

Journal of Academic Research in Economics

Volume 11

Number 3

December 2019



ISSN 2066-0855

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BANK CONSOLIDATION AND LENDING CHANNEL OF MONETARY POLICY TRANSMISSION IN NIGERIA

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Abstract

This study examined the impact of bank consolidation exercise on bank lending channels as a monetary policy transmission mechanism. The study is based on Nigeria economy for the period 2005b to 2013 and the data used such as, loans and advances, real Gross Domestic Product, Inflation rate, and monetary policy indicator were obtained from CBN Statistical bulletin while data on capitalization, liquidity, total asset and bank consolidation, were obtained from financial reports of banks. The data was analyzed using Generalized Method of Moment (GMM) technique and the result shows that monetary policy had a significant negative relationship with bank loan supply. The result also that consolidation in the banking industry had a negative effect on monetary policy transmission through bank lending channel. The study concludes that consolidation in the banking sector had a negative effect on the effectiveness of bank lending channel in Nigeria.

Keywords: Bank consolidation, Bank Landing Channel, Monetary policy.

JEL classification: C21, E41, E51, E52.

1. INTRODUCTION

Monetary policy is a tool of general macroeconomic management used by the monetary authorities to achieve economic objectives of sustainable economic growth, price stability, balance of payment, full-employment equilibrium, and external balance (Nwankwo, 1991, and CBN, 2008). Monetary policy works through the effects on cost and availability of credit/loan to influence real activity (Jhingan, 2002).

In the quest to improve the effectiveness of monetary policy, monetary economists have also focused attention on monetary policy transmission

mechanism. Transmission mechanism involves the various channels through which policy-induced changes in the nominal money stock or the short-term nominal interest rate affects prices and output in the economy. Identifiable monetary channels of transmission include interest rate, exchange rate, asset price, and credit channels (comprising of bank lending and balance sheet channels).

The 'credit view' stems from the problem of asymmetric information in the financial market and emphasizes the role of banks in financial intermediation. As argued by Kamin, Turner, and Van Dack, (1998), financial markets especially in developing countries are often so poorly developed that the quantity of the credit and even its price becomes an important instrument of monetary policy. The theoretical perspective to credit view, unlike interest rate channel which deals with the liability side of the banks' balance sheet, focuses on assets side of the banks' balance sheet to explain monetary policy transmission. It assumes existence of three assets in the economy such as money, bonds and bank loans. Exponents of 'credit view' conceive that, monetary contraction by restricting the banks to issue deposits impedes their capacity to extend loans. Thus, investment expenditure is adversely affected and consequently aggregate output.

However, the renewed interest in monetary transmission channels with banking lending channel taking lead stem from the vital roles banks play in an economy, growing literature on asymmetric information in financial markets, and various reform programmes that many economies in the world have embarked on. Highlighting the possible impacts of consolidation in banking sector on bank-credit channel of monetary transmission, Olivero *et al.*, (2011) argued that consolidation in the banking sector could have a significant influence on the strength of bank lending channel of monetary policy transmission.

Nigeria financial sector has been experiencing significant financial reform that has altered its monetary policy transmission mechanism through bank credit channel since 1986. The height of these financial reforms experience in Nigeria thus far started in 2003 under a comprehensive economic reform blue print- the National Economic Empowerment and Development strategy (NEEDS) (Anyanwu, 2008), with the aim of putting in place a viable modern financial system that can ensure efficient mobilization and allocation of savings through economic channels (CBN, 2011). This could have altered the monetary transmission especially through the bank credit channel as this was meant to increase efficiency in the sector and to put the sector in the position where it can give the right support to the real sector in terms of credit provision for investment purposes. Lacks of recent studies that substantially cover this period thus create a knowledge gap which could affect the formulation of an informed policy actions and effects by the financial authority.

Furthermore, at the very heart of the reform exercise was bank consolidation process, by way of either merger or acquisition, which has changed the face of banking business in Nigeria. This has been established in the literature to have a significant effect on the effectiveness of bank credit channel of monetary policy transmission (Olivero *et al.*, 2011). The exercise caused a reduction in number of operating banks from 89 to 25 initially and later to 21 as a result of

further consolidation process. However, studies have shown that consolidation in the banking sector has a significant impact on the effectiveness of bank lending channel of monetary policy transmission (Ahtik, 2012; Olivero *et al.*, 2011). The direction of this impact on bank credit channel in an economy cannot be determined unless through empirical investigation. Hence, consolidation in Nigeria's banking sector provides such opportunity to examine how consolidation in the sector has affected monetary policy transmission through bank credit channel.

The rest of this study is arranged as follows: Section II contains the review of relevant literature. Section III explains the theoretical framework, methodology, model specification, data source and measurement. Section IV is about empirical analysis and discussion of result while Section V contains the conclusion and policy recommendation.

2. REVIEW OF LITERATURE

Following the theoretical models of the role of credit in business cycles and of the transmission mechanism there is this conclusion that, given capital market imperfections, credit conditions may amplify and propagate the effect of shocks in the economy, Kaufmann and Valderama (2005) investigate this by comparing the behavior of loans to households and loans to nonfinancial corporations in Austria, Germany, the Netherlands and the United Kingdom. Analyzing credit aggregates in these countries in a framework accounting for diverging economic environments allows for an assessment of how the amplifying and asymmetric effects of credit aggregates differ between market-based and bank-based financial systems. The results show that the state of the economy impacts the way in which shocks are propagated through credit markets. The effects of shocks are smoothed over time in bank-based financial systems irrespective of the economic environment and in market-based systems only during periods of subdued economic growth or tight liquidity conditions. During economic recoveries, an amplifying effect in market-based systems was observed. Thus, the deceleration in credit growth in the above-mentioned countries between 1999 and 2003 was mainly demand side rather than supply-side driven, given the overall slowdown of the economy.

Olivero *et al* (2011) examine the relationship between increased consolidation in banking sector and monetary transmission mechanism through bank lending channel in Asian and Latin American Countries by using bank level data ranging from 1996 to 2006 using GMM approach. The study found that increased consolidation reduces the effectiveness of bank lending channel which suggests a negative relationship exists between the consolidation measure and bank loan. This means that the supply of loans grows at a slower rate in more concentrated markets. Also, a positive and significant coefficient on the interaction of consolidation measure with monetary policy measure shows that increased consolidation in the banking industry makes monetary policy transmission weaker

by reducing its impact on the supply of bank loans. Similarly, Fungacova, Solanko and Weil (2013) examine how bank competition influences the bank lending channel in the Eurozone countries for a sample of banks from 12 Eurozone countries over the period 2002-2010 using GMM technique. The study found that competition strengthens the transmission of monetary policy through the bank lending channel. Further investigation shows that more competitive banks were more sensitive to monetary policy only before the financial crisis.

Furthermore, Sun, Gan, and Hu (2010) test the existence of the bank lending channel to explain the monetary policy transmission in China from 1997Q1 through 2008Q4. To disentangle the bank loan supply and bank loan demand effects of monetary policy movement, this study uses a VECM model to test for a number of exclusion and exogeneity restrictions on the existing cointegration relationships among the variables. In the identified loan supply equation, loan supply is negatively related to required reserve ratios and official one-year lending rate in the long term. This confirms the existence of a lending channel for monetary transmission in China. The VECM's short-term dynamics also show that the short-run disequilibria in the loan supply are corrected through changes in the lending rate, suggesting that monetary policy plays a role in restoring equilibrium in the credit market by affecting the official commercial bank lending rate. The result further reveals that under a "window guidance" system bank lending channel plays an important role in China's monetary policy transmission. Similarly, Qiyue (2013) carried out the same test on China by using unbalanced quarterly panel data from 27 commercial banks from 2000Q2 to 2011Q4, and applying a one-step GMM estimator. The findings suggest central bank monetary policy asymmetrically affects bank lending behavior. Small banks are found more sensitive to contractionary monetary policy in the Chinese context. Well capitalized banks appear to be more likely to adjust their lending behaviours in response to expansionary monetary policy, and conversely, undercapitalized banks tend to adjust with the advent of contractionary monetary policy. The importance of the bank lending channel declines after China introduced stricter capital regulations in early 2004, but the effect is still apparent in times of expansionary policy.

Moreover, on China economy, Du (2010) investigates the propagation of monetary policy through the banking system by analyzing the effect of policy instruments on banks' loan supply. Using bank level data for major commercial banks from 1990-2009, the study examined the supply side of the narrow credit channel: loan level responses of commercial banks to monetary policy tools of the central bank. The result reveals that banks have disparate but strong responses to different monetary policy impulses depending on their type and level of capitalization. In addition, the major banking reform in the 1990s has changed some characteristics of the bank-dependent propagation mechanism without diminishing its central role in monetary transmission.

Meanwhile, Osuagwu (2008) investigates the impact of monetary policy variables on the performance of the stock market in Nigeria using quarterly data for twenty-four years (1984:1 – 2007:4). A linear combination of stock market index and monetary policy variables is estimated using ordinary least squares; co-

integration and error-correction specification. It is observed that stock market performance is strongly determined by broad money supply, exchange rates and consumer price index in the short and long-run. Hence, the liquidity, exchange rate and price level channel of monetary policy transmission is supported by evidence as determinants of stock price movements in Nigeria.

Empirical studies that are specifically focus on bank lending channel include Oyaromade (2003) which test for the existence of credit rationing in the Nigeria economy from 1970:1-1999:12 using disequilibrium model and structural VAR approach. The study concluded that interest rate and credit channels are the two main channels of monetary transmission exist in the Nigeria economy. Similarly, Ogun and Akinlo (2010) uses Structural Vector Autoregressive (SVAR) technique to test the effectiveness of bank credit channel of monetary transmission with the adoption of deregulatory measures in Nigeria for the period 1986:1 to 2006:4. The study found that bank credit channel is ineffective in Nigeria. Also, bank deposits, securities holdings and total loans and advances responded slowly to monetary policy shock during the simulation period. Monetary policy shock also contributed very little to the forecast errors of these bank balance sheet variables.

At bank level, Chibundu (2009) investigates the cross-sectional differences in the way banks with varying characteristics respond to policy shocks, or put differently, whether it is possible to find evidence of bank lending channel in Nigeria. To this effect, a dynamic reduced form model close to that proposed by Kashyap, Anil and Stein (2000) which allows for asymmetries in loan supply across banks, depending on their size, liquidity and capitalization was estimated. A panel of 40 banks observed quarterly over the period 1999Q1 – 2008Q4 is used and a dynamic generalized method of moments (GMM) technique is adopted. The results are consistent with a weak bank lending channel. The size and liquidity positions of banks acted as sources of information asymmetry that influence bank loan supply response to monetary policy shock. However, the degree of capitalization does not seem to be a source of cross-sectional differences in the response of loan supply to monetary policy shocks.

Furthermore, a recent study that is also related to the role of bank in monetary policy transmission mechanism (as it tests one of the assumption of bank lending channel) is the work of Ajayi and Atanda (2012), where they examine the effect of monetary policy instruments on banks performance between 1970 and 2008. The Engle-granger two-step cointegration approach was adopted based on the regression model that regresses bank lending and advances on minimum policy rate, cash reserve ratio, liquidity ratio, inflation and exchange rate. The empirical estimates show that monetary policy is not effective to stimulate credit in the long run. Specifically, none of the monetary policy instruments except reserve ratio was found significant at 5% critical value.

3. THEORETICAL FRAMEWORK

The theoretical framework upon which this study stands is credit view (Bernanke and Blinder, 1988). Credit view postulates that a contractionary monetary policy (an increase of the monetary policy rate) will reduce banks' deposit base and will make money market borrowing costlier. Consequently, this will affect banks' loan supply because they cannot completely offset the reduction in deposits with other sources of finance, either because it may be too costly for them to raise uninsured funds of finance or they have restricted access to non-deposit funding (Bernanke and Blinder, 1988; Mishkin, 1995). The resulting consequences of the foregoing is a decline in the volume of funds available for consumption and investment and then a repressed economic activity. In order to develop the models for estimation, a simplified version model of Bernanke and Blinder (1988), as modified by Kashyap and Stein (1997) and then (Erhmann et al., 2001), developed for identifying bank lending channel was considered. One of the advantage of this model is that it corrects a weakness of the Bernanke and Blinder model, which is non-inclusion of banks' financial characteristics as additional factors from the supply side of the loan market. In the buildup of the model, Erhmann et al., (2001) described the market for bank deposits as an equilibrium relationship where deposits (D) are assumed to be equal to money (M) with both being functions of the interest rate (MP) set by the monetary authority. This is specified as follows:

$$M = D = -\psi MP + x \quad (1)$$

Where x is a constant.

Bank i faces a loan demand L_i^d that depends on economic activity (y), the inflation rate (π), and the loan nominal interest rate (R_L). This is specified as follows:

$$L_i^d = \phi_1 y + \phi_2 \pi + \phi_3 R_L \quad (2)$$

$$\phi_1 > 0, \phi_2 \begin{matrix} < \\ > \end{matrix} = 0, \text{ and } \phi_3 < 0$$

Loan demand is supposed to be positively related to economic activity, and negatively related to the loan nominal interest rate. The coefficient associated to inflation, namely ϕ_2 , could be either positive or negative in close relation with the nature of the steady-state equilibrium in the economy.

The loan supply by bank L_i^s is specified to be a function of the available amount of loanable funds (money or deposits) (D), the loan nominal interest rate (R_L), and the monetary policy instrument(s) (MP), where the instrument can be either the short term interest rate set by the Central Bank or the reserve requirements rate on deposits or both. The direct effect of the policy interest rate

stands for the opportunity costs for a bank when the bank uses interbank market as a liquidity source. Thus, loan supply is given by the following expression:

$$(L_i^S) = \mu_i(X_i)D_i + \phi_4R_L + \phi_5MP \tag{3}$$

$$\phi_4 > 0 \text{ and } \phi_5 < 0$$

In addition, it is further assumed that not all banks are equally dependent on deposits. In particular, the model considers that the impact of a change in deposits on loan supply depends on bank characteristics related to size, liquidity and capitalization (X_i), representing characteristics of each bank. This is defined as follows:

$$\mu_i(X_i) = \mu_0 - \mu_i \tag{4}$$

The equilibrium condition in the loan market combine with equations (1) to (4) result in the following reduced form of the model:

$$L_i = \frac{1}{\phi_3 + \phi_4} (\phi_1\phi_4 + \phi_2\phi_4\pi - (\phi_5 + \mu_0\psi)\phi_3MP + \mu_1\psi\phi_3MPx_i + \mu_0\phi_3X - \mu_1\phi_3xX_i) \tag{5}$$

Expression (5) can be expressed in a more compact form as follows:

$$L_i = \beta_0 + \beta_1y + \beta_2\pi - \beta_3MP + \beta_4MPX_i + \beta_5X_i \tag{6}$$

Coefficients β_k where $k= 0, 1, \dots, 5$ are determined in an appropriate manner from expression (6) as functions of initial parameters, μ_0, μ_1 and μ_h where $h = 1, \dots, 5$.

The coefficient β_4 relates the reaction of loans of bank i to the monetary policy interacting with its characteristics (size, capitalization and liquidity).

Under the model assumptions, a significance of coefficient β_4 implies that the monetary policy affects the supply of loans.

An implicit identifying assumption is that the interest rate loan demand elasticity does not depend on the bank characteristics (X_i). In other words, the coefficient ϕ_3 is the same for all banks.

The assumption of homogeneous reaction of the loan demand is crucial for the identification of the monetary policy effects on loan supply; it rules out the cases where, for example, small or large bank customers are more sensitive to interest rate changes. Such assumption seems quite reasonable for Nigeria considering the fact that bank credits is the main source of external finance for firms (including large firms) with few substitutes available.

3.1. MODEL SPECIFICATION

Based on the theoretical framework above and keeping the objective in view, estimated models for this study are specified as follows:

$$L_{it} = F(L_{t-1}, MR_{it}, GRT_{it}, INF_{it}, X_{it}, X_{it}MR_{it}) \quad (7)$$

Where:

- L is a bank's outstanding loans and advances;
- MR is the Monetary policy indicator;
- GRT is the Growth rate of Gross Domestic Product;
- CPI is the consumer price index;
- X refers to each bank-specific characteristic such as: liquidity, size and capitalisation ratio;
- XMR is the interaction term between each of the aforementioned bank-specific characteristic and the monetary policy indicator; and v is the error term.

Considering the fact that the relationship between the dependent and independent variables are non-linear as noted in the theoretical model of Bernanke and Blinder, 1988), all the variables were logged to linearize the relationship. Hence, we have,

$$\ln(L_{it}) = \alpha_0 + \alpha_1 \ln(L_{it-1}) + \alpha_2 \ln MR_{it} + \alpha_3 \ln(GRT_{it}) + \alpha_4 \ln CPI_{it} + \alpha_5 X_{it} + \alpha_6 MR_{it} + v_{it} \quad (8)$$

In order to capture the impact of bank consolidation on the strength of bank lending channel, equation 8 is modified by incorporating bank consolidation (C) and its interaction with monetary policy indicator ($C \times MR$). This is with a view to determine the impact of bank consolidation on lending channel which is in line with the work of Olivero *et al.*, 2013 and Ahtik, 2012. Hence, the second equation is specified thus:

$$\ln(L_{it}) = \beta_0 + \beta_2 \ln MR_{it} + \beta_3 \ln(GRT_{it}) + \beta_4 \ln CPI_{it} + \beta_5 \ln C_{it} + \beta_6 \ln C_{it} \ln MR_{it} + \beta_7 X_{it} + v_{it} \quad (9)$$

Where:

- α_0 and β_0 are the intercept term;
- C is Bank consolidation indicator;

- *CMR* is the interaction term between bank consolidation indicator and the monetary policy indicator;
- *i*, *t* and *ln* refer to bank subscript, time specific subscripts and natural log;
- and $\alpha_1 \dots \alpha_6$ and $\beta_1 \dots \beta_7$ are the parameters to be estimated.

The a priori expectation is that $\alpha_1, \alpha_2, \alpha_3$ and $\alpha_5 > 0$, while α_4 and $\alpha_6 < or > 0$.

β_3 and $\beta_6 > 0$; β_2 and $\beta_5 < 0$ while β_4 and $\beta_7 > or < 0$

3.2. MEASUREMENT FOR VARIABLES AND SOURCE OF DATA

Data used covers the period of 2005 to 2013 with fifteen commercial banks out of twenty-one (21) currently operating in Nigeria. All the variables have a maximum number of 135 observations except those with missing values.

Table 3.1

Name of Variable	Measurement	Source
<i>LN</i> - Loan and advance of the commercial banks to private non-financial institutions	Loan and advance of the commercial banks to private non-financial institutions	Nigeria Stock Exchange, Africa financial and financial report
<i>GRT</i> -Real Gross Domestic Product	Growth rate of gross domestic product	CBN Statistical Bulletin
<i>INFL</i> - Inflation rate	Consumer price index	CBN Statistical Bulletin
<i>MR</i> - Monetary policy rate	Treasury bill and monetary policy rate	CBN Statistical Bulletin
<i>C</i> - Consolidation in banking sector	¹ Concentration ratio and Herfindahl-Hirshman index ²	Nigeria Stock Exchange, Africa financial, financial report and Author's calculation

¹ Concentration Ratio: is defined as total deposit of three largest banks divided by total deposit of all the banks.

That is, $C_{Ratio} = \frac{\text{Sum of Deposits of three Largest Commercial Banks}}{\text{Total Volume of deposits of commercial banks}}$

² The Herfindahl-Hirshman index (HHI) is also used as the concentration measure, which is defined as the sum of the squared deposit market shares of each commercial banks. The mathematical notation of this is as follow:

$$HHI = \sum_{i=1}^n P_i^2$$

While: P = Market share of each commercial bank
N = Number of commercial banks in the industry

X^3 - Bank characteristics: 1. Size	Total asset	Nigeria Stock Exchange, Africa financial, financial report and Author's calculation
2. Liquidity	Cash and cash equivalent divided by total asset	
3. Capital base	Shareholder's fund divided by total asset	

4. EMPIRICAL ANALYSIS AND DISCUSSION

Implementation Process of Bank Consolidation Document in Nigeria

After the implementation process, 25 banks out of 89 banks were able to meet with the policy requirement. This figure was a result of series of merger and acquisition that took place. The tables below present the list of banks that emerged from the consolidation exercise with the number of banks that merged together to form them:

Table 4.1. List of Emerging banks from Consolidation Exercise

S/N	Emerging Bank	Nature of Arrangement	Participants
1	Access Bank Plc	Merger	Access Bank Plc, Capital Bank and Marina Bank
2	Afribank		Afribank and AfribankInter'nal Ltd. Later acquired Lead Bank and Assurance Bank
3	Diamond Bank	Acquisition	Acquired Lion Bank
4	EcobankPlc	Acquisition	Acquired Allstate Bank
5	Equitorial Trust Bank	Merger	Equitorial Trust Bank and Devcom Bank
6	Fidelity Bank	Merger	Fidelity Bank, Manny Bank and FSB Inter'nal
7	First Bank Plc	Merger	First bank Plc, FBN Merchant Bank and MBC Inter'nal
8	First City Monument Bank	Merger	Cooperative Dev. Bank; Midas Bank; Nig America Merchant Bank
9	First Inland	Merger	First Atlantic Bank, Inland Bank, IMB Plc and

³ X - which represents bank characteristics are captured with size, liquidity and capital base. These three bank characteristics are normalized with respect to their sample means using the following formular by Erhmann *et al.*, (2001):

$$\begin{aligned}
 Size_{it} &= \log A_{it} - \frac{1}{N_t} \sum_t \log A_{it} \\
 Liquidity_{it} &= \frac{L_{it}}{A_{it}} - \frac{1}{T} \sum_t \left(\frac{1}{N_t} \sum_i \frac{L_{it}}{A_{it}} \right) \\
 Capitalization_{it} &= \frac{C_{it}}{A_{it}} - \frac{1}{T} \sum_t \left(\frac{1}{N_t} \sum_i \frac{C_{it}}{A_{it}} \right)
 \end{aligned}$$

	Bank		NUB Inter'nal
10	GT Bank Plc	Nil	GT Bank alone
11	IBTC Chartered	Merger	IBTC, Chartered and Regent Bank
12	Intercontinental Bank	Merger	Intercontinental Bank, Gateway Bank, Equity and Global Bank
13	Nigeria International Bank	Nil	NIB alone
14	Oceanic Bank		Oceanic Bank and Intern'al Trust Bank
15	PHB Plc	Merger	Platinum and Habib Bank
16	Skye Bank	Merger	Prudent, Bond, Cooperative, Reliance and EIB
17	Spring Bank	Merger	Citizen Bank, Fountain Trust Bank, Guardian Express Bank, ACB Inter'nal, Omegabank and Trans Inter'nal
18	Stanbic Bank	Nil	Stanbic alone
19	Standard Chartered Bank	Nil	Standard chartered bank
20	Sterling Bank	Merger	Magnum Trust Bank, NAL Bank, NBM Bank, INMB Ltd and Trust Bank of Africa
21	Union Bank	Merger/ Acquisition	UBN, UBN Merchant Bank, UTB and Broad Bank
22	United Bank for Africa	Merger/ Acquisition	UBA, Standard Trust Bank, Continental Trust Bank
23	Unity Bank Plc	Merger	Bank of the North, New African Merchant Bank, Tropical Bank, Centre Point Bank, NNB Plc, First Interstate Bank, Intercity Bank, SocieteBancaire and Pacific Bank
24	Wema Bank Plc	Merger	Wema Bank Plc and National Bank
25	Zenith Bank Plc	Nil	Zenith Bank alone

Source: U. KAMA (2006), CBN Bullion.

About 76 banks out the existing 89 banks in Nigeria came together to form the 25 banks that after that emerged after the consolidation exercise. The remaining 13 banks failed to meet with the reform requirement and were left with the strategy option of 'cease operation and surrender the practice'. The table below presented the name of banks that could not meet up the consolidation policy requirement of 25-billion-naira capital base.

Table 4.2. *Unconsolidated Banks during 2005 Consolidation Programme in Nigeria*

1. All States Trust Bank	6. Fortune Bank	11. City Express Bank
2. Hallmark Bank	7. Liberty Bank	12. Gulf Bank
3. Trade Bank	8. Triumph Bank	13. Assurance Bank
4. African International Bank	9. Eagle Bank	
5. Societe General Bank	10. Metropolitan Bank	

Source: Dike O. (2006:31-32) Newswatch Magazine January 16

4.1. BANK LENDING CHANNEL

Following the controversy in the studies on the existence of bank lending channel as monetary policy transmission mechanism in Nigeria, this study first examined whether bank lending channel is such a veritable channel in transmitting monetary policy in Nigeria before proceeding to test the impact of consolidation on its effectiveness. The relevance of bank lending channel in transmitting monetary policy lies in the significance of the coefficients of monetary policy indicator and its interactions terms with specific characteristics of banks such as size, capitalization and liquidity. To this end, equation 3.8 in chapter three was estimated as five dissimilar models differentiated with inclusion or the exclusion of variables capturing bank characteristics and their interaction terms with monetary policy indicator.

The first specification (that is model 1) was estimated with all bank characteristics but without their interaction terms with the monetary policy indicator. Model 2 estimated as stated in equation 3.8 where all bank characteristics with their interactions were included in the model. Each of the last three columns of table 4.1 contained model 3, 4 and 5 where at least one of the bank characteristics and its interaction with monetary policy indicator were estimated with the model; Model 3 contained size as a measure of bank characteristics including its interaction with monetary policy indicator, while model 4 and 5 contained liquidity and capital base as banks characteristics respectively. This was to capture the distributional effect of monetary policy through each of the bank characteristics.

Table 4.3 Test of bank lending channel using treasury bill rate as monetary policy

	Model 1	Model 2	Model 3	Model 4	Model 5
Indicator	Size Liquidity Capitalization	Size Liquidity Capitalization with Interactions	Size	Liquidity	Capitalization
<i>LNN(-1)</i>	0.220***	0.2065**	0.3187***	0.457***	0.481***
<i>LTBR</i>	-0.414***	-0.3541**	-0.318**	-3.445**	-.322*
<i>LGRT</i>	-1.601**	-1.7654***	-1.763***	-1.945***	-1.9097***
<i>LCICP</i>	1.455***	1.503***	1.363***	1.634***	1.523**
<i>AST</i>	0.4256***	1.0829***	0.729***		
<i>LIQ</i>	-0.301	-1.1687		0.7034	
<i>CAP</i>	0.361	-3.6405**			0.0183
<i>LTBR_AST</i>		-0.2846***	-.1836**		
<i>LTBR_LIQ</i>		0.419		-0.0522	

<i>LTBR_CAP</i>		2.1718**			-0.1338
<i>SARGAN TES</i>	47.85	29.23 (0.212)	27.87	38.61	37.89 (0.256)
<i>(P-VALUE)</i>	(0.479)		(0.221)	(0.231)	
<i>MA 1 TEST</i>	-2.46 (0.014)	-2.58 (0.010)	-2.75	-2.65	-2.70 (0.007)
<i>(P-VALUE)</i>			(0.006)	(0.008)	
<i>MA 2 TEST</i>	1.04 (0.297)	1.17 (0.243)	0.91	0.28	0.81 (0.418)
<i>(P-VALUE)</i>			(0.361)	(0.777)	

Note: *, **, **** denotes level of significance at the 10%, 5%, 1%; ‘()’ are probability values.; Log of total bank loan to private sector (LNN); log of inflation rate (CICPI) (proxied by consumer price Index); log of bank total assets (AST); log of bank equity (CAP); log of treasury bill rate (TBR); log of concentration ratio (C); herfindahl index (HHI) and liquidity (LIQ) as proxied by cash and cash equivalent plus securities divided by total asset are used estimation.

Source: Author’s Computation

From the table 4.3 above, the result of the Sargan test confirmed the appropriateness and fitness of the models in this study by rejecting both first and second order serial correlation. Furthermore, the coefficient of monetary policy variable was negative and statistically significant in the five models at both 5%, and 10%. This implies that a negative relationship exists between the bank lending and monetary policy rate which is in consonant with a priori expectation. A percentage increase (decrease) in monetary policy (treasury bill rate) would lead to 0.35 percent decrease (increase) in bank lending. It suggests that monetary policy contraction reduces the loan supply in Nigeria which is consistent with bank lending channel. This is also in line with Oyaromade (2005); Mbutor (2007); and Chibundu (2008).

Inflation rate (CPI) had a positive relationship with loan supply as expected. Growth rate of Gross Domestic Product (GRT) displayed a negative relationship that is in contrary to a priori expectation. The negative relationship between GDT and loan growth rate is supported by Chmielewski (2006) in Poland and Matousek and Sarantis (2009) in Solvenia and Hungary. Explanation for this is that GDP especially in the transition economies like Nigeria captures something else that is not included in the model but related to the process of transition (Cottarelli *et al.*, 2005).

Moreover, there positive significance relationship between the bank size and loan supply (AST) meaning that a percentage increase in bank size liquidity and bank size liquidity with interaction caused loan supply to increase by 0.42% and 1.08% respectively. Furthermore, the negative significance of the coefficient of the interaction terms of monetary policy with bank size means that bank size strengthened the response of banks to monetary policy stance in Nigeria. This also revealed that big banks seem to contract lending more while faced with an increase in the short-term interest rates than smaller banks. This could be probably due to both bad loans problems and high yields on Treasury Bonds (Havrylchyk and Jurzyk, 2004). Bank capital and liquidity base are the only source of asymmetric response of banks to monetary policy effects since they were both positively signed but not significant. However, when all the characteristics and their interaction were included in model as reported in Table 5.3, bank capitalization and interaction with monetary policy rate seemed to have positive significant impact on bank lending,

implying that banks with lower capitalization are more sensitive to monetary policy (representing source of asymmetric response of banks to monetary shocks). Nevertheless, this was not enough ground to establish its impact since the same was found insignificant in other model specifications. Hence, the nonexistence of a bank lending channel operating through banks of different level of capitalization could be as a result of bank consolidation exercise that took place in 2005 where all banks in Nigeria were asked to raise their capital base to minimum of 25 billion naira. The consolidation ended the life of many banks that could not meet up with the requirement suggesting that some banks in Nigeria do not have a strong capital base. As argued by Van den Heuvel (2001), it takes banks that could not meet up with minimum capital requirement for bank capital to have impact on bank lending which would be too costly a risk for bank to take. As result, banks tend to limit the risk of future capital inadequacy (Gambacorta & Ibanez, 2011). Also, the coefficients associated with liquidity variable and its interaction with the policy rate were not significant. The explanation for this could also be linked to consolidation exercise. Banking industry has attracted a whole lot of funds since consolidation, so much that issuing loan was not the problem most times but getting a credit worthy individuals or corporate bodies. Based on the findings related to interaction terms of bank characteristics with monetary policy, lending channel can be adjudged a weak channel of monetary policy transmission.

4.2. EFFECT BANK CONSOLIDATION ON MONETARY POLICY CHANNEL

Having established the relevance of bank lending channel in the previous section, the study set to determine the effect of bank consolidation on the effectiveness as a monetary policy transmission channel. The motivation for this was as a result of impressive role that bank consolidation process had played in transforming banking industry in Nigeria. There is no gainsaying the fact that its impact could also be felt in the area of transmission of monetary policy effects through the core of banking activity of lending. To this effect, equation 3.9 was estimated. Both concentration ratio captured by three largest banks deposit over total deposit of the industry, and Herfindahl-Hirshman index were used as a measure of consolidation. The impact of consolidation on bank lending channel is revealed by the significance and the signing of the coefficients of consolidation variables and that of their interaction term with monetary policy indicator. The results are presented in table 4.4 below:

Table 4.4. *Test of Effect of Consolidation on Bank Lending Channel*

	<i>Model 1</i>	<i>Model 2</i>
	<i>Concentration Ratio</i>	<i>Herfindahl-Hirshman Index</i>
<i>LNN(-1)</i>	0.318**	0.255***
<i>LTBR</i>	-0.5779**	-5.2166***
<i>LC</i>	-0.43769**	-5.947***
<i>LTBR_LC</i>	0.0274*	2.6547***
<i>LGRT</i>	1.372*	0.255
<i>AST</i>	0.310***	0.2987***
<i>LIQ</i>	0.4396	0.551
<i>CAP</i>	0.0416	0.188
<i>TEST(P-VALUE) SARGAN</i>	91.34 (0.143)	82.90 (0.106)
<i>TEST(P-VALUE) MA 1</i>	-1.97 (0.049)	0.67 (0.506)
<i>TEST(P-VALUE) MA 2</i>	0.21 (0.834)	-2.27 (0.023)

Note: *, **, *** denotes level of significance at the 10%, 5%, 1%; ‘()’ are probability values; Log of total bank loan to private sector (LNN); log of inflation rate (C1CPI) (proxied by consumer price Index); log of bank total assets (AST); log of bank equity (CAP); log of treasury bill rate (TBR); log of concentration ratio (C); herfindahl index (HHI) and liquidity (LIQ) as proxied by cash and cash equivalent plus securities divided by total asset are used estimation.

From the Table 4.4, the coefficient of monetary policy rate was statistically significant and negative as expected. This further confirmed the result above that monetary policy tightening affected the ability of banks to extend loan which indicates the evidence of bank lending channel in Nigeria. Furthermore, growth rate of Gross Domestic Product was found positive and statistically significant. This conforms to a priori expectation and indicate positive demand side effect on loan growth. Inflation rate as captured by consumer price index was found to be insignificant and also having a distorting effect on the model. It is therefore removed. The coefficients on the variables used to measure bank liquidity (LIQ), size (AST), and capitalization (CAP) as proxies for the strength of banks’ balance sheets show positive relationship with loan supply which implies loan supply increases faster in banks with a higher degree of liquidity, capitalization and/or size. However, only bank size had a significant impact.

Coefficients of the consolidation measures were negatively signed and statistically significant. This can be interpreted to mean that an increased concentration in the loan market (banking sector) would cause loan supply to reduce. For instance, in the first model where concentration ratio was used as a measure of consolidation, the coefficient of consolidation measure is 0.438 which suggested that one percent increase in level of concentration in the banking sector would cause loan supply to reduce by 0.438 %. Also, the interaction term of the monetary policy indicator and concentration ratio through which the effect of consolidation on bank lending channel is captured is found to be positively related

to loan. This implies as concentration in the banking sector increases, the effectiveness of transmission of monetary policy through bank loan supply reduced by 0.027%. Furthermore, model two where Herfindahl-Hirshman index was used as the indicator of consolidation displayed a stronger significant and negative relationship with bank lending having recorded a coefficient of 5.22. This presented Herfindahl-Hirshman index as a better measure of consolidation in Nigeria. However, the empirical interpretation of this result was that one percent increase in bank consolidation will reduce bank lending by 5.22%. This finding is consistent with previous studies such as Berger et al (1995), Peek and Rosengen (1996); and Berger and Udell (1996) who confirmed that increasing consolidation in banking sector reduces loan supply. Furthermore, the coefficient of the interaction term of monetary policy rate with consolidation measure had a significant positive impact on loan supply. The inference that can be drawn from this is that increased consolidation in the banking industry weakened monetary policy transmission through bank lending. That is, the response of loan supply by banks to monetary policy effects reduces at every increase in the level of concentration in the banking sector. This finding is also consistent with previous studies (Olivero *et al* 2011, Adams and Amel, 2005). For instance, Olivero *et al* (2011) found the existence of buffering effect of consolidation on the monetary policy transmission mechanism in the banking sector in eighteen Asian and Latin America economies.

The test statistics of the appropriateness and fitness of the estimated models and method as also presented in the later column of the Table 4.2. To start with, Sargan test which tested the adequacy of the instruments used in the models confirmed the validity of the instruments used in this study as the test was insignificant in all the models. The null hypothesis of no first order serial correlation was rejected while we failed to accept the presence of second order serial correlation. All these conform to a priori expectation and hence demonstrate the appropriateness and fitness of the estimated models.

5. CONCLUSION AND POLICY RECOMMENDATIONS

5.1. CONCLUSION

The objective of the study is to identify bank lending channel and the impact on bank consolidation on its effectiveness as monetary policy transmission in Nigeria.

The evidence that emerged based on the empirical findings showed that bank lending channel is a weak channel of monetary policy transmission and not sensitive to capital base and level of liquidity in the banking sector.

Furthermore, the study also found that bank consolidation has made banking industry highly concentrated which is mitigating against the effectiveness of bank lending channel of monetary policy transmission in Nigeria.

5.2. POLICY RECCOMENDATIONS

In view of the findingd which have emanated from this study, the following policy recommendations are made:

- Financial authority in Nigeria should take advantage of bank lending channel in transmitting monetary policy effects in order to manage the economy;
- Government through the Central Bank of Nigeria should monitor and control excessive market power of individual bank in the industry as this mitigate against the effectiveness of bank lending channel of monetary transmission and as well as bank loan supply in Nigeria.

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