Bank capital, earnings smoothing and provisioning practices in Nigeria: IFRS and risk evidence

Abdulai Agbaje Salami and Ahmad Bukola Uthman
Department of Accounting, Al-Hikmah University Ilorin, Ilorin, Nigeria

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Abstract

Purpose – This study empirically tests the use of loan loss provisions (LLPs) for earnings and capital smoothing when emphasis is laid on banks' riskiness and adoption of the International Financial Reporting Standards (IFRSs) in Nigeria.

Design/methodology/approach – Annual bank-level data are hand-extracted between 2007 and 2017 from annual reports of a sample 16 deposit money banks (DMBs), and analysed using appropriate panel regression models subsequent to a number of diagnostic tests including heteroscedasticity, autocorrelation and cross-sectional dependence. The use of both reported LLPs (TLLP) and discretionary LLPs (DLLP) for earnings and capital management is tested to advance the practice in the literature.

Findings – Generally, the study finds that Nigerian DMBs manage capital via LLPs, while mixed results are obtained for earnings smoothing. However, during IFRS, Nigerian DMBs' management of capital is identifiable with TLLP, while smoothing of earnings is peculiar to DLLP. Additionally, evidence of the improvement in loan loss reporting quality expected during IFRS for riskier Nigerian DMBs, could not be attained. This is corroborated by the study's findings of the use of both TLLP and DLLP for earnings and capital management during IFRS by DMBs in solvency crisis against the only use of TLLP to manage capital found for the entire period.

Practical implications – The evidential capital and earnings lopsidedness may subject Nigerian DMBs' going-concern to a lot of questions.

Originality/value – The study sets a foremost record in the empirical test of managerial opportunistic behaviour embedded in earnings and capital concurrently while accounting for loan losses by all categories of Nigerian DMBs in terms of riskiness, following accounting regime change.

Keywords Capital management, Deposit money banks, Earnings smoothing, IFRSs, Loan loss provisions, Solvency risk

Paper type Research paper

1. Introduction

Loan loss provisions (LLPs) represent an accounting choice and/or accrual that are unique to the preparation and presentation of financial reports of depository financial institutions through provision of all-inclusive accounting information to all user groups. This all-encompassing role has a part of its components, the decisions related to the management of capital and earnings smoothing (Salami, 2021). These two decisions are central to adjustments to LLPs by depository financial institutions prior and subsequent to the regulation by Basel Committee on Banking Supervision (BCBS) (Ahmed *et al.*, 1999; Anandarajan *et al.*, 2003, 2007).

Apart from the fact that amount of capital held by banks which is referred to as capital adequacy (Anandarajan *et al.*, 2007), is a sign of potential of banks to cover or absorb losses,

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making retained earnings (arrived at after adjustments to loan loss impairment charges in the income statement), one of the components of Tier 1 (core) capital as required by Basel standards, underlines the linkage between bank regulatory capital and accounting for loan losses (Leventis *et al.*, 2011). This argument is also espoused by the inclusion of general LLPs in the components of bank core capital though restricted to 1.25% of risk-weighted assets (Central Bank of Nigeria (CBN), 2010) to improve the quality of capital being reported by depository financial institutions (Leventis *et al.*, 2011). As required by the BCBS, minimum capital adequacy ratio is fixed at 8% (Anandarajan *et al.*., 2007; Ozili and Outa, 2017), but in Nigeria three categories are recognised: 10% for banks with regional or national authorisation; 15% applies to those with international licensing, while 16% is applicable to those with domestic systemically important status (CBN, 2015; CBN, 2019). If the capital ratio of a bank as required by the CBN in Nigeria falls below regulatory benchmark(s), the bank can be labelled, depending on the level of inadequacy: "undercapitalised; significantly undercapitalised; critically undercapitalised or insolvent" (CBN, 2010), using the requirements of Supervisory Intervention Framework (CBN, 2019). Banks' attempts to evade being categorised "undercapitalised" or "insolvent" may compel them to explore all available means of avoiding sanctions legally or illegally.

The proportion of LLPs in banks' accruals and non-cash expenses accounting for not less than 50% in income statement (Salami, 2021) necessitates the adjustments upward or downward of LLPs, and delayed incurrence of LLPs as a strategy for earnings management (Fernando and Ekanayake, 2015). The position in the literature is that accounting standards incorporate some flexible requirements that promote bank management incentives to smooth earnings achievable via adjustments to LLPs (Acar and Ipci, 2015). These flexibilities are evident in the corporate entities' management privilege to create or defer some expenditure while attempting to determine profit (Healy and Wahlen, 1999). Thus, bank management can select reporting methods, disclosures and estimates that suit their business models in order to appear best-performing before the investors and other stakeholders (Healy and Wahlen, 1999).

Since management of capital and earnings to meet up with regulatory requirements involve higher level of managerial discretions, the tendency for banks in solvency crisis to be indulged in accounting manipulations is higher (Yasuda *et al.*, 2004; Leventis *et al.*, 2011). This was revealed following the special audit of deposit money banks (DMBs) in Nigeria, by the CBN in 2009 (Sanusi, 2010a). The outcomes of 2009 special audit prompted a number of reforms (Sanusi, 2010a, b, 2011), the results of which the regulators were convinced that Nigerian financial system is stable, and DMBs are on sound footing (Sanusi, 2012). However, the events that led to the CBN's take-over of the management of Skye Bank Plc (a bank with systemic importance status) and its subsequent collapse (Proshare, 2017), as well as disposal to private investors after its acquisition of a bridge bank provide the need for empirical investigation into the reality of the use of LLPs for earnings and capital management by banks threatened by solvency risk. The celebrated acquisition of Diamond Bank Plc by Access Bank Plc with acquiree, having some reminiscent signs of risk of insolvency, given its return of substantial amount of losses occasioned by high level of non-performing exposures in the 2017 accounting year provided another testimony.

In Nigeria, preference is given to reporting in the International Financial Reporting Standards (IFRSs) by Nigerian DMBs, even before the IFRSs were officially adopted for all public-interest entities in the country (Sanusi, 2012). This lends credence to the fact that Nigerian banking regulators' conviction that reporting in globally recognised principles-based accounting standards have a tendency to improve financial reporting quality and propriety as claimed in the literature (Liu and O'Farrell, 2011; Allehaidan, 2020; Eiler *et al.*, 2021). Notwithstanding this expectation, the issue of non-compliance with requirements of

IFRSs and extant law and regulation levied against Stanbic IBTC Holdings, with subsequent sanctions by the Financial Reporting Council of Nigeria (FRCN) (FRCN, 2015) requires further investigation. Also, the depletion in capital and earnings is noticeable with Skye Bank Plc subsequent to its acquisition (when expected to be stronger) of Mainstreet Bank Limited (Proshare, 2017), and serious non-performing loans crisis is identifiable with Diamond Bank Plc prior to its merger with Access Bank Plc may be pointers to the influence of non-performing exposures reporting and discretionary provisioning for corporate earnings and bank capital optimisation, regardless of accounting regime.

The necessity for this study which accentuates its contribution to the accounting for loan losses literature is in fourfold. First, further attention is required to be given to recurring non-performing loan crisis and lopsided corporate reporting in Nigeria as banks attempt to optimise their capital and earnings. There are few studies in this regard in Nigeria (Ozili, 2015; Atoyebi and Simon, 2018). Second, without prejudice to the avalanche of studies testing the use of bank provisions for capital and earnings optimisation (Curcio *et al.*, 2017; Caporale *et al.*, 2018; Elnahass *et al.*, 2018; Ozili and Outa, 2018; Ashraf *et al.*, 2019; Muriu and Josea, 2020; Tran *et al.*, 2020 and Nikulin and Downing, 2021), there are restricted number of studies even in the last decade, testing the conditional effect of IFRS adoption on the use of LLPs to manage earnings and capital (Gebhardt and Novotny-Farkas, 2011; Leventis *et al.*, 2011 and Ozili and Outa, 2018).

It is also evident, following the series of corporate bank failures on a global pedestal and the spread of IFRS gospel that the test of the joint conditional effect of risk of insolvency and the IFRS adoption is identifiable only with Leventis *et al.* (2011). In the Nigerian context, the conditional effect of IFRSs on the use of LLPs to manage capital and earnings is identifiable with Ozili (2015) and Atoyebi and Simon (2018), while the focus of Yahaya *et al.* (2015), Eneje *et al.* (2016) and Ozili and Outa (2019) was only on the use of LLPs to smooth earnings. The consideration of voluntary IFRS period by Ozili (2015) cannot be considered as real IFRS reporting is based on the requirements of IFRS 1: *First-Time Adoption of IFRS,* while mandatory period covered by Ozili and Outa (2019) and Eneje *et al.* (2016) was halted for data collection in 2014 and 2015, respectively .

Third, the derivation of discretionary LLPs (DLLP) provides more evidence of the management of capital and earnings by banks (Kwak *et al.*, 2009; Zgarni and Fedhila, 2019; Tran *et al.*, 2020). Nonetheless, the evidence becomes more robust when moderated by the IFRS adoption and risk of insolvency as contained in this study. This advances the approach of Leventis *et al.* (2011), and reveals more in the adjustments to capital and earnings while accounting for loan losses. Fourth, an empirical post mortem of the IAS 39: *Financial Instruments- Recognition and Measurements* regime which is based on incurred loss model has the capacity to reveal level of precautions required in the application of IFRS 9: *Financial Instruments*' rules with more in-built discretionary requirements. This task also makes a revelation of level of additional oversights required of the regulators in the entrenchment of accounting quality in the industry. Pure IAS 39 regime in Nigeria for loan loss accounting adequately covered in this study was between 2012 and 2017.

Apart from contributing to the empirical attempts to provide means of resolving high non-performing exposures peculiar to banks in this part of the world, the study has capacity to fill other gaps. The concurrent test of the conditional effect of IFRS and solvency risk while Nigerian DMBs' attempt to use actual/total LLPs (TLLP) and/or DLLP to optimise capital and earnings is one, the coverage of the entire IAS 39 regime is another.

There are five additional sections of literature review, methodology incorporating description of variables and data, empirical results, discussion of findings and concluding remarks after the background information provided in this section.

2. Literature review

2.1 Theoretical background

Bank managers' motive to smooth/manage earnings is explained with income smoothing hypothesis (Anandarajan *et al.*., 2007; Ozili and Outa, 2019; Salami, 2021), while motive for smoothing capital is premised on capital management hypothesis (Curcio *et al.*, 2014; Olszak *et al.*, 2017). In contrast, the need for reform is explained with "institutional change theory" when inconsistencies are observable in the polity (Harries, 2012).

Income smoothing hypothesis describes a situation whereby a manager takes managerial actions that increase the reported earnings when income is low and vice versa (Fudenberg and Tirole, 1995). This emphasises the fact that smoothing of earnings is dependent on the economic circumstance of a firm (Kanagaretnam *et al.*, 2003). Bank management resorts to the disposal of trading securities to perpetrate real income smoothing, while artificial income smoothing in the bank financial reporting involves the management of LLPs (Taktak *et al.*, 2010). The basis of capital management hypothesis is that the bank management is encouraged to use LLP to manage capital since some regulatory costs are associated with capital requirements violation (Olszak *et al.*, 2017). In the regulation of banks, banks are compelled to hold the regulatory capital ratio benchmarks (Anandarajan *et al.*, 2005), failure of which may attract regulator's interference in the bank management (Curcio *et al.*, 2014). Also, the level of capital adequacy of a bank has a role to play in securing approval for acquisition of another bank, and being classified as a big or systemically important bank (Ahmed *et al.*, 1999).

The adjustments to rules, policies, expectations and patterns called institutions (Wegerich, 2001; Kingston, 2019; Samadi and Alipourian, 2021), governing the human interactions and paths of developments encapsulate institutional change (Coccia, 2018). This suggests that a true institutional change reflects an overhaul of the structures and architecture of the agencies and organisations as well as their relationships (Hobley and Shields, 2000; Wegerich, 2001). The fallout of 2009 special audit of banks in Nigeria (Sanusi, 2010a) and subsequent events (FRCN, 2015), which necessitated a number of reforms including the establishment of FRCN and the adoption of IFRS are a typical institutional change scenarios.

Based on improved financial reporting disclosures attributable to IFRS reporting in the literature (Eiler *et al.*, 2021), change in corporate reporting norms and rules geared towards avoiding or reducing considerably use of LLPs for earnings and capital management is envisaged upon reporting in IFRS by Nigerian DMBs (Sanusi, 2012). This is the premise relied upon in adopting institutional change theory alongside income smoothing and capital management hypotheses.

2.2 Previous empirical findings and hypotheses development

From the study's empirical review, it is evident that the test of the moderating influence of IFRS and solvency risk on the use of provisions for capital and earnings smoothing is only attributable to Leventis *et al.* (2011), who focuses on European Union (EU) commercial banks. Majority of other previous studies, including Nigerian studies of Ozili (2015), Eneje *et al.* (2016), Atoyebi and Simon (2018) and Ozili and Outa (2019), test only the moderation of IFRS reporting. The review incorporating the direction of the previous findings to develop the study's hypotheses is restricted to virtually studies of the past two decades.

2.2.1 Earnings management and provisioning practices. The provisioning decision meant to determine whether banks use LLPs to smooth/manage earnings is based on the positive impact of earnings before taxes and LLPs (EBTL) on provisioning practices measured in the literature as TLLP and/or DLLP. At country-level, the use of LLPs for earnings management/smoothing are found by Alali and Jaggi (2011), El Sood (2012), Dolar (2016), Pérez *et al.* (2008),

Carbo-Valverde and Rodriguez-Fernandez (2018), Pinho and Martins (2009), Curcio *et al.* (2014) and Nikulin and Downing (2021). More evidence of the use of LLPs for earnings smoothing/management is also identifiable with findings of Abdullah *et al.* (2013), Adzis *et al.* (2015), Misman and Ahmad (2011), Chang *et al.* (2008), Floro (2010), Skała (2014), Fernando and Ekanayake (2015), Acar and Ipci (2015), Dushku (2016), Schechtman and Takeda (2018), Muriu and Josea (2020), Le *et al.* (2021) and Pandey *et al.* (2022). For cross-country studies, the empirical findings of positive relationship between LLPs and EBTL, are traceable to the works of Hasan and Wall (2004), Zoubi and Al-Khazali (2007), Fonseca and González (2008), Bouvatier and Lepetit (2012), Bushman and Williams (2012), Olson and Zoubi (2014), Curcio and Hasan (2015), Abdullah *et al.* (2017), Elnahass *et al.* (2018), Skała (2018), Zainuldin and Lui (2020), Doan *et al.* (2020) and Ozili (2022a).

On the negative relationship between LLPs and EBTL, suggesting a non-use of LLPs for earnings management/smoothing, previous typical empirical findings are those of Ashour (2011), Alessi *et al.* (2014), Ashraf *et al.* (2015), Curcio and Hasan (2015), Abu-Serdaneh (2018), Caporale *et al.* (2018), Tran *et al.* (2020) and Shala and Toçi (2021). Using the majority of findings in the LLPs' literature, the first hypothesis (H1) is stated as follows:

H1. The effect of earnings before taxes and LLPs on provisioning practices is positive for Nigerian DMBs

The majority of the evidence in the accounting for loan-loss literature regarding the use of provisions to smooth earnings is favourable to the improved financial reporting quality upon the adoption of IFRSs. This is as found by Norden and Stoian (2013), Adzis *et al.* (2016), Arbak (2017), Ozili and Outa (2019), vanOosterbosch (2009), Gebhardt and Novotny-Farkas (2011), Leventis *et al.* (2011), Ashraf *et al.* (2019), Jutasompakorn *et al.* (2021) and Jakubíková (2022). However, the reversal is found by Ozili and Outa (2018) for South African banks reporting in IFRSs, Eneje *et al.*. (2016) and Atoyebi and Simon (2018) for Nigerian DMBs. Duru and Tsitinidis (2013) could not establish any difference in the income smoothing practices of banks in Norway, Denmark, Finland and Sweden under both national the generally accepted accounting principles (GAAPs) and IFRSs, while earnings management via LLPs is found by Chen *et al.* (2021) to continue subsequent to switch to Basel III by Chinese commercial banks. For the period 2005–2017 in the UK, traces of earnings smoothing is reported by Ozili (2022b), except for the period 2014–2017 when IFRS 9 is applied. EU and sub-Saharan African banks' evidence provided by Taylor and Aubert (2022), revealed a reduction in earnings smoothing upon the adoption of IFRS 9 but comparatively the reduction is only identifiable with banks in Sub-Saharan Africa. For Ashraf *et al.* (2015), the coefficient of EBTL is significantly positive for banks in the Organisation of Islamic Cooperation (OIC) reporting in IFRSs. From more evidence of improved use of LLPs for earnings management upon the adoption of IFRSs, the study proposes the second hypothesis (H2) is stated as follows:

H2. There is reduction in the use of LLPs for earnings management by Nigerian DMBs upon the adoption of IFRSs.

The empirical evidence of the use of LLPs to manage earnings by banks threatened by risk of insolvency is reported only by Leventis *et al.* (2011) in the literature. Notwithstanding the study of Leventis *et al.* (2011), related evidence can be deduced when financial crisis and other risks are considered. As found by Alali and Jaggi (2011) and Ma and Song (2016), the use of LLPs for earnings management is typical of banks with high asset risk portfolio and systemic crash and distress risk, respectively. Curcio *et al.* (2014), Skała (2014) and Curcio *et al.* (2017), find that Chinese, Polish cooperative, European area banks, respectively, engaged in earnings smoothing via LLPs regardless of financial crisis. The evidence in the literature is sufficient enough to propose the study's third hypothesis (H3) is stated as follows:

H3. The use of LLPs for earnings management is identifiable with Nigerian DMBs threatened by risk of insolvency.

As found by Leventis *et al.* (2011), the relationship between EBTL and LLPs for voluntary and mandatory adopters of IFRSs is found to be significantly negative for listed EU commercial banks threatened by solvency risk. This empirical result necessitates the fourth hypothesis (H4) is stated as follows:

H4. The use of LLPs to smooth earnings is negative during IFRSs for Nigerian DMBs in solvency crisis.

2.2.2 Capital management and provisioning practices. Unlike the use of LLPs for earnings management, the relationship between bank regulatory capital measured as core capital (CCAR) and/or total risk-based capital (TRCAR) (Leventis *et al.*, 2011; Curcio and Hasan, 2015 and Elnahass *et al.*, 2018), and LLPs should be negative to confirm the use of LLPs for capital management. There is more empirical evidence of the use of LLPs to manage capital in the literature (Ahmed *et al.*, 1999; Anandarajan *et al.*, 2003, 2005; Kanagaretnam *et al.*, 2004; Alali and Jaggi, 2011 and Tran *et al.*, 2020). Other studies with evidence of capital management include Anandarajan *et al.* (2007), Ghosh (2007), Kwak *et al.* (2009), Pinho and Martins (2009), Floro (2010), Misman and Ahmad (2011), Karimiyana *et al.* (2014), Schechtman and Takeda (2018) and Muriu and Josea (2020). At cross-country level, Bouvatier and Lepetit (2012), Ben Othman and Mersni (2014) and Curcio and Hasan (2015), found the use of LLPs for capital management. In contrast, the non-use of LLPs for capital management is reported by Lobo and Yang (2001), Kanagaretnam *et al.* (2003), Chang *et al.* (2008), Pérez *et al.* (2008), Ashour (2011), El Sood (2012), Abdullah *et al.* (2013), Olson and Zoubi (2014), Curcio and Hasan (2015), Abdullah *et al.* (2017), Carbo-Valverde and Rodriguez-Fernandez (2018) and Shala and Toçi (2021), while mixed findings were reported by Collins *et al.* (1995), Alessi *et al.* (2014), Adzis *et al.* (2015), Abu-Serdaneh (2018) and Nikulin and Downing (2021). The preponderance of studies with inverse relationship suggests the fifth hypothesis (H5) of the study is stated as follows:

H5. The influence of CCAR and TRCAR on provisioning practices is significantly negative for Nigerian DMBs.

Since the adoption of IFRS has a role to play in the measurement and disclosure practices most especially in the definition of equity (Leventis *et al.*, 2011), some changes should be expected in the use of LLPs for capital management. As reported by Leventis *et al.* (2011), the act of capital management via LLPs reduces upon the adoption of IFRSs by EU commercial banks. During voluntary IFRS period, the use of LLPs to manage capital was typical of Nigerian DMBs as found by Ozili (2015). However, during mandatory period, Atoyebi and Simon (2018) could not establish practice of capital management via LLPs by Nigerian DMBs. While Arbak (2017) reported mixed findings of the use and non-use of LLPs to manage capital based on results of panel fixed-effects model and Generalised Method of Moments respectively, Ashraf *et al.* (2019) could not establish use LLPs for capital management subsequent to interaction with principled-based accounting standards. In contrast, Le *et al.* (2021) and Chen *et al.* (2021) reveal the use of LLPs to manage capital subsequent to Vietnamese banking restructuring programme and Chinese commercial banks' switch to Basel III, respectively. The increase in capital management is noticeable in the loan loss behaviour of European banks upon their switch to Basel III as found by Jutasompakorn *et al.* (2021). Based on the foregoing IFRS evidence, it is hypothesised the sixth hypothesis (H6) is stated as follows:

H6. The influence of CCAR and TRCAR on provisioning practices is significantly positive for Nigerian DMBs during IFRS.

The relevant evidence of the use of LLPs to manage capital is found by Leventis *et al.* (2011) for EU listed banks threatened by risk of insolvency though statistically insignificant. However, the finding of Elnahass *et al.* (2018) shows those conventional banks with loss-generating attributes in Jordan, Bahrain and Qatar have the habit of using LLPs to manage capital within the sampled period 2007–2013, which is inclusive of financial crisis period of 2007–2009. These findings are relied upon to hypothesis (H7) is stated as follows:

H7. The influence of CCAR and TRCAR on provisioning practices is significantly negative for Nigerian DMBs threatened by solvency risk.

The sole evidence found by Leventis *et al.* (2011) is that riskier EU commercial banks do not use LLPs for capital management upon the adoption of IFRSs, given the insignificant positive coefficient of measure capital management. Based on this evidence, related hypothesis (H8) about the use of LLPs to manage bank capital by riskier Nigerian DMBs during IFRS is stated as follows:

H8. The influence of CCAR and TRCAR on provisioning practices is significantly positive for Nigerian DMBs threatened by solvency risk during IFRS.

3. Methodology

3.1 Research design and data

The appropriateness of longitudinal design for the study is based on the level at which the data was collected for the study. However, longitudinal cohort design is found more appropriate because banks which are the study's units of analysis provide undifferentiated services. While the study's population is all Nigerian depository financial institutions, relevant data are hand-extracted from annual reports of Nigerian DMBs. The criteria used to select DMBs included in the sample are: (1) DMB is listed on Nigerian Exchange Group (NGX); (2) DMB is not listed but for one reason or the other has its financial information in public domain; (3) DMB has merged with another bank, been acquired by a bigger bank or been delisted from NGX but has financial information covering 60% of sampled period and (4) DMB must have relevant information related to the study's variables covering not less than 60% of the period 2007–2017 covered by the study whether operating in its brand name or has been delisted. Based on the criteria, a sample of 16 DMBs is selected for analysis. The data are obtained for the period 2007–2017. The sampled period 2007–2017 is selected because it coincided with period information on Basel's bank capital adequacy ratio became accessible in the financial reports of banks in Nigeria, given regulatory directives and IFRSs were adopted in Nigeria. However, the information related to 2018 and beyond which also belong to IFRS period is excluded, owing to change in accounting for loan losses from IAS 39: *Incurred Loan Loss Model* to IFRS 9: *Expected Credit Loss Model* which can distort the study's findings. Besides, the so-called IFRS 9 adoption for loan loss reporting is to be partially implemented for the first four years (1 January 2018 to 31 December 2021) based on the CBN directives. Therefore, for an 11-year period of collection of data and a sample of 16 DMBs, 176 firm-year observations of bank-level data are probable. However, due to merger and acquisition, delisting and missing annual reports of some DMBs, an unbalanced panel dataset of 169 bank-year observations is eventually used for data analysis.

3.2 Estimation techniques

Apart from panel regression analysis for which study's hypotheses are tested, basic descriptive statistics are also performed to identify basic characteristics of the sampled DMBs. The process involved in panel regression model followed favours panel corrected

standard errors (PCSEs) in models presented in Tables 1 and 2 compared to those in Table 3. This is subject to the pooled ordinary least squared (pooled OLS) and/or panel fixed-effects (panel FE) models having heteroscedasticity, serial correlation at first order and cross-sectional dependence. Breusch-Pagan/Cook-Weisberg test incorporating fitted values of TLLP and DLLP (BPW-H1) and BPCW with explanatory variables (BPW-H2) are performed to detect the presence of heteroscedasticity in pooled OLS, while Wooldridge test for heteroscedasticity (W-HET) is performed for panel FE. Nevertheless, Wooldridge test for the first-order autocorrelation-WAR(1) and Pesaran cross-sectional dependence (PCD) test are performed regardless of panel FE and pooled OLS. Thus, Prais-Winsten regression correlated with PCSEs (PCSE-PW), which has capacity to correct heteroscedastic, panel first-order autocorrelated and/or contemporaneous autocorrelated error structures and cross-sectional dependence (Blackwell, 2005; Solano *et al.*, 2020) is adopted for models with interaction variables where issues of heteroscedastic, autocorrelated residuals and cross-sectional dependence are evident as presented in Tables 1 and 2. PCSE-PW is also applicable as evident in this study, where number of cross-sections is higher than number of time series for data collection (N > T) and datasets are unbalanced (Beck and Katz, 1995; Solano *et al.*, 2020). The regression models are preceded by preliminary analyses for testing the presence of multi-collinearity, which include variance inflation factor (VIF), pairwise correlation analysis and condition index.

Table 1.
Regression estimates testing capital management (CCAR) and earnings smoothing including IFRS and risk interactions with provisions

	Dependent variable: TLLP				Dependent variable: ADLLP			
Variable	Coefficient	PCSE	z	$p>\|z\|$	Coefficient	PCSE	z	$p>\|z\|$
CCAR	0.1032	0.0714	1.45	0.148	−0.0873*	0.0238	−3.66	0.000
EBTL	1.7820$^{\lambda}$	0.6976	2.55	0.011	−0.4821*	0.1791	−2.69	0.007
IFRS	0.1298*	0.0265	4.89	0.000	−0.0433*	0.0088	−4.91	0.000
IFRS*CCAR	−0.3219*	0.1116	−2.88	0.004	0.0719$^{\lambda}$	0.0360	2.00	0.046
IFRS*EBTL	−1.8577*	0.7031	−2.64	0.008	0.6392*	0.1838	3.48	0.001
SVR	0.1217*	0.0286	4.26	0.000	0.0031	0.0056	0.56	0.577
SVR*CCAR	−0.0314	0.0916	−0.34	0.732	0.0807*	0.0289	2.79	0.005
SVR*EBTL	−2.4116*	0.7233	−3.33	0.001	−0.2568	0.2116	−1.21	0.225
IFRS*SVR*CCAR	−1.0754*	0.1416	−7.59	0.000	−0.0716$^{\lambda}$	0.0336	−2.13	0.033
IFRS*SVR*EBTL	1.8429$^{\lambda}$	0.8848	2.08	0.037	0.4334	0.2926	1.48	0.139
ΔNPL	0.0038$^{\theta}$	0.0020	1.90	0.057	–	–	–	–
LTA	–	–	–	–	−0.0342	0.0222	−1.54	0.124
LEV	−0.0018*	0.0002	−8.28	0.000	0.0000	0.0001	0.30	0.766
LgTA	0.0158$^{\lambda}$	0.0065	2.41	0.016	−0.0023	0.0024	−0.95	0.341
LST	0.0123	0.0125	0.98	0.325	−0.0015	0.0033	−0.44	0.661
_cons	−0.3863*	0.1479	−2.61	0.009	0.1287*	0.0465	2.77	0.006
HUS		30.05(0.0046)*				7.76(0.8588)		
W-HET		97875.26(0.0000)*				–		
LM		–				0.00(1.0000)		
BPW-H1		–				37.45(0.0000)*		
BPW-H2		–				41.40(0.0000)*		
WAR(1)		7.624(0.0146)$^{\lambda}$				5.958(0.0275)$^{\lambda}$		
PCD		2.770(0.0056)*				3.331(0.0018)*		
R^2		0.884				0.526		
Wald		520.50(0.0000)*				2915.69(0.0000)*		
Model Type		PCSE-PW				PCSE-PW		
Observation		169				169		

Source(s): Authors' computation (2020) using outputs from STATA 14. Other than R^2, diagnostic statistics are reported with p-value in parentheses. $^{\theta}$, $^{\lambda}$ and * indicate significance at 90%, 95% and 99% levels of statistical confidence, respectively

Variable	Dependent variable: TLLP Coefficient	PCSE	z	$p>\|z\|$	Dependent variable: ADLLP Coefficient	PCSE	z	$p>\|z\|$
TRCAR	0.0735	0.0588	1.25	0.211	−0.0794*	0.0262	−3.02	0.002
EBTL	1.9317*	0.5424	3.56	0.000	−0.3656$^{\lambda}$	0.1734	−2.11	0.035
IFRS	0.1283*	0.0308	4.16	0.000	−0.0478*	0.0089	−5.34	0.000
IFRS*TRCAR	−0.3330*	0.1036	−3.22	0.001	0.0616	0.0439	1.40	0.161
IFRS*EBTL	−1.9383*	0.5848	−3.31	0.001	0.5228*	0.1856	2.82	0.005
SVR	0.1619*	0.0279	5.81	0.000	0.0006	0.0071	0.09	0.932
SVR*TRCAR	−0.4034*	0.0895	−4.51	0.000	0.1692*	0.0334	5.06	0.000
SVR*EBTL	−1.7714*	0.5985	−2.96	0.003	−0.4973$^{\lambda}$	0.2129	−2.34	0.019
IFRS*SVR*TRCAR	−0.6311*	0.1150	−5.49	0.000	−0.1558*	0.0448	−3.48	0.000
IFRS*SVR*EBTL	0.9611	0.9421	1.02	0.308	0.6819$^{\lambda}$	0.3157	2.16	0.031
ΔNPL	0.0015	0.0023	0.67	0.500	–	–	–	–
LTA	–	–	–	–	−0.0178	0.0253	−0.7	0.481
LEV	−0.0015*	0.0004	−3.43	0.001	0.0000	0.0001	−0.01	0.994
LgTA	0.0232*	0.0083	2.79	0.005	−0.0021	0.0028	−0.76	0.447
LST	0.0087	0.0150	0.58	0.563	−0.0031	0.0035	−0.88	0.379
_cons	−0.5330*	0.1805	−2.95	0.003	0.1145$^{\lambda}$	0.0529	2.16	0.030
HUS		27.84(0.0149)$^{\lambda}$				6.32(0.9339)		
W-HET		35028.31(0.0000)*				–		
LM		–				0.00(1.0000)		
BPW-H1		–				34.50(0.0000)*		
BPW-H2		–				39.11(0.0004)*		
WAR(1)		8.839(0.0095)*				5.924(0.0268)$^{\lambda}$		
PCD		3.336(0.0008)*				3.339(0.0006)*		
R^2		0.8775				0.5508		
Wald		515.36(0.0000)*				1809.05(0.0000)*		
Model Type		PCSE-PW				PCSE-PW		
Observation		169				169		

Source(s): Authors' computation (2020) using outputs from STATA 14. Other than R^2, diagnostic statistics are reported with p-value in parentheses. $^{\lambda}$ and * indicate significance at 95% and 99% levels of statistical confidence, respectively

Table 2. Regression estimates testing capital management (TRCAR) and earnings smoothing including IFRS and risk interactions with provisions

3.3 Study's econometric models and variables

Dual measure of provisioning practices, TLLP and DLLP, in the literature (Salami, 2021) necessitates the separation of LLPs into non-discretionary and discretionary components (Kanagaretnam *et al.*, 2003; Kwak *et al.*, 2009; Zgarni and Fedhila, 2019 and Tran *et al.*, 2020). This allows for making distinctions between the use of TLLP and DLLP for managerial discretionary decisions (Salami, 2021). Several loan loss models are used in the literature while segregating LLPs into discretionary and non-discretionary provisions (Beaver and Engel, 1996; Kanagaretnam *et al.*, 2003; Kwak *et al.*, 2009 and Lassoued *et al.*, 2017). Notwithstanding multiplicity of loan loss models, this study adopts Kanagaretnam's *et al.* (2003) non-discretionary loan loss model with components that are easily obtainable from annual reports of Nigerian DMBs. The non-discretionary model of Kanagaretnam *et al.* (2003), which makes LLP scaled by beginning gross loans ($LLPV_{it}$) a function of non-performing loans at $year_{(t-1)}$ scaled by $gross\ loans_{(t-1)}$ ($NPFL_{it-1}$), change in non-performing loans scaled by $gross\ loans_{(t-1)}$ ($CHNPFL_{it}$) and change in gross loans ($CHGLOAN_{it}$) is specified in equation (1) as follows:

$$LLPV_{it} = \beta_0 + \beta_1 NPFL_{it-1} + \beta_2 CHNPFL_{it} + \beta_3 CHGLOAN_{it} + \varepsilon_{it} \quad (1)$$

The variables: $NPFL_{it-1}$; $CHNPFL_{it}$ and $CHGLOAN_{it}$ stand for non-discretionary components while the disturbance (ε_{it}) represents DLLP in equation (1). The derivation of DLLP from

Variables	Dep.Var. = TLLP Coefficient	SE	Dep.Var. = ADLLP Coefficient	SE	Dep.Var. = TLLP Coefficient	SE	Dep.Var. = ADLLP Coefficient	SE
CCAR	−0.8953*	0.0578	−0.0284[λ]	0.0136	–	–	–	–
TRCAR	–	–	–	–	−1.0285*	0.0495	−0.0210	0.0146
EBTL	1.7039*	0.4363	−0.519*	0.1048	1.8580*	0.3567	−0.5489*	0.1040
ΔNPL	0.0051	0.0073	–	–	0.0003	0.0059	–	–
LTA	–	–	−0.0054	0.0254	–	–	−0.0058	0.0257
LEV	−0.0002	0.0008	−0.0002	0.0002	−0.0014[λ]	0.0006	−0.0002	0.0002
LgTA	−0.0716*	0.0255	−0.0074[φ]	0.0042	−0.0822*	0.0208	−0.0083[φ]	0.0042
LST	−0.0212	0.0604	0.0024	0.0073	−0.0129	0.0492	0.0027	0.0073
_cons	1.6204*	0.5187	0.2003[λ]	0.0859	1.8987*	0.4235	0.2195[λ]	0.0856
HUS	26.86(0.0002)*		2.15(0.9050)		45.95(0.0000)*		2.36(0.8840)	
W-HET	26454.42(0.0000)*		–		4939.07(0.0000)*		–	
LM	–		0.00(1.0000)		–		0.00(1.0000)	
BPW-H1	–		27.41(0.0000)*		–		24.24(0.0000)*	
BPW-H2	–		28.51(0.0000)*		–		26.15(0.0002)*	
WAR(1)	3.529(0.0799)		4.381(0.0537)		0.932(0.3498)		2.811(0.1144)	
PCD	1.344(0.1790)		1.684(0.0921)		1.176(0.2394)		1.722(0.0850)	
R^2	0.5468		0.2464		0.6854		0.2359	
Adj.R^2	–		0.2185		–		0.2076	
RMSE	–		0.03878		–		0.03905	
F-test	43.31(0.0000)*		8.83(0.00000)*		77.15(0.0000)*		8.34(0.0000)*	
Model Type	Panel FE		Pooled OLS		Panel FE		Pooled OLS	
Observation	169		169		169		169	

Source(s): Authors' computation (2020) using outputs from STATA 14. Regression coefficients are reported with Z/t statistics in parentheses. Other than R^2 diagnostic statistics are reported with p-value in parentheses. [φ], [λ] and * indicate significance at 90%, 95% and 99% levels of confidence, respectively. Overall R^2 is reported for the panel FE while Adj.R^2 (adjusted R^2) is reported for Pooled OLS in addition to R^2

Table 3. Regression estimates testing capital management (CCAR|) and earnings smoothing (without interactions) with provisions

equation (1) ensures the test of use of DLLP for both earnings and capital management in addition to the use of TLLP.

Following the approach of previous studies (Ahmed *et al.*, 1999; Alali and Jaggi, 2011; Curcio *et al.*, 2017; Elnahass *et al.*, 2018; Nikulin and Downing, 2021), variables related to the use of LLPs for earnings and capital management are included in the same model to test study's hypotheses without IFRS and bank's riskiness interactions. These econometric models are specified in equations (2) and (3) with TLLP and DLLP as dependent variables, respectively:

$$TLLP_{it} = \propto_0 + \propto_1 CCAR_{it} + \propto_2 TRCAR_{it} + \propto_3 EBTL_{it} + \propto_4 \Delta NPL_{it} + \propto_5 LEV_{it} + \propto_6 LgTA_{it} + \propto_7 LST_{it} + \mu_{it} \quad (2)$$

$$DLLP_{it} = \propto_0 + \propto_1 CCAR_{it} + \propto_2 TRCAR_{it} + \propto_3 EBTL_{it} + \propto_4 LTA_{it} + \propto_5 LEV_{it} + \propto_6 LgTA_{it} + \propto_7 LST_{it} + \mu_{it} \quad (3)$$

To test the hypotheses with interaction of IFRS and bank risk of insolvency, the approach of Leventis *et al.* (2011) is followed with some deductions from works of Elnahass *et al.* (2018) and Nikulin and Downing (2021). Equations (4) and 5 are specified with TLLP and DLLP as dependent variables, respectively, as follows:

$$TLLP_{it} = \propto_0 + \propto_1 CCAR_{it} + \propto_2 TRCAR_{it} + \propto_3 EBTL_{it} + \propto_4 IFRS_{it} + \propto_5 (IFRS{*}CCAR)_{it} + \propto_6 (IFRS{*}TRCAR)_{it} + \propto_7 (IFRS{*}EBTL)_{it} + \propto_8 SVR_{it} + \propto_9 (SVR{*}CCAR)_{it} + \propto_{10} (SVR{*}TRCAR)_{it} + \propto_{11} (SVR{*}EBTL)_{it} + \propto_{12} (IFRS{*}SVR{*}CCAR)_{it} + \propto_{13} (IFRS{*}SVR{*}TRCAR)_{it} + \propto_{14} (IFRS{*}SVR{*}EBTL)_{it} + \propto_{15} \Delta NPL_{it} + \propto_{16} LEV_{it} + \propto_{17} LgTA_{it} + \propto_{18} LST_{it} + \mu_{it} \quad (4)$$

$$DLLP_{it} = \propto_0 + \propto_1 CCAR_{it} + \propto_2 TRCAR_{it} + \propto_3 EBTL_{it} + \propto_4 IFRS_{it} + \propto_5 (IFRS{*}CCAR)_{it} + \propto_6 (IFRS{*}TRCAR)_{it} + \propto_7 (IFRS{*}EBTL)_{it} + \propto_8 SVR_{it} + \propto_9 (SVR{*}CCAR)_{it} + \propto_{10} (SVR{*}TRCAR)_{it} + \propto_{11} (SVR{*}EBTL)_{it} + \propto_{12} (IFRS{*}SVR{*}CCAR)_{it} + \propto_{13} (IFRS{*}SVR{*}TRCAR)_{it} + \propto_{14} (IFRS{*}SVR{*}EBTL)_{it} + \propto_{15} LTA_{it} + \propto_{16} LEV_{it} + \propto_{17} LgTA_{it} + \propto_{18} LST_{it} + \mu_{it} \quad (5)$$

The description and measurement of variables included in equations (2)–(5) are presented in Table 4.

4. Empirical results

4.1 Summary statistics

The descriptive analysis is presented in Table 5 and 6 , following Leventis *et al.* (2011) and Gebhardt and Novotny-Farkas (2011) approach. While summary statistics presented in Table 5 are based on accounting regime, those presented in Table 6 are on the basis of Nigerian DMBs' riskiness.

If the mean values presented are considered as the bases as obtainable in Table 5, favourable summary statistics are attributable to pre-IFRS period in terms of capital adequacy (CCAR and TRCAR), TLLP for level of credit risk and Z-SCORE measuring level of Nigerian DMBs solvency. Others favour IFRS period other than DLLP which symbolises income-increasing and income-decreasing earnings smoothing with negative and positive mean (median) values for pre-IFRS and IFRS periods, respectively. For banks' riskiness, values of summary statistics of less risky banks (those not threatened by risk of insolvency) presented in Table 6 are more favourable for almost all study's variables, including CCAR and TRCAR, for satisfactory level of capital ratio and EBTL for earnings which are independent variables. However, income-increasing earnings smoothing is identifiable with less risky banks while income-decreasing earnings smoothing is typical of risky banks with negative and positive mean (median) values of DLLP respectively. Regarding credit risk, the growth in non-performing loans (ΔNPL) at 70%, 15% and 811% for mean, median and maximum values, respectively, for less risky DMBs is a concern while concern for TLLP is identifiable with risky banks.

S/N	Notation	Variable name	Measurements	Sources
1	$TLLP_{it}$	Actual LLPs	Ratio of provisions scaled by total bank loans	Ahmed *et al.* (1999)
2	$DLLP_{it}$	Discretionary LLPs	Disturbances of equation (1)	Kanagaretnam *et al.* (2003)
3	$CCAR_{it}$	Core capital	Ratio of core capital to bank total risk-weighted assets	Curcio *et al.* (2017)
4	$TRCAR_{it}$	Total regulatory capital	Sum of Tier 1 and Tier 2 capitals scaled by risk-weighted assets	Bouvatier and Lepetit (2012)
5	$EBTL_{it}$	Earnings before LLP and tax	EBTL scaled by total assets	Ahmed *et al.* (1999)
6	$IFRS_{it}$	Reporting in IFRS	Categorical variable coding "1" for reporting in IFRS and "0" otherwise	Leventis *et al.* (2011)
7	SVR_{it}	Solvency risk	Dummy variable "1" for bank having Z-score lower than all sampled banks' median Z-score and "0" otherwise	Leventis *et al.* (2011)
8	$IFRS*CCAR_{it}$	IFRS and Tier 1 capital	Interaction of capital Management with reporting regime	Leventis *et al.* (2011)
9	$IFRS*TRCAR_{it}$	IFRS and total capital	Interaction of capital management with reporting regime	Leventis *et al.* (2011)
10	$IFRS*EBTL_{it}$	IFRS and earnings before LLP and tax	Interaction of pre-LLP and pre-tax earnings with accounting regime	Gebhardt and Novotny-Farkas (2011)
11	$SVR*CCAR_{it}$	Solvency risk and core capital	Interaction of capital management with solvency risk status	Leventis *et al.* (2011)
12	$SVR*TRCAR_{it}$	Solvency risk and total capital	Interaction of capital management with solvency risk status	Leventis *et al.* (2011)
13	$SVR*EBTL_{it}$	Solvency risk and pre-tax and LLP earnings	Interaction of earnings management with solvency risk status	Leventis *et al.* (2011)
14	$IFRS*SVR*CCAR_{it}$	IFRS, Solvency risk and core capital	Interaction among IFRS, risk level and Tier 1 capital	Leventis *et al.* (2011)
15	$IFRS*SVR*TRCAR_{it}$	IFRS, Solvency risk and total capital	IFRS, risk level and bank regulatory capital Interaction	Leventis *et al.* (2011)
16	$IFRS*SVR*EBTL_{it}$	IFRS, Solvency risk and pre-tax and LLP earnings	IFRS, risk level and earnings before LLP and tax Interaction	Leventis *et al.* (2011)
17	ΔNPL_{it}	Change in non-performing loans	Year t non-performing loans minus Year t-1 bad loans scaled by Year t-1 bad loans	Gebhardt and Novotny-Farkas (2011)
18	LTA_{it}	Credit risk	Gross loans scaled by bank total assets	Curcio and Hasan (2015)
19	LEV_{it}	Leverage of banks	Total debts divided by total equity	Elnahass *et al.* (2018)
20	$LgTA_{it}$	Size	Bank total assets' natural logarithm	Ozili (2015)
21	LST_{it}	DMBs' listing status	Dummy variable (1) for DMB listed in other clime and (0) otherwise	Leventis *et al.* (2011)

Source(s): Authors' Compilation (2020) using deductions from previous studies

Table 4. Definition and measurement of variables related to test of hypotheses

Table 5.
Descriptive statistics based on accounting regime

Period (OBS)	Variable	CCAR	TRCAR	EBTL	ΔNPL	LTA	LEV	LgTA	LST	TLLP	DLLP	ADLLP	ZSCORE
Before IFRS (76)	Mean	0.17	0.21	0.02	0.84	0.45	6.09	20.29	0.26	0.04	−0.00	0.04	16.53
	Median	0.2	0.22	0.03	0.10	0.42	5.10	20.28	0.00	0.02	−0.01	0.02	17.13
	Std.Dev	0.23	0.16	0.04	2.01	0.14	6.49	0.76	0.44	0.06	0.07	0.06	11.83
	Min	−0.97	−0.64	−0.20	−0.77	0.18	−9.64	18.68	0.00	−0.28	−0.31	0.00	−4.93
	Max	0.48	0.51	0.06	8.11	1.01	35.03	21.77	1.00	0.31	0.29	0.31	43.08
During IFRS (93)	Mean	0.13	0.15	0.03	0.30	0.45	8.6	20.98	0.38	0.06	0.0002	0.02	13.46
	Median	0.15	0.18	0.03	0.15	0.46	6.51	20.95	0.00	0.02	−0.01	0.02	14.38
	Std.Dev	0.24	0.25	0.02	0.95	0.11	19.25	0.80	0.49	0.30	0.02	0.01	9.39
	Min	−1.98	−1.98	−0.03	−0.99	0.06	−1.65	18.87	0.00	−0.02	−0.04	0.00	−38.34
	Max	0.34	0.34	0.09	6.91	0.77	191.2	22.45	1.00	2.93	0.07	0.07	29.52
Full period (169)	Mean	0.15	0.18	0.03	0.54	0.45	7.47	20.67	0.33	0.05	−0.00	0.03	14.84
	Median	0.16	0.20	0.03	0.13	0.45	6.05	20.76	0.00	0.02	−0.01	0.02	15.29
	Std.Dev	0.24	0.22	0.03	1.54	0.13	14.94	0.85	0.47	0.23	0.05	0.04	10.64
	Min	−1.98	−1.98	−0.20	−0.99	0.06	−9.64	18.68	0.00	−0.28	−0.31	0.00	−38.34
	Max	0.48	0.51	0.09	8.11	1.01	191.2	22.45	1.00	2.93	0.29	0.31	43.08

Source(s): Authors' computation (2020) using outputs from STATA 14. OBS represents number of bank-year observations

Table 6.
Descriptive statistics based on Nigerian DMBs' riskiness

All DMBs (OBS)	Variable	CCAR	TRCAR	EBTL	ΔNPL	LTA	LEV	LgTA	LST	TLLP	DLLP	ADLLP	ZSCORE
RISKY BANKS (84)	Mean	0.05	0.1	0.02	0.38	0.44	9.6	20.46	0.36	0.07	0.01	0.04	6.59
	Median	0.13	0.17	0.03	0.11	0.43	7.28	20.68	0.00	0.03	0.001	0.02	7.19
	Std.Dev	0.29	0.27	0.04	1.20	0.14	20.98	0.87	0.48	0.32	0.07	0.06	7.47
	Min	−1.98	−1.98	−0.2	−0.99	0.06	−9.64	18.68	0.00	−0.28	−0.31	0.00	−38.34
	Max	0.25	0.44	0.09	5.79	1.01	191.2	22.28	1.00	2.93	0.29	0.31	14.94
LESS RISKY BANKS (85)	Mean	0.24	0.26	0.04	0.7	0.45	5.36	20.87	0.29	0.02	−0.01	0.02	22.99
	Median	0.23	0.24	0.04	0.15	0.46	5.66	20.8	0.00	0.01	−0.01	0.01	22.11
	Std.Dev	0.08	0.08	0.01	1.81	0.11	1.52	0.79	0.46	0.02	0.02	0.01	5.99
	Min	0.12	0.16	0.005	−0.76	0.17	2.50	19.2	0.00	−0.01	−0.09	0.00	15.29
	Max	0.48	0.51	0.07	8.11	0.65	9.75	22.45	1.00	0.08	0.04	0.09	43.08
ALL SAMPLED BANKS (169)	Mean	0.15	0.18	0.03	0.54	0.45	7.47	20.67	0.33	0.05	0.00	0.03	14.84
	Median	0.16	0.20	0.03	0.13	0.45	6.05	20.76	0.00	0.02	−0.01	0.02	15.29
	Std.Dev	0.24	0.22	0.03	1.54	0.13	14.94	0.85	0.47	0.23	0.05	0.04	10.64
	Min	−1.98	−1.98	−0.2	−0.99	0.06	−9.64	18.68	0.00	−0.28	−0.31	0.00	−38.34
	Max	0.48	0.51	0.09	8.11	1.01	191.2	22.45	1.00	2.93	0.29	0.31	43.08

Source(s): Authors' computation (2020) using outputs from STATA 14. OBS represents number of bank-year observations

Though Z-SCORE is not one of the study's variables, it is included because solvency risk (SVR) considered a moderating variable is derived from it. Based on the number of observations of less risky banks which is 84 against 85 for less risky banks, there is no doubt that large proportion of Nigerian DMBs is threatened by risk of insolvency within the sampled period. ADLLP represents absolute values of DLLP, indicating absolute values of residual terms derived from equation (1).

4.2 Multi-collinearity tests

If the results of VIF presented in Table 7 are solely relied upon, there is no multi-collinearity problem in the study's models. As revealed in Table 7, there is no any variable with VIF width >10, tolerance $\left(\frac{1}{VIF}\right)$ <0.1 and R-squared >0.9. Having VIF for each variable and mean VIF >10, tolerance <0.1 and R-squared >0.9 is outside the threshold of multi-collinearity (Gujarati and Porter, 2009). In contrast, pairwise correlation matrix presented in Table 8 reveals that TRCAR and CCAR cannot be used together in the same model given a correlation coefficient >0.8 suggested by Brooks (2008). This is confirmed by the results of condition index presented in Table 9 with an overall condition number of 115.87 being in excess of 30 set by Gujarati and Porter (2009). Since two of the tests of multi-collinearity conducted give evidence of multi-collinearity problem in the study's models, CCAR and TRCAR, are individually included in separate models. This necessitates estimating two regression models for each of equations (2)–(5).

Variable	VIF	$\sqrt{VIF}$	$\frac{1}{VIF}$	R^2
CCAR	5.12	2.26	0.1952	0.8048
TRCAR	4.71	2.17	0.2124	0.7876
EBTL	1.50	1.22	0.6678	0.3322
IFRS	1.47	1.21	0.6816	0.3184
SVR	1.48	1.21	0.6776	0.3224
ΔNPL	1.10	1.05	0.9095	0.0905
LTA	1.22	1.11	0.8166	0.1834
LEV	1.07	1.04	0.9303	0.0697
LgTA	1.90	1.38	0.5272	0.4728
LST	1.43	1.20	0.6992	0.3008
Mean VIF	2.10			

Source(s): Authors' computation (2020) using outputs from STATA 14

Table 7. Variance inflation factor of non-explanatory variables

	CCAR	TRCAR	EBTL	IFRS	SVR	ΔNPL	LTA	LEV	LgTA	LST
CCAR	1.00									
TRCAR	0.88*	1.00								
EBTL	0.27*	0.15*	1.00							
IFRS	−0.08	−0.14	0.23*	1.00						
SVR	−0.42*	−0.36*	−0.33*	0.07	1.00					
ΔNPL	0.11	0.06	0.02	−0.17*	−0.10	1.00				
LTA	−0.08	−0.07	−0.28*	0.01	−0.02	0.18*	1.00			
LEV	−0.07	−0.09	−0.07	0.08	0.14	−0.05	−0.12	1.00		
LgTA	0.30*	0.23*	0.27*	0.41*	−0.24*	−0.05	0.03	−0.12	1.00	
LST	0.09	0.06	0.16*	0.12	0.07	0.03	0.10	−0.03	0.47*	1.00

Source(s): Authors' computation (2020) using outputs from STATA 14. * indicates significance at 5% level of significance

Table 8. Pairwise correlation matrix of non-interaction explanatory variables

	Eigenvalues	Condition index
1	6.0848	1.0000
2	1.4005	2.0844
3	0.9020	2.5973
4	0.7775	2.7976
5	0.6153	3.1447
6	0.5642	3.2841
7	0.3017	4.4909
8	0.2475	4.9580
9	0.0708	9.2727
10	0.0353	13.1200
11	0.0005	115.8721
Condition Number		*115.8721*

Source(s): Authors' computation (2020) using outputs from STATA 14

Table 9. Eigenvalues and condition index

4.3 Regression results

4.3.1 Estimates of Kanagaretnam's et al. *(2003) model.* To determine whether Nigerian DMBs use DLLP to manage earnings and capital, the approach of Kanagaretnam *et al.* (2003) is followed to estimate DLLP from equation (1). Following the approach of a number of previous studies (Kanagaretnam *et al.*, 2003; Kwak *et al.*, 2009; Lassoued *et al.*, 2017; Zainuldin and Lui, 2020), equation (1) is estimated using OLS. However, the need to correct autocorrelated and heteroscedastic disturbances (BPW-H1, BPW-H2 and WAR(1) being significant at *p*-value <5%) necessitates the application of OLS correlated with PCSE (PCSE-OLS) as presented in Table 10.

The regression estimates in Table 10 are a confirmation in the literature that increase in non-performing loans and change in loans and non-performing loans prompt increase in LLPs (Kanagaretnam *et al.*, 2003, 2004; Shawtari *et al.*, 2015) with significantly positive coefficients at *p*-value less than 1%, 10% and 1%, respectively. The residuals of regression model presented in Table 10 are used as DLLP. However, given the fact that DLLP as a measure of earnings smoothing or management could be income-increasing with negative

		Dependent variable: LLPV	
Variable	Coefficient	z	*p*-value
$NPFL_{(t-1)}$	0.0994543*	10.45	0.000
CHNPFL	0.0144808*	12.37	0.000
CHGLOAN	0.0090474^{o}	1.75	0.080
_cons	0.0178782*	5.31	0.000
R^2		0.1802	
Wald		239.47(0.000)*	
BPW-H1		22.29(0.0000)*	
BPW-H2		38.08(0.0000)*	
WAR(1)		30.87(0.0001)*	
Observation		169	
Model Type		PCSE-OLS	

Source(s): Authors' computation (2020) using outputs from STATA 14. Other than R^2 diagnostic statistics are reported with *p*-value in parentheses. * and ^{o} are signs of significance of regression coefficients and other statistics at 99% and 90% levels of confidence, respectively. PCSE-OLS denotes OLS with correlated Panels-Corrected Standard Errors

Table 10. Regression estimates of Kanagaretnam's *et al.* (2003) loan loss model

DLLP or income-decreasing with positive DLLP, absolute value of DLLP (ADLLP) is adopted as the dependent variable in the relevant models of the study (see, for instance, Lassoued *et al.*, 2017; Quttainah *et al.*, 2013; Zainuldin and Lui, 2020).

4.3.2 Hypotheses testing. Hypotheses related to use of provisions for earnings and capital management without IFRS and risk of insolvency interaction (hypotheses 1 and 5) are tested by estimating equations (2) and (3), while those with IFRS and solvency risk interaction (hypotheses 2, 3, 4, 6, 7 and 8) are tested using the estimates of equations (4) and (5). The results of the estimation of equations (2) and (3) are presented in Table 3 while those of equations (4) and (5) are presented in Tables 1 and 2, respectively. The regression results of tests of the use of LLPs to manage capital and earnings presented in Table 3 show that models adopted are panel FE and pooled OLS. This is based on the significance of Hausman statistics (HUS) and Breusch-Pagan Langrange Multiplier test (LM) for panel FE and pooled OLS, respectively, without the joint significance of heteroscedasticity, serial correlation and cross-sectional dependence tests. In contrast, the concurrent significance of heteroscedasticity, autocorrelation and cross-sectional dependence statistics at p-value <0.05 necessitates the rejection of the assumptions of homoscedasticity, no first-order autocorrelation and no cross-sectional dependence as evident in Tables 1 and 2, respectively. This is premised on the adoption of PCSE-PW for models presented in Tables 1 and 2.

From regression estimates, Table 3 depicts that Nigerian DMBs use provisions to manage capital given the significantly negative coefficients of CCAR and TRCAR, except that the coefficient of TRCAR is insignificant in the model with ADLLP as dependent variable. This is a dependable pointer to the acceptance of hypothesis 5. Earnings before taxes and LLPs (EBTL) positive influence on TLLP at p-value <0.01 suggests that Nigerian DMBs use actual LLP (TLLP) to manage or smooth earnings rather than discretionary LLP (DLLP) based on EBTL's significantly negative influence on ADLLP at p-value <0.01. Thus, the first hypothesis can be accepted if the use of TLLP rather than DLLP for earnings smoothing is prioritised. Other results of note are the negative coefficients of leverage (LEV) but only significant in the model with TRCAR as independent variable and those of DMBs' size as measured by natural logarithm of total assets (LgTA). Also, no clear-cut conclusion can be made on the impact of changes in non-performing loans (ΔNPL) as the coefficients are insignificant.

For the regression results showing the tests of hypotheses incorporating moderation of IFRS and solvency risk presented in Tables 1 and 2, panel model procedure followed favours the application of PCSE-PW. This is sequel to joint significance of BPW-H1 and BPW-H2 (for pooled OLS) or W-HET (for panel FE), WAR(1) and PCD.

From regression coefficients, it is revealed that CCAR/TRCAR has positive impact on TLLP but significantly negative effect on ADLLP. This reveals that Nigerian DMBs use discretionary provisions (DLLP) to manage capital rather than use reported provisions (TLLP) to manage capital. Also, the significantly positive coefficient of earnings before taxes and LLP (EBTL) in the TLLP model is an indication of use of actual or reported LLPs to manage earnings. On the contrary, the significant negative coefficient of EBTL suggests that Nigerian DMBs do not use discretionary provisions (DLLP) to manage earnings in the model with ADLLP as independent variable. There is also evidence that during IFRS loan loss charges are on the increase, while discretionary provisions are falling given significantly positive and negative coefficients of IFRS in both models in each table. However, with significantly negative (in TLLP model) and positive (in ADLLP model) coefficients of IFRS*CCAR and IFRS*TRCAR, DMBs use reported LLPs rather than discretionary provisions to manage capital during IFRS.

Contrary results are also established with the coefficients of IFRS*EBTL in both models as evident in each Tables 1 and 2. Nigerian DMBs are not found to be using total provisions (TLLP) to manage earnings given the significantly negative coefficients of IFRS*EBTL in the models with TLLP as dependent variable while evidence of earnings management using discretionary provisions (DLLP) is established, given the significantly positive coefficient of

IFRS*EBTL in the models with ADLLP as dependent variable. In the area of risk, solvency risk is found to be contributory to increase in level of provisioning based on the positive coefficients of SVR in all models in Tables 1 and 2 except that SVR coefficients are not significant in the models with ADLLP as dependent variable. While Nigerian DMBs threatened by solvency risk use LLPs to manage capital based on the negative coefficients of SVR*CCAR and SVR*TRCAR though coefficient of SVR*CCAR is not significant, provisions are not used to manage earnings as SVR*EBTL coefficient is significantly negative in the model with TLLP as dependent variable. In contrast, Nigerian DMBs threatened by solvency risk are found not to be using discretionary provisions (DLLP) to manage capital as the coefficients of SVR*CCAR and SVR*TRCAR are significantly positive at p-value <0.01. The non-use of provisions to manage earnings by DMBs threatened by solvency risk is reinforced with the negative coefficient of SVR*EBTL in the model with ADLLP as dependent variable except that the coefficient is not significant in the model, including CCAR. However, in the IFRS period, Nigerian DMBs threatened by solvency risk use LLPs regardless of measure to manage capital given the significantly negative coefficients of IFRS*SVR*CCAR and IFRS*SVR*TRCAR. This is also similar to the use of LLP to manage earnings during IFRS by DMBs threatened by solvency risk as the coefficient of IFRS*SVR*EBTL is positive across all models though not significant in two of the models.

Based on the results presented in Tables 1 and 2, the retention of hypotheses 2 and 6 will be based on the assumptions that DLLP rather than TLLP and TLLP rather than DLLP are used to manage earnings and capital, respectively, in Nigeria in the IFRS regime. While the third hypothesis is rejected because troubled Nigerian DMBs are not found to used LLPs to smooth earnings, the retention of hypothesis 7 is based on the assumption that Nigerian DMBs threatened by risk of insolvency use DLLP rather than TLLP to manage capital. Nonetheless, evidence of use of both TLLP and DLLP to smooth earnings and capital by Nigerian DMBs in solvency crisis are reported, therefore, both hypotheses 4 and 8 are retained.

For control variables, change in non-performing loans (ΔNPL) is positively related to provisioning practices though not significant in the TRCAR model. Total loans-to-total assets (LTA) have insignificant negative impact on provisioning decisions, given negative coefficient of LTA. Other control variables of LEV, LgTA and LST have conflicting sign of negative and positive coefficients in both models in each of Tables 1 and 2.

5. Discussion of findings

From the results of analysis of unbalanced panel datasets of sampled 16 Nigerian DMBs, it is evident that Nigerian banks, without the interaction of IFRSs and solvency risk, use LLPs to manage capital given negative coefficients of CCAR and TRCAR, while mixed results are found for the use of LLPs to smooth or manage earnings. Using LLPs to manage capital regardless of type of capital and approach to provisioning. This means that Nigerian banks use both reported LLPs and discretionary provisions to manage both CCAR and TRCAR. By this, it is evident that the collapse of Nigerian DMBs in the past can be traced to manipulation of capital adequacy ratios in order to appear well-capitalised using the instrumentality of loan loss reporting. This is in consonance with the proposition of capital management hypothesis adopted in this study. A confirmation of the use of LLPs for regulatory capital management established in this study is comparable to a number of previous studies including recent ones of Schechtman and Takeda (2018) and Muriu and Josea (2020). For earnings management, the relationship between earnings before taxes and LLPs (EBTL) and TLLP, which is significantly positive is an indication of use of LLPs to smooth earnings and a confirmation of income-smoothing hypothesis. In contrast, significantly negative coefficient of EBTL in the model with ADLLP as dependent variable reveals that Nigerian DMBs use total LLPs rather than DLLP to smooth earnings. This is an indication that, in the

Nigerian context, some discretionary tendencies are imbedded in non-discretionary provisions used by Nigerian banks to smooth earnings. The use of reported LLPs by Nigerian DMBs to manage or smooth earnings found in this study, is comparable to findings of Elnahass *et al.* (2018), Skała (2018), Zainuldin and Lui (2020), Doan *et al.* (2020), Ozili (2022a) and Pandey *et al.* (2022) but contrary to that of Shala and Toçi (2021).

Regardless of the nature of capital and earnings management, that is, whether achieved via TLLP or DLLP, the presence of both acts questions the going concern of Nigerian DMBs. The collapsed DMBs in the last one and half decades and those that were bailed out by the CBN and the Assets Management Corporation of Nigeria (AMCON), were found guilty of unholy capital and earnings optimisation (Sanusi, 2010a, 2012; Proshare, 2017). The discretionary use of LLPs for capital and earnings smoothing may also negatively affect the international relevance and rating of Nigerian DMBs as well as their access to Global Depository Receipts some of them are known for.

The adoption of IFRS has brought about increase in the level of reported LLPs but decrease in DLLP. An increase in reported LLPs may suggest a counter-cyclical provisioning, while a decrease in DLLP is typical of reduction in earnings smoothing which may be synonymous to improved financial reporting quality. However, the risk of insolvency is found to increase the provisioning level of Nigerian DMBs regardless of whether actual or discretionary. The different circumstances of actual LLPs and discretionary LLPs during IFRS have prompted mixed use of provisions for earnings and capital management between TLLP and DLLP. While the IFRS aids the use of reported LLPs for capital management, it discourages the use of discretionary provisions for the same purpose. This is also the case for the use of LLPs for earnings management during IFRS. Managing earnings via discretionary LLPs is prioritised compared to TLLP. Capital management for banks threatened by solvency risk is pronounced via discretionary LLPs but reversed using reported LLPs. However, the DMBs threatened by solvency risk are not found culpable in the use of provisions whether actual or discretionary to smooth or manage earnings. This implies that investors are likely to be faced with a great deal of indecision as regards the use of LLPs for earnings and capital management by Nigerian DMBs. Nevertheless, the investors or any stakeholders have the opportunity of being categorical in their decisions regarding DMBs threatened by solvency risk use of LLPs for earnings and capital management during IFRS as coefficients of IFRS*SVR*CCAR/TRCAR and IFRS*SVR*EBTL are negative and positive, respectively.

The non-use of actual LLPs (TLLP) for earnings management during IFRS in Nigeria can be likened to the findings of Abdullah and Bujang (2016), Arbak (2017), Ozili and Outa (2019) Jutasompakorn *et al.* (2021), Jakubíková (2022), Ozili (2022b) for IFRS 9 period and Taylor and Aubert (2022) but contrary to the findings of Ashraf *et al.* (2015), Atoyebi and Simon (2018) and Taylor and Aubert (2022) for EU banks. The non-use of LLPs to smooth earnings by riskier Nigerian DMBs found in this study disagrees with findings of Leventis *et al.* (2011), while evidence of earnings management via LLPs by riskier Nigeria DMBs during IFRS contrasts empirical conclusion of Leventis *et al.* (2011). Though contrary evidence is reported by Atoyebi and Simon (2018), evidence of the use of TLLP by DMBs to manage capital during IFRS found in this study, is a confirmation of previous findings of Ozili (2015), Arbak (2017), Leventis *et al.* (2011) and Jutasompakorn *et al.* (2021). Some levels of agreement between the findings of this study and those of Leventis *et al.* (2011) regarding the use of TLLP by riskier banks for capital management are established but contrary to the evident increased capital management practices via LLPs by riskier Nigerian DMBs during IFRS. However, uniquely identifiable with this study in the loan loss accounting literature are evidence of use of DLLP to manage earnings during IFRS, non-use of DLLP to manage earnings by riskier banks, non-use of DLLP to manage capital during IFRS and by riskier banks and the use of DLLP to manage capital by riskier banks during IFRS.

The evidence of the use of LLPs to manage capital found in this study may shift the attention of CBN from DMBs that are failing to those believed to be in good financial condition because of their satisfactory capital base. The satisfactory capital base may be a ruse as the process for determining it appears to be subject to managerial discretionary behaviour embedded in LLPs reporting. Another implication is that it might be somehow difficult to categorically state that there is improvement in the financial reporting quality of Nigerian DMBs despite the evidence of reduction in DLLP during IFRS. This is due to the fact that accounting information furnished in relation to Nigerian DMBs' capital and earnings appears not to represent what it purports to owing to evidential capital and earnings smoothing while reporting in IFRS. The tendency for analytical investors and customers to lose confidence in the reliability of the information contained in the Nigerian DMBs' financial reports is higher given palpable lopsidedness in earnings and capital optimisation. The confidence in the efficacy of reforms may also be subject to some doubts as issues of financial reporting impropriety that prompted the IFRS adoption still subsist.

6. Conclusions

Despite the evidence of reduction in discretionary provisioning upon the adoption of IFRSs in Nigeria, the inability of IFRS reporting to improve loan loss reporting in terms of the use of LLPs to manage capital and earnings does not only require increase in reporting requirements but also requires the FRCN (as a complement to activities of the CBN), re-sharpening its regulatory oversights. The FRCN is also expected to adopt related financial reporting guidelines that can improve loan loss reporting in Nigeria. While the conduct of stress tests by CBN as enshrined in Basel III is appreciable, the positive relationship between solvency risk and discretionary provisioning found in this study suggests that stress testing should be made in short-term periodic intervals, timely, based on individual banks (against the present consolidated approach) and published for the general public to discourage excessive discretionary provisioning.

Although the switch from IAS 39 loan loss model to IFRS 9 model for loan loss reporting in Nigeria is understandable, some levels of precaution are required to avoid Spanish scenario reported by Carbo-Valverde and Rodriguez-Fernandez (2018), where earnings smoothing was found to linger subsequent to the adoption of dynamic provisioning and Brazilian situation where no difference can be spotted in the earnings management practices of Brazilian banks, using IAS 39 and hybrid model of Brazilian Central Bank accounting principles (Galdi *et al.*, 2021). There are also evidence of continuation and increase in the earnings and capital smoothing practices via LLPs by Chinese and European banks, respectively, subsequent to the adoption of Basel III (Chen *et al.*, 2021; Jutasompakorn *et al.*, 2021). The contribution of this study to the literature and the avalanche of new findings as related to the use of DLLP for earnings and capital management by Nigerian DMBs during IFRS might be constrained by the exclusion of IFRS 9 regime in the coverage but mitigated by partial implementation of IFRS 9 in the country for the first four years, with effect from 1 January 2018. This is an indication that future Nigerian studies stand the chance of providing additional evidence through a comparison of discretionary provisioning behaviour of the two regimes in loan loss reporting.

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About the authors

Dr Abdulai Agbaje Salami, who completed his Ph.D. with the title: *"Bank Corporate Decisions and Loan Loss Provisioning Practices among Deposit Money Banks in Nigeria"* at Kwara State University Nigeria, has specialisation in "Corporate Reporting" and "Behavioural Accounting". The Senior Lecturer in the Department of Accounting, Al-Hikmah University Ilorin Nigeria, has published in reputable international journals including Zagreb International Review of Economics and Business, Studia Universitatis Vasile Goldis Economics Series and Trends Economics and Management. Abdulai Agbaje Salami is the corresponding author and can be contacted at: aasalami@alhikmah.edu.ng

Dr Ahmad Bukola Uthman is, at present, Senior Lecturer and Head, Department of Accounting, Al-Hikmah University Ilorin Nigeria. He has requisite skills in the use of accounting software and his research focus is on Corporate Reporting, Forensics, Accounting Education and Islamic Accounting and Finance. He has expertise in both qualitative and quantitative approaches to research with quality outputs in reputable outlets of global ranking including Critical Perspectives on Accounting, Journal of Islamic Accounting and Business Research and Management and Accounting Review.