategic planners and regulatory authorities. Operational activities of a typical Nigerian commercial bank are not sufficiently optimized to ensure maximum earnings from credit creation through loans and advances. This explains why loan interest earnings are sufficiently eliminated by rising cost of credit, given the high incidence of non-performing credit. A more pragmatic credit management and screening procedure is necessary to enhance earnings from credit as it is the single largest activity of a commercial bank.

Furthermore, undue emphasis of regulatory authorities on bailout, recapitalization and mergers of banks, often designed as exit-attempts to correct incidences of financial ill-health in Nigeria, might not be necessary if policy structure is designed to reduce high mortality of business and worrisome infrastructural decay, currently the bane of Nigerian banking sector. This study indicates that using the measures of liquidity creation shows that large banks absorb risk easily due to their capital base capacity and thereby dominate the 'financial fragility-crowding out' effect. In other words, in the case of banks with gross total assets of over ₦1 bn, the net effect of bank capital on liquidity creation is positive and significant. Hence, the CBN authority should maintain the standard of recapitalization policy.

Future Scope: This study focused on aggregated data to assess the impact of bank capital on bank liquidity creation. For future studies, it is suggested that the details of the bank capital as well as bank liquidity creation can be disaggregated so as to thoroughly analyze the impact of each particular type of the variables on a case basis. A more detailed breakdown of the sources of bank capital and bank liquidity creation at operational level, e.g., forex and operations, retail, etc., would shed more light on and help understand how policy makers in the financial service sectors make their decisions. Further research can be done by categorizing banks based on their assets, capital base and risk exposure so as to determine which banks need funds and which banks need sanctions.

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