

Bank Loan Loss Cyclicity in Nigeria: Global Versus Local Economic Crises Effect

Abdulai Agbaje Salami, Ahmad Bukola Uthman & Kayode Mohammed Ajape

Abstract

The occurrence of global and local meltdowns and the subsequent instability experienced by the Nigerian banking sector necessitate empirical test of the nexus between business cycle and loan loss provisions (LLPs). This study examined the loan loss cyclicity behaviour of Nigerian deposit money banks (DMBs) taking into consideration economic-boom-bust-cycles. Bank-level and macroeconomic data were obtained from sampled 16 DMBs' annual reports and CBN Statistical Bulletin respectively between 2007 and 2017 covering both periods of global financial meltdown (2008-2009) and local economic recession (2016-2017). The study's hypotheses were tested using Prais-Winsten regression with correlated Panel Corrected Standard Errors (PW-PCSE). The results generally showed that provisioning behaviour by Nigerian DMBs is pro-cyclical. This was based on significantly negative coefficients of loans growth ($\Delta LOAN$) and real GDP growth rate (GDPGR) representing bank-specific and macroeconomic loan loss pro-cyclicity respectively. In contrast, loan loss counter-cyclicity was found during global financial crisis against majority evidence in the literature. Meanwhile, loan loss pro-cyclicity was peculiar to Nigerian DMBs during local economic recession. While the loan loss pro-cyclical behaviour of Nigerian DMBs represents imprudent provisioning policies and might have been incidental to the collapse of some Nigerian banks in the past, the counter-cyclicity during global meltdown is traceable to the fact that the crisis had no substantial negative influence on Nigeria's financial system. To address the problem of pro-cyclicity, it was recommended that bank regulators ensure that macroeconomic prediction models adopted by Nigerian DMBs be made relative perfect. There is also need for strengthening bank capital buffers in record time and conduct of stress tests for individual DMBs rather extant consolidated approach among others.

Keywords: Global Financial Crisis, Local Economic Recession, Loan Loss Cyclicity, Deposit Money Banks

Introduction

The cyclical dependence between loan loss provisions (LLPs) and business cycle communicates financial information about the potential or otherwise of depository financial institutions to absorb losses during economic upheaval. Loan loss cyclicity also reveals the ability of banks to signal financial strength provided that the fluctuation of the aggregate economy of a country is taken into consideration (Salami, 2021). Bank provisioning decisions in relation to business cycle are incidental to adjustments made to loan loss provisioning rule by financial reporting standards' setters and regulators in time of crisis or to correct reporting deficiencies (Central Bank of Nigeria (CBN), 2010, 2019; Huizinga & Laeven, 2018; Olszak, Pipień Kowalska & Roszkowska, 2017; Sanusi, 2010a, 2010b, 2012). The birth of Basel III as advancement to Basel II and the revision of Prudential Guidelines in Nigeria were products of responses to non-performing exposures and macroeconomic downturns. This can be substantiated with circumstances that led to the introduction of Basel III (Bank for International Settlements (BIS), 2021; Basel Committee for Banking Supervision (BCBS), 2011) and objectives of revised prudential guidelines in Nigeria (CBN, 2010, 2019).

The loan loss cyclicity is also emphasised by the linkage of bank provisioning policies to the banking system safety and soundness and that of banking sector to the national and global economies. This makes business cycle-LLPs linkages provide rationale for losses resulting from bank asset/credit quality inadequacies. In other

words, bank asset/credit quality inadequacies represented by non-performing assets of higher magnitude are ascribable to bank failures (Gaston & Song, 2014). During crisis, banks are confronted with difficulties in lending, funding their activities and improving on their asset quality based on empirical evidence provided by Abdulkarim, Hassan, Hassan and Mohamad (2014) and Muhmad and Hashim (2015) subsequent to Asian and global financial crises of 1990s and 2000s respectively. Despite the collapse of over 320 United States of America (US) banks between 2008 and 2010 as the fallout of global financial meltdown, a sum of \$1 trillion had to be expended to cushion the effect by US government (Hambusch, 2015). In Nigeria, over \$9 billion losses were incurred by Nigerian banks as a result of 2009 banking crisis (Beck, Maimbo, Faye & Triki, 2011) aside from a whopping sum of N620 billion and over N1.7 trillion provided as bailouts and additional liquidity by CBN and Asset Management Corporation of Nigeria (AMCON) respectively (Sanusi, 2010a, 2011, 2012). The instability identifiable with banking institutions as a result of financial crisis explains why favourable cyclical dependence between LLPs and business cycle is indispensable.

As evident in the literature, favourable loan loss cyclical is termed loan loss counter-cyclical while the reversal is loan loss pro-cyclical (Adzis, 2017; Bonin & Kosak, 2013; Huizinga & Laeven, 2018). At bank-level, the relationship between growth in bank lending and LLPs is referred to as bank-specific cyclical (Berger & Udell, 2004). Alternatively, the nexus between LLPs and macroeconomic factors like real Gross Domestic Product (GDP) growth rate, rates of interest, inflation and unemployment (Abdullah, Ahmad & Bujang, 2015; Mohd Isa, Choong, Gun Fie & Abdul Rashid, 2018) is known as macroeconomic cyclical (Bonin & Kosak, 2013). Bank-specific pro-cyclical occurs when growth in bank lending exerts negative impact on LLPs while the reversal is bank-specific counter-cyclical (Bonin & Kosak, 2013). For macroeconomic cyclical, negative relationship between real GDP growth rate which is often used in the literature (Adzis, Anuar & Mohd Hishamuddin, 2015; Alessi, Di Colli & Lopez, 2014; Dushku, 2016; Floro, 2010; Mohd Isa et al., 2018; Ozili, 2015) and LLPs represents macroeconomic pro-cyclical but the reversal which is favourable is tagged macroeconomic loan loss counter-cyclical (Adzis, 2017). Loan loss pro-cyclical whether at bank or macroeconomic level represents imprudent bank provisioning policies (Olszak & Pipień, 2014).

The rate at which a number of Nigerian deposit money banks (DMBs) ceased to operate in their brand subsequent to 2009 banking crisis in the country remains a source of concern because of its lingering ripple effects. Although the situation was ascribed to the consequence of global financial meltdown (Sanusi, 2010a, 2011), the scenario was not evident until 2009 CBN special audit of the Nigerian DMBs. Upon introduction of reforms with confidence in probable counter-cyclical LLPs (CBN, 2010) and sound banking system (Sanusi, 2012), the occurrence of local economic recession between 2016 and 2017 somehow provided a setback. The collapse of Skye Bank Plc which was characterised by high non-performing exposures after acquiring Mainstreet Bank (Proshare, 2017) provided rationale for an investigation into loan loss cyclical as the event occurred during the economic recession. Similar rationale can be provided for the acquisition of Diamond Bank Plc whose whopping losses for the 2017 financial year (year of recession) were enshrouded in the takeover by Access Bank Plc.

The literature seems to attach more importance to the influence of global financial crisis on loan loss cyclical (Adzis et al., 2015; Huizinga & Laeven, 2018; Ozili, 2015) compared to the influence of local economic recession (see, for instance, Caporale, Alessi, Di Colli & Lopez, 2018). In Nigeria, the level of non-performing exposure and crisis it degenerated into coupled with occurrence of economic recession between 2015 and 2017 have not prompted, until now, any empirical examination of loan loss cyclical dependence. The available evidence in this regard is that of Ozili (2015) which was conducted prior to the occurrence of local economic recession. Therefore, this study has the capacity to reveal the cyclical behaviour of Nigerian DMBs during both global and local economic meltdowns. This is to show whether there is justification for the recent switch to

Basel III and /or International Financial Reporting Standards (IFRS) 9 by Nigerian DMBs. The application of requirements of Basel III and IFRS 9 gives consideration to macroeconomic cycle (Parmani & Pan, 2017).

Literature Review

Theoretical Underpinning

The arguments of “screening profitability hypothesis” (SPH) are bases used to explain the relationship between bank provisioning behaviour and business cycle examined in this study. The SPH propounded by Ruckes (2004) is based on the proposition that “the average default probability of a borrower declines in an economic upswing which affects the profitability of screening and causes low screening activity in such times” (Domikowsky, Foos & Pramor, 2015, p. 1). The ascription of changes in bank lending standards to changes in lenders’ demand side is subject to bank credit policies fluctuation over the economic cycle (Ruckes, 2004). This is an indication that “different phases of the business cycle are associated with different information collection and processing activities of banks and different degrees of credit market competition, which prompt higher credit standards during recessions and looser ones in boom times” (Ruckes, 2004, p. 1074). The variability of the average default quality of borrowers over the economic cycle summarises the fact that there will be considerable drop in the average quality of a borrower when the economic prospects of a nation are bleak but high when bright. This suggests that intensive screening produces a negative assessment with high probability indicating that the marginal benefit from testing is low during severe economic downturns (Domikowsky et al., 2015). The expensiveness of screening by the banks places higher priority on general economic situations than individual assessment of borrower’s quality in banks’ lending decisions. In summary, the evaluation of loan applicants is not properly done when the prospects of the economy are either very good or very bad.

The above postulates of SPH by Ruckes (2004) reinforce that provisioning behaviour of banks will be pro-cyclical. Loan loss pro-cyclicality emphasises low LLPs during economic upswing given low default probability assumption and high LLPs during economic recessions given high default probability assumption.

Empirical Review and Hypotheses Development

As obtainable in the literature, loan loss cyclicality is all about whether bank-specific or macroeconomic provisioning behaviour is either pro-cyclical or counter-cyclical. At bank-level where nexus between bank lending growth and LLPs is examined, bank-specific pro-cyclicality indicating inverse relationship between loan growth and LLPs is reported by Olszak, Chodnicka-Jaworska, Kowalska and Świtła (2018) and Araújo, Lustosa and Dantas (2018b) for Polish and Brazilian banking respectively. For cross-country studies, negative relationship between loan growth and LLPs are found by Cavallo and Majnoni (2001), Laeven and Majnoni (2003), Bikker and Metzmakers (2005) for provisioning policies of Italian and Japanese banks, Bonin and Kosak (2013) for European banks (though the coefficient is insignificant) and Skąła (2015) for Central European banking sector. Further evidence of bank-specific pro-cyclicality is traceable to the findings of Pool, de Haan and Jacobs (2015), Adzis (2017), Araújo, Lustosa and Paulo (2018a), Huizinga and Laeven (2018), Surjaningsih, Hafidz, Adamanti Muhajir and Sari (2018) and Molla (2021). In contrast, bank-specific counter-cyclicality was found by Bikker and Metzmakers (2005), Adzis et al. (2015), Dushku (2016), Abu-Serdaneh (2018), Olszak and Pipień (2014), Soedarmono, Pramono and Tarazi (2017), Wang, Xie and Jin (2019) (though with non-discretionary LLPs) and Hegde and Kozłowski (2021).

Since evidence of bank-specific pro-cyclicality is preponderant in the literature, it is hypothesised (Hypothesis one) that:

H₁: Growth in Nigerian DMBs’ lending has significantly negative influence on their provisioning policies.

Like bank-specific cyclicality, loan loss cyclicality studies at macroeconomic level also reported more evidence of pro-cyclicality than counter-cyclicality. As obtainable from the findings of Pain (2003), Fillat and Montoriol-Garriga (2010), Floro (2010), Glen and Mondragón-Vélez (2011), Gaul (2014), Arbak (2017) and Mohd Isa et

al. (2018), GDP growth rate and LLPs are inversely related. LLPs also follow the trends of economy as found by Cavallo and Majnoni (2001), Laeven and Majnoni (2003), Dinamona (2008), Bouvatier and Lepetit (2008), Bonin and Kosak (2013), Ozili (2015, 2017), Olszak et al. (2018), Abu-Serdaneh (2018) and Araújo et al. (2018a, 2018b). Evidence of depository financial institutions charging more LLPs during economic bust is also traceable to the findings of Olszak and Pipień (2014) for 9 out of 13 sampled countries when data were analysed using Seemingly Unrelated Regression Equation model rather than pooled ordinary least squared regression, Adzis, Tripe and Dunmore (2016), Olszak et al. (2017), Soedarmono et al. (2017), Adzis (2017), Abdullah, Bujang and Sahudin (2017) and Huizinga and Laeven (2018). The evidence of provisioning policies following the business cycle dimension indicating macroeconomic loan loss pro-cyclicality was empirically reported by Surjaningsih et al. (2018), Dolar (2019), Danisman, Demir and Ozili (2021), Malovaná and Tesařová (2021), Hessou, Lensink, Soumaré and Tchakoute Tchuigoua (2021) for microfinance banks and Du, Hancock and von Hafften (2022). The macroeconomic loan loss pro-cyclicality evidence reported by Alessi et al. (2014), Adzis et al. (2015) and Bryce, Dadoukis, Hall, Nguyen and Simper (2015) was inconclusive as the coefficient of GDP growth rate was found insignificant. For macroeconomic loan loss counter-cyclicality, the findings of Handorf and Zhu (2006), Domikowsky, Bornemann, Duellmann and Pflingsten (2014), Dushku (2016), Caporale et al. (2018), Muriu and Josea (2020) and Hegde and Kozłowski (2021) are good reference points.

The majority of evidence provided above suggests that LLPs-business cycle nexus is pro-cyclical indicating that the second hypothesis (H_2) should be:

H₂: Nigerian DMBs' provisioning practices are significantly and negatively influenced by the pattern of economic cycle.

Using a sample of 1,419 banks from 45 countries across Europe, Latin America, United States of America (US) and Asia, Laeven and Majnoni (2003) found that substantial provision for loan losses is not made until period of cyclical downturns. Similarly, despite the financial crisis, the provisioning behaviour of banks of Czech Republic origin and those of other European countries (15 and 36 banks respectively) is pro-cyclical as found by Frait and Komárková (2013). As established by Adzis et al. (2015) and Arbak (2017), Malaysian commercial banks and Belgian credit institutions respectively were found to be charging higher LLPs during global financial crisis compared to pre and post-crisis periods. The increase in LLPs during financial crisis identifiable with Malaysian and Belgian banks as an indication of pro-cyclicality was also evident in the significantly negative coefficient of GDP growth rate in both studies. The findings of Bushman and Williams (2015) for US banks also align with the practice of delaying expected loss recognition until the period of economic busts/recessions based on the analysis of quarterly data obtained between 1993 and 2009. The trend of pro-cyclical provisioning behaviour during financial crisis was also evident in the findings of Huizinga and Laeven (2018) who reported the significantly negative coefficient of GDP growth rate when interacted with global financial crisis for banks in Euro and Non-euro countries. In contrast, evidence of decrease in LLPs and inverse LLPs-GDP growth rate nexus was found by Caporale et al. (2018) indicating counter-cyclicality during Italian recession of 2011-2015 and global financial crisis period of 2008-2009.

The evidence of more pro-cyclical provisioning reported during global meltdown and counter-cyclical provisioning during local recession in the previous studies necessitates the third and fourth hypotheses as follows:

H₃: Loan loss provisioning behaviour of Nigerian DMBs is not counter-cyclical during global financial crisis.

H₄: The level of LLPs of Nigerian DMBs is not higher to be pro-cyclical during local economic recession of 2016-2017.

Methods, Data and Econometric Models

The study obtained both bank-specific and macroeconomic data as related to the variables of the study from Nigerian DMBs’ annual reports and corporate database respectively. Data related to GDP growth rate used as a measure economic cycle were obtained from CBN Statistical Bulletin. Data were obtained for the period 2007-2017 covering both the periods of global financial crisis (2008-2009) as affected Nigeria and local economic recession of 2016-2017. The period between 2007 and 2017 became appropriate because related disclosures in the annual reports of Nigerian DMBs started in 2007 while data beyond 2017 have capacity to distort the findings of the study because of switch to “expected credit loss model” of IFRS 9 and/or Basel III. A sample 16 out of 26 DMBs as at 31 December 2018 (CBN, 2018) was used for data collection at bank-level based on the access to information relevant to the study and availability of annual reports. The number of bank-year observations probable was 176 but 169 was used for analysis owing to missing annual reports of some DMBs. This was occasioned by the period a particular DMB started to make its financial information publicly available and the cessation of operation of another in its brand name after disposal by CBN and AMCON to private investors outside capital market.

Data collected were analysed descriptively using mean, standard deviation, minimum and maximum values while Prais-Winsten regression model with correlated Panel Corrected Standard Errors (PW-PCSE) was used to test the study’s hypotheses. PCSE is adopted if regression models have error structures with presence of heteroscedasticity, first-order autocorrelation and/or contemporaneous autocorrelation/cross-sectional dependence (Blackwell, 2005, Solano, Camino-Mogro & Armijos-Bravo, 2020). PCSE is said to be also appropriate for unbalanced panel with higher number of cross-sections (N) than time series (T) (Solano et al., 2020) as evident in this study with ‘N’ = 16 and ‘T’ = 11. Though PW-PCSE was adopted, procedural steps involved in static panel data model involving choice between panel fixed-effects (PFE) and random-effects (PRE) models on one hand and PRE and pooled OLS on the other hand using appropriate diagnostic tests were followed. Prior to regression analysis, the study opted for the choice of pair-wise correlation analysis, variance inflation factor and use of condition index to test the presence of multi-collinearity problem among the explanatory variables.

To test the study’s hypotheses, the following models as specified below were tested. The first model is specified without the interaction of economic crises while the second model includes the economic crises effect of cyclical dependence between LLPs and business cycle. The first model which is used to test the first two hypotheses is specified according to deductions from previous studies (Bonin & Kosak, 2013; Huizinga & Laeven, 2018; Soedarmono et al., 2017) as:

$$LLP_{it} = \alpha_0 + \alpha_1 \Delta LOAN_{it} + \alpha_2 GDPGR_t + \alpha_3 NPL_{it} + \alpha_4 LTA_{it} + \mu_{it} \text{ --- (1)}$$

To test the moderating influence of economic crises on loan loss cyclicalities as contained in hypotheses 3 and 4, deductions were made from the works of Huizinga and Laeven (2018) and Caporale et al. (2018) to expand the equation (1) as:

$$LLP_{it} = \alpha_0 + \alpha_1 \Delta LOAN_{it} + \alpha_2 GDPGR_t + \alpha_3 CRSS_{it} + \alpha_4 (CRSS * \Delta LOAN)_{it} + \alpha_5 (CRSS * GDPGR)_{it} + \alpha_6 REC_{it} + \alpha_7 (REC * \Delta LOAN)_{it} + \alpha_8 (REC * GDPGR)_{it} + \alpha_9 NPL_{it} + \alpha_{10} LTA_{it} + \mu_{it} \text{ --- (2)}$$

Though two (2) econometric models were specified, six (6) regression models were presented based on separate before joint inclusion of the study’s non-interaction independent variables in regression results presented in Table 6. The definitions and measurements of the study’s variables (both dependent and independent variables) specified in equations (1) and (2) are presented in Table 1.

Table 1: Measurements and Definitions of Study's Variables

S/N	Notation	Variable Name	Description
1	LLP_{it}	Loan Loss Provisions	Ratio of LLPs scaled by total loans
2	$\Delta LOAN_{it}$	Growth in bank lending	Difference between previous and current gross loans scaled by previous period gross loans
3	$GDPGR_t$	GDP growth rate	Real growth rate of GDP testing for pro or counter-cyclicity
4	$CRSS_{it}$	Global financial Crisis dummy	An indicator variable given 1 for years 2008-2009 and 0 otherwise
5	$CRSS * \Delta LOAN_{it}$	Financial crisis and bank lending growth	Interaction of financial crisis with loan growth rate
6	$CRSS * GDPGR_{it}$	Financial crisis and GDP growth rate	Interaction of financial crisis with GDP growth rate
7	REC_{it}	Local Economic Recession	Dummy variable (1) for years 2016 and 2017, 0 otherwise
8	$REC * \Delta LOAN_{it}$	Economic Recession and DMBs' lending growth	Interaction of local economic recession with loan growth rate
9	$REC * GDPGR_{it}$	Local Economic Recession and GDP growth rate	Interaction of local economic recession with GDP growth rate
10	NPL_{it}	Non-performing loans	Non-performing loans scaled by total loans
11	LTA_{it}	Credit risk	ratio of gross loans to DMBs' total assets

Source: Authors' Compilation (2020) based on deductions from relevant literature and conceptual framework

Data Analysis and Results

Descriptive Analysis

The descriptive statistics of the study's variables are presented in Table 2 based on three categories of full sampled, global financial crisis and local economic meltdown periods following the approach of Curcio, Simone and Gallo (2017).

As evident in Table 2, Nigerian DMBs appear to charge higher LLPs during local economic recession compared to global financial crisis given higher mean (maximum) LLP values of 13.36% (293.47%) during local recession compared to 5.56% (22.62%) during global meltdown. This is a similitude of pro-cyclical loan loss provisioning behaviour by Nigerian DMBs during local economic recession which reality is subject to outcome of regression estimates. Overall, the level of LLPs charged by Nigerian DMBs may be somewhat low given mean value of 4.8%, the maximum value of 293.47% reveal worsening financial condition of some Nigerian DMBs within the sampled period. The negative sign for minimum value of LLP is an indication of LLPs recovered rather than incurred in some periods. While LLP is higher during local recession, non-performing loans (NPL) are higher during global meltdown. This might be attributed to the existence of AMCON during local economic recession whose mandate is to buy banks' toxic assets. Nonetheless, the level of non-performing loans is higher in Nigeria given a mean of 9.76% and maximum value of 88.5% during the study's full sampled period.

Table 2: Summary Statistics

PERIOD	Variable	LLP	ΔLOAN	GDPGR	LTA	NPL
FULL SAMPLE PERIOD (169)	Mean	0.0480	0.2525	0.0507	0.4463	0.0976
	Std. Dev.	0.2284	0.3687	0.0314	0.1256	0.1388
	Min	-0.2836	-0.9750	-0.0158	0.0605	0.0089
	Max	2.9347	2.1181	0.0954	1.0119	0.8846
GLOBAL MELTDO WN PERIOD	Mean	0.0556	0.4242	0.0778	0.4886	0.2033
	Std. Dev.	0.0541	0.4286	0.0059	0.1523	0.2032
	Min	0.0040	-0.2627	0.0720	0.2597	0.0182
	Max	0.2262	2.1181	0.0835	1.0119	0.7403
LOCAL MELTDO WN PERIOD	Mean	0.1336	0.0787	-0.0038	0.4657	0.0559
	Std. Dev.	0.5298	0.2585	0.0122	0.1414	0.0497
	Min	-0.0020	-0.9750	-0.0158	0.0605	0.0123
	Max	2.9347	0.4643	0.0082	0.7688	0.2681

Source: Authors' computation (2020) based on STATA 15 outputs. Number of bank-year observations in parentheses

Evidence of pro-cyclical provisioning behaviour can also be observed from the summary statistics of growth in DMBs' lending (ΔLOAN). As evident in Table 2, ΔLOAN is lower during local economic recession using mean (maximum) values of 7.87% (46.43%) as basis compared to 42.42% (211.8%) during global financial crisis. Addendum to this is the substantial drop in lending growth to the tune of -97.5% compared to -26.3% during local and global financial crises respectively. The reduction in bank lending is peculiar to period of economic busts as evident in the literature (Bonin & Kosak, 2013). For real GDP growth rate (GDPGR), it appears Nigerian economy was in a better position during global financial crisis compared to local economic recession. While the maximum value of GDPGR during local economic recession is <1%, it was as high as 8.4% during global meltdown. The revelation made by mean GDPGR that Nigeria's economy substantially nosedived during local recession given average GDPGR of -0.4% compared to a higher mean of 7.8% during global meltdown is additional evidence. On the whole, Nigeria's economic performance as measured by GDPGR was not too woeful given mean (maximum) GDPGR of 5.1% (9.5%) if not for a minimum GDPGR of -1.6%. Regardless of economic status, loan takes substantial part of Nigerian DMBs' total assets accounting for not less than 40% in terms of mean LTA. This is with the exception of the fact that, the minimum value during local recession (6.1%) is lower than 25.97% minimum value during global financial crisis.

Multi-Collinearity Diagnostics

The results of pair-wise correlation analysis, variance inflation factor (VIF) and Eigenvalues and condition index used to test for the presence of multi-collinearity problem among the study's explanatory variables are presented in Tables 3, 4 and 5 respectively. From Table 3, no two variables have correlation coefficient >0.8 other than REC and GDPGR. This suggests that it may not be appropriate to include both variables in the same model. However, using VIF which is believed to be superior (Ferré, 2009; Galvão & Araújo, 2009), the case of multi-collinearity is not manifest. As contained in Table 4, there is no any variable including REC and GDPGR with VIF coefficient higher than 10 and tolerance level lower than 0.1 as well as R-squared higher than 0.9 considered to be the benchmark (Gujarati & Porter, 2009). Similar to what is obtainable under VIF analysis, the total condition number of 13.02 as presented in Table 5 is less than 30 recommended for multi-collinearity problem to set in (Gujarati & Porter, 2009). Therefore, the issue of collinearity between REC and GDPGR does not exist using results of VIF and condition index.

Table 3: Correlation Matrix of Non-Interaction Explanatory Variables

Variables	Δ LOAN	GDPGR	CRSS	REC	LTA	NPL
Δ LOAN	1.0000					
GDPGR	0.2489*	1.0000				
CRSS	0.2170*	0.4024*	1.0000			
REC	-0.2197*	-0.8085*	-0.2158*	1.0000		
LTA	-0.0306	-0.0019	0.1568*	0.0716	1.0000	
NPL	-0.1193	0.3152*	0.3548*	-0.1400	0.2853*	1.0000

Source: Authors' computation (2020) based on STATA 15 outputs. * stands for significance at 5% significance level

Table 4: Variance Inflation Factor

Variable	VIF	SQRT VIF	Tolerance	R-Squared
Δ LOAN	1.17	1.08	0.8584	0.1416
GDPGR	3.71	1.93	0.2694	0.7306
CRSS	1.38	1.17	0.7247	0.2753
REC	3.10	1.76	0.3226	0.6774
LTA	1.11	1.06	0.8978	0.1022
NPL	1.40	1.18	0.7137	0.2863
Mean VIF	1.98			

Source: Authors' computation (2020) based on STATA 15 outputs

Table 5: Eigenvalues and Condition Index

	Eigenval	Cond. Index
1	4.0492	1.0000
2	1.1844	1.8490
3	0.7758	2.2846
4	0.5775	2.6480
5	0.3241	3.5346
6	0.0652	7.8828
7	0.0239	13.0185
Overall Condition	13.0185	

Source: Authors' computation (2020) based on STATA 15 outputs

Test of Hypotheses and Discussion of Findings

The results of hypotheses testing are presented in Table 6 using the estimates of PW-PCSE. The appropriateness of PW-PCSE for the first two regression models is dependent on the significance of panel data Wooldridge test for heteroscedasticity in fixed-effects model (FE-HET), Wooldridge panel data first-order autocorrelation test (FART) and Pesaran's test of cross sectional independence (PCSD) at 95% confidence level. This is subsequent to the choice of panel fixed-effects (PFE) as a result of significance of Hausman test (HMT). The choice of PW-PCSE is also made in the remaining four regression models but preceded by the choice of Pooled OLS as a result of insignificance of HMT and Random-Effects Langrange Multiplier test (LMT). As evident in Table 6, presence of heteroscedasticity, serial correlation and cross-sectional dependence in the residual terms is evident in all the four models with initial choice of Pooled OLS. Thus, significance of HET-BP1 and HET-BP2, FART and PCSD respectively except in the Δ LOAN and GDPGR model with interaction terms. The higher values of absolute correlation of the residuals (ABCR), being a little bit far from zero, confirms additionally the presence of cross-sectional dependence in the error terms of all regression models presented in Table 6.

The significantly negative coefficients of Δ LOAN and GDPGR in the regression models without interaction terms is an indication of pro-cyclical loan loss provisioning in Nigeria and a confirmation of "screening profitability hypothesis" (SPH) assumptions. Bank-specific pro-cyclicality is evident with significantly negative

coefficient of Δ LOAN while macroeconomic pro-cyclicality is evident with significantly negative coefficient of GDPGR. This confirms the argument of SPH that increase in banks' lending which is identifiable with economic boom is often followed by low LLPs given low customers' default probability assumption. Loan loss pro-cyclicality as evident at bank and macroeconomic levels in Nigeria based on the results presented in Table 6 suggests an imprudent provisioning. The imprudent provisioning behaviour has become the order of the day globally if majority of previous findings are taken into consideration. Thus, the findings of this study agree with the findings of a number of previous studies including the recent ones of Araújo et al. (2018a), Dolar (2019), Danisman et al. (2021), Du et al. (2022), Huizinga and Laeven (2018), Malovaná and Tesařová (2021) and Molla (2021).

For regression models with interaction terms, evidence of pro-cyclical loan loss provisioning is also reported as the coefficients of Δ LOAN and GDPGR remain significantly negative despite the inclusion of measures of crisis and their interaction terms. However, during global financial crisis, there was evidence of reduction in LLPs given significantly negative coefficient of CRSS though positive in " Δ LOAN only" model but not significant. The reduction in LLPs during global meltdown is confirmed by the positive coefficient of $CRSS*\Delta$ LOAN indicating bank-specific loan loss counter-cyclicality notwithstanding its insignificance in the " Δ LOAN and GDPGR" model. The counter-cyclical provisioning is also established by the significantly positive coefficient of $CRSS*GDPGR$. The counter-cyclical behaviour in provisioning practices of Nigerian DMBs during global financial crisis may be suggestive of prudent provisioning policies or indicative of the fact that the extent of influence of the crisis on Nigeria's financial system was low.

In contrast, evidence of Nigerian DMBs charging higher LLPs was evident during Nigeria's economic recession of 2016-2017 given the significantly positive coefficient of REC in the relevant models. The charging of higher LLPs during the recession is reflected in the negative coefficients of $REC*\Delta$ LOAN and $REC*GDPGR$ except in the "GDPGR only" model where the coefficient of $REC*GDPGR$ is positive. Notwithstanding the positive coefficient of $REC*GDPGR$ in a model, it is largely evident that provisioning behaviour of Nigerian DMBs during 2016-2017 recession was pro-cyclical if relevant coefficients in the " Δ LOAN and GDPGR" model are used as basis. The inability of Nigerian DMBs to absorb substantial losses which is an indication of imprudent provisioning was evident during recession given charging of higher LLPs.

The counter-cyclical provisioning found during global meltdown at bank and microeconomic levels for Nigerian DMBs disagrees with findings of a number of country-specific studies including Adzis et al. (2015) for Malaysian banking sector and Arbak (2017) for Belgian credit institutions except Caporale et al. (2018) for Italian banks. The pro-cyclical provisioning behaviour established in Nigeria during local economic recession is contrary to counter-cyclical provisioning found for Italian banks during Italian recession of 2011-2015 by Caporale et al. (2018).

Table 6: Regression Estimates

Variable	Dependent Variable = LLP					
	ΔLOAN Only	GDPGR only	ΔLOAN & GDPGR	ΔLOAN Only	GDPGR only	ΔLOAN & GDPGR
	Without Interaction	Without Interaction	Without Interaction	With Interaction	With Interaction	With Interaction
ΔLOAN	-0.1732 (-6.76)*		-0.1525 (-5.56)*	-0.0125 (-1.91) ^o		-0.0016 (-0.13)
GDPGR		-1.8028 (-3.24)*	-1.1526 (-2.29) ^λ		-0.8515 (-1.79) ^o	-0.5669 (-3.53)*
CRSS				0.0043 (0.52)	-0.4072 (-1.93) ^o	-0.2149 (-2.19) ^λ
CRSS*ΔLOAN				0.0294 (2.30) ^λ		0.0216 (0.96)
CRSS*GDPGR					5.8789 (2.17) ^λ	2.972842 (2.49) ^λ
REC				0.2413 (65.99)*	0.1258 (3.47)*	.179623 (15.87)*
REC*ΔLOAN				-1.6311 (-71.90)*		-2.1518 (-57.26)*
REC*GDPGR					5.9617 (4.05)*	-15.4250 (-25.72)*
NPL	0.1813 (3.08)*	0.3705 (6.23)*	0.2762 (4.64)*	0.1442 (14.05)*	0.2813 (7.27)*	0.1529 (8.87)*
LTA	-0.6002 (-7.06)*	-0.6881 (-7.28)*	-0.6437 (-7.08)*	-0.0640 (-3.57)*	-0.6382 (-8.14)*	-0.0978 (-3.30)*
_cons	0.3580 (7.68)*	0.4294 (7.28)*	0.4222 (7.53)*	0.0454 (5.02)*	0.3293 (7.09)*	0.0934 (5.17)*
HMT	8.97 (0.0297) ^λ	8.02 (0.0456) ^λ	8.48 (0.0756) ^o	3.36 (0.8494)	8.42 (0.2969)	8.18 (0.6113)
FE-HET	18622.71 (0.0000)*	19340.9 (0.000)*				
LMT			0.79 (0.1876)	0.17 (0.3408)	1.15 (0.1416)	1.20 (0.1367)
HET-BP1			21.16 (0.0000)*	102.60 (0.0000)*	20.35 (0.0000)*	91.19 (0.0000)*
HET-BP2			22.65 (0.0001)*	111.42 (0.0000)*	22.17 (0.0024)*	107.01 (0.0000)*
FART	14.08 (0.0019)*	17.42 (0.0008)*	12.639 (0.0029)*	3.37 (0.0860) ^o	22.852 (0.0002)*	0.917 (0.3535)
PCSD	5.410 (0.0000)*	12.169 (0.0000)*	7.361 (0.0000)*	9.796 (0.0000)*	15.279 (0.0000)*	25.200 (0.0000)*
ABCR	0.320	0.501	0.360	0.572	0.665	0.534
R ²	0.1575	0.1323	0.1751	0.6285	0.1585	0.7475
Wald	129.27 (0.0000)*	83.97 (0.0000)*	161.38 (0.0000)*	15810.63 (0.0000)*	138.44 (0.0000)*	7978.39 (0.0000)*
Observation	169	169	169	169	169	169
Model Type	PW-PCSE	PW-PCSE	PW-PCSE	PW-PCSE	PW-PCSE	PW-PCSE

Source: Authors' computation (2020) based on STATA 15 outputs. Regression coefficients are reported with Z-statistics in brackets; PW-PCSE represents Prais-Winsten Regression with correlated Panel Corrected Standard Errors. Breusch-Pagan / Cook-Weisberg test for heteroscedasticity with fitted values of dependent variable- ADPL (HET-BP1) and independent variables (HET-BP2), Random-Effects Breusch-Pagan Langrange Multiplier test (LMT), Hausman statistics (HMT), panel data Wooldridge test for heteroscedasticity (FE-HET)

and Wald Statistics (Wald) reported chi-square statistics with p-values in parentheses. Wooldridge panel data first-order autocorrelation test: FART reported F-statistics with p-value in parenthesis. Pesaran's test of cross sectional independence (PCSD) reported cross sectional dependence (CD) statistic with p-values in parenthesis. ABCR stands for average absolute correlation of the residuals. ^o, ^λ, and * indicate significance at 10%, 5% and 1% level of significance respectively.

Also, it is evident across all models that increase in LLPs is subject to the level of non-performing loans based on the significantly positive coefficient of NPL at p-value <0.01. The significantly negative coefficient of LTA in all models is a confirmation of the behaviour of ΔLOAN and additional evidence of bank-specific pro-cyclicality.

Summary and Conclusion

The series of banking crises that featured over the business cycle between 2007 and 2017 globally and in Nigeria with their attendant consequences remain a source of concern. Since bank loan loss provisioning decisions have a connection with the economic situation given customers' loan default probability, the link between business cycle and loan loss provisions (LLPs) when emphasis is laid on boom-bust scenario of an economic cycle was examined in the Nigerian context. This became realistic owing to the occurrence of global financial crisis between 2007 and 2009 and local economic recession over the period 2015-2017. While bank-specific and macroeconomic data were obtained for the period 2007-2017, analyses were based on Prais-Winsten regression with correlated Panel Corrected Standard Errors (PW-PCSE). The hypotheses testing using PW-PCSE revealed that two of the study's hypotheses were retained while two others were rejected. The two hypotheses of bank-specific and macroeconomic loan loss pro-cyclicality were retained while the assumptions of pro-cyclical provisioning during global meltdown and counter-cyclical provisioning during local economic recession were rejected.

Although it is generally believed and empirically claimed in the literature that global financial meltdown (2008-2009) caused a lot of disruptions in the banking sector worldwide, its disruption in the loan loss reporting and behaviour in Nigeria is not as pronounced as that of local economic recession (2016-2017). As found, it is largely observable that loan loss cyclicality at bank and macroeconomic levels in Nigeria is pro-cyclical. It is equally evident that during global recession, LLPs were on downward trends. However, more LLPs are charged during local economic recession in Nigeria. Charging more LLPs during economic upheaval as evident during local economic recession in Nigeria is a sign of loan loss pro-cyclicality while the opposite as identifiable with period of global financial crisis in Nigeria is a sign of loan loss counter-cyclicality. This is evident in the interactions of local recession with loans growth and real GDP growth rate on one hand which are substantially negative and those of global meltdown with loans growth and real GDP growth rate on the other hand which are positive.

While the collapse of some Nigerian DMBs post-global financial crisis might be attributed to stricter regulation than consequences of financial crisis, the cessation of operation of some banks in 2018 accounted for the fallout of 2016-2017 Nigerian economic recessions. Therefore, it is indeed not surprising that one of Nigerian DMBs with international operating licence had to discontinue its operations subsequent to incurring huge losses and got subsumed by a bigger bank. This suggests that instability in the Nigerian banking system is a product of not building up LLPs during economic booms which resulted in the failure of some DMBs to absorb unexpected losses when the economy contracted.

Policy Recommendations

The switch to counter-cyclical provisioning rule of IFRS 9 and/or Basel III by Nigerian banks is a welcome development but constrained by the directives for partial absorption of losses arising from its applications for the first four years ending 31 December 2021. Nonetheless, giving banks latitude to apply the guidelines without

extensive and/or intensive home-made inputs and enduring oversights may thwart the original motive of entrenching counter-cyclical provisioning practices in the country.

Also, an attempt to revise CBN 2010 Prudential Guidelines through 2019 exposure draft was commendable despite delayed implementation until now. Better still; opportunities abound for necessary adjustments geared towards counter-cyclical provisioning practices to be incorporated before its eventual approval.

It is important to note that success of new provisioning regime of IFRS 9 and/or Basel III requires perfect prediction models. Therefore, regulators should ensure that macroeconomic prediction models adopted by DMBs are relatively perfect so that the projection of economic downturn will not amount to nullity.

To address the problem of loan loss pro-cyclicality forthwith, mechanisms to adopt should include ensuring banks issue financial statements having all qualitative characteristics required by International Accounting Standards Board, strengthening the bank capital buffers in record time and conducting stress tests for individual banks (rather than extant consolidated approach) and making the reports available for public use.

Despite providing rationale for the necessity of greater precautions and domestic inputs in the adoption of counter-cyclical provisioning rule, constraints to generalising the study's findings for the entire depository institutions stand out. This is however due to the absence of substantial relevant financial information of microfinance and primary mortgage banks in the public domain. A comparative study of loan loss cyclical behaviour in the International Accounting Standard (IAS) 39 and the present IFRS 9 regimes has the tendency to provide additional evidence.

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Abdulai Agbaje Salami (PhD) is of the Department of Accounting Al-Hikmah University Ilorin. abdagbaje1@gmail.com, +2348064386468
Ahmad Bukola Uthman (PhD) is of the Department of Accounting Al-Hikmah University Ilorin. ahmadbuthman@gmail.com,
+2348059374911
Kayode Mohammed Ajape (PhD) is the Department of Accounting University of Lagos. majape@unilag.edu.ng, +2348065095598