# Signalling Behaviour and Bank Provisioning Policies in Nigeria: The Conditional Effect of the IFRS Adoption and Solvency Risk

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## Abstract

**Purpose of the article:** Based on the propositions of the signalling hypothesis and prospect theory, this study examined the extent of attempt by Nigerian deposit money banks (DMBs) to solve the issue of adverse selection via signalling their financial prospects using loan loss provisions (LLPs). The empirical test was subject to the DMBs' riskiness and changes in the accounting rule given failure of a number DMBs and the adoption of the International Financial Reporting Standards (IFRSs) respectively in Nigeria in the recent past.

**Methodology:** Bank-level unbalanced panel datasets of a sample 16 DMBs, which are related to the variables of the study, were hand-extracted from their annual reports and account between 2007 and 2017. The analysis was conducted using the Prais-Winsten regression correlated with panel corrected standard errors (PCSE-PW) owing to the presence of heteroscedastic and autocorrelated residuals in the study's regression models.

**Scientific aim:** The study examined the relationship between LLPs and one-year-ahead changes in earnings before taxes and LLPs to establish whether Nigerian DMBs signal their financial strength via LLPs.

**Findings:** The study largely found that Nigerian DMBs, regardless of accounting regime and risk of insolvency, do not use LLPs to signal their financial strength. However, where the evidence of signalling via LLPs was evident the coefficient of earnings signalling was insignificant, where it was significant signalling was achievable via discretionary LLPs (DLLP) rather than actual LLPs (TLLP) suggesting manipulative provisioning in the use of LLPs to signal.

**Conclusions:** The study's findings included empirical communication alerts to the regulators and Nigerian DMBs on the need for improvement in earnings signalling, as the present scenario may be interpreted as a sign of a non-going concern by analytical stakeholders.

**Limits of research:** The generalisation of the study's findings may be limited by the focus on one regime (IAS 39) of IFRS loan loss reporting but mitigated by the partial implementation of the second regime (IFRS 9) for the first four years in the country.

**Keywords:** loan loss provisions, earnings signalling, IFRSs, solvency risk, banks, Nigeria

**JEL Classification:** C33, D22, G21, M41, M48

## Introduction

The decisions for which loan loss provisions (LLPs) are used by depository institutions in the process of discharging their financial intermediary role which involves facilitating the linkage between surplus-spending and deficit-spending units of the economy are numerous. These decisions as empirically established in the literature cut across a number bank-specific and macroeconomic decisions (Salami, 2021). Profits signalling, as earnings signalling are alternatively referred to, is one of the managerial decisions in loan loss reporting which has attracted attention in the literature in the recent time (Arbak, 2017; Abu-Serdaneh, 2018; Tran *et al.*, 2020; Muriu, Josea, 2020; Salami, 2021) despite that its relevance has spanned over two decades in bank provisioning practices literature (Wahlen, 1994; Beaver, Engel, 1996; Ahmed *et al.*, 1999). Although, increase in LLPs, as a component of the profit or loss statement, has the capacity to reduce the level of banks' profitability, investors and/or regulators appear to hold a contrary view. The increase in LLPs, if banks' going-concern is not threatened in any form, is a pragmatic evidence of banks' financial strength given their ability to absorb future potential losses (Dushku, 2016). The estimates of LLPs represent a tool for signalling useful facts to investors about non-performing loans and prospect of future earnings of depository financial institutions (Ozili, Outa, 2017).

The signalling of future prospects by corporate entities allow investors to make useful informed economic judgements regarding their stakes most especially when information leading to the corporate signalling behaviour is true, valid and substantially reliable (Morris, 1987; Kirmani, Rao, 2000; Connelly *et al.*, 2011). However, earnings signalling via LLPs may become corporate subterfuge given the dichotomy of the measure of LLPs. Bank provisioning practices are either represented by the actual level of LLPs as disclosed in the depository financial institutions' profit or loss statement and other comprehensive income or difference between actual and predicted levels of LLPs often referred to as discretionary LLPs in the relevant literature (Ozili, 2015; Arbak, 2017; Ashraf *et al.*, 2019; Salami *et al.*, 2020; Salami, 2021). Discretionary LLPs (DLLPs) are used in the literature as a measure of the level of earnings smoothing/management (Amidu, Kuipo, 2015; Lassoued *et al.*, 2017; Salami *et al.*, 2020). Thus, with respect to the dual use of bank provisioning practices to measure banks' financial condition, investors, depositors and other users of bank financial information may inadvertently give credence to signals made via DLLPs or LLPs with substantial discretionary components.

Bank supervisors and regulators play a key role in ensuring the financial system soundness in any country. In Nigeria, the Central Bank of Nigeria (CBN) is statutorily empowered and saddled with the responsibility of ensuring the financial system stability and standards of banking practice comparable to the global best practice (CBN Act, 2007; Bank and Other Financial Institutions Act (BOFIA), 2020). Apart from providing oversight on banks' operations, the response of the CBN to the upheaval in the financial system comes in the form of revision of Prudential Guidelines, introduction of new reforms and issue of new circulars (CBN, 2010; Sanusi, 2010a, 2012). The crisis in the Nigerian banking sector in 2009 with a number of deposit money banks (DMBs) being found to be unhealthy was followed by a number of reforms. The Asset Management Corporation of Nigeria (AMCON) was established to acquire banks' toxic assets, DMBs were directed to start reporting using the International Financial Reporting Standards (IFRSs) and the Prudential Guidelines were revised in 2010 (Sanusi, 2012). Notwithstanding the reform of the Prudential Guidelines includes the review of loan loss provisioning, priority is given to the relevant IFRSs in providing

for LLPs in banks' financial reports.

The claim of the improvement in banks' financial reporting quality and disclosure and the possibility of increase in global competitiveness appear to be rationale for the adoption of the IFRSs to account for loan losses in Nigeria (Sanusi, 2010a, 2010b). However, subsequent events in the industry with attendant threats of going concern of a number of Nigerian DMBs call for concern and inquiry into the reality of the use of LLPs to signal banks' financial strength. The collapse of Skye Bank Plc in 2016 after its acquisition of Mainstreet Bank Limited (a bridge bank under the management of AMCON and Nigeria Deposit Insurance Corporation) in 2015 as sanctioned by CBN based on reliance on Skye Bank's financial health (Proshare, 2017) and related positive signalling behaviour may be a typical example of manipulative provisioning during the IFRS regime. The case of removal of the Board of Directors of Stanbic IBTC Holdings Plc by the Financial Reporting Council of Nigeria (FRCN) in 2015, which emanated from the bank's violation of some IFRS disclosure requirements and a number of statutory provisions (FRCN, 2015), is another testimony.

Banking operations are believed to be highly risky. This makes the banks' assets and liabilities to be arranged in order of liquidity unlike non-financial firms. With loans and advances accounting for a larger proportion of banks' liquid assets, the issue of solvency risk becomes an important factor for accounting manipulations whereby banks threatened by serious risk of insolvency are found culpable (Yasuda *et al.*, 2004; Leventis *et al.*, 2011). The events that led to the collapse of Skye Bank Plc in 2016, a sanction imposed on Stanbic IBTC Holdings in 2015, acquisition of Diamond Bank Plc in 2018 with imminent signs of collapse prior to the time and the recent shake-up in the boards of FBN Holdings Plc and its subsidiary (First Bank Nigeria Limited) in first quarter of 2021 are a call for providing a nexus between use of LLPs for earnings signalling and banks' riskiness.

The empirical test of the use of LLPs for earnings signalling is also necessitated by the fact that a larger proportion of Nigeria's DMBs are listed in the stock market. As of 31 December 2017, 16 DMBs out of 26 Nigerian DMBs accounting for about 62% were listed on the Nigerian Stock Exchange (now known as the Nigerian Exchange Group (NGX)) (Salami, 2018). Nigerian DMBs are not only in a larger proportion on the NGX, their stocks often include most traded in the market on a daily basis. This is an indication that bank executives have the responsibility to provide the required information to the investors and other users who may come in terms of signalling their financial prospect.

Despite the avalanche of studies testing the use of LLPs for earnings signalling in the literature (Ahmed *et al.*, 1999; Lobo, Yang, 2001; Anandarajan *et al.*, 2003, 2007; Kanagaretnam *et al.*, 2004, 2005; Ghosh, 2007; Leventis *et al.*, 2012; Attia *et al.*, 2013; Alessi *et al.*, 2014; Adzis *et al.*, 2015; Ozili, 2015; Abu-Serdaneh, 2018; Caporale *et al.*, 2018; Ashraf *et al.*, 2019; Tran *et al.*, 20120 Muriu, Josea, 2020), the empirical test of joint conditional effect of IFRSs and bank riskiness is traceable only to the study of Leventis *et al.* (2012), which was conducted for listed commercial banks in European countries. In Nigeria, the nexus between accounting rule changes (IFRS adoption) and use of LLPs for earnings signalling is identifiable based on the extent of literature search only with Ozili (2015) but as such, it was conducted for the voluntary IFRS regime. As provided by IFRS 1: *First Time adoption of IFRS*, the adoption of IFRSs by an entity while still reporting in local accounting standards is not considered IFRS reporting. Besides, apart from the fact that the study on the relationship between DLLPs and bank signalling behaviour is not evident in the Nigerian context, empirical test of the practice globally is identifiable only with Tran *et al.* (2020),

which was conducted for the United States of American (U.S.) banking. Therefore, this study contributes to the literature by considering the joint moderating effect of the IFRS adoption and banks' riskiness on the use of LLPs for earnings signalling particularly in the Nigerian context.

Apart from introductory section which provides background information including the issue and objective of the study, this study contains five additional sections. Section 1 focuses on the literature review with an emphasis on theoretical underpinning and review of previous empirical studies leading to the development of the study's hypotheses. Section 2 provides the research methods adopted for the collection and analysis of data. Sections 3 and 4 spell out the presentation of the results and discussion of the study's findings after data analysis, while Section 5 draws conclusions, as well as makes recommendations based on the findings.

## 1. Literature review

### 1.1 Theoretical background

Two theories prominently used to explain signalling behaviour of banks in their loan loss decisions in the literature are the signalling theory and the prospect theory (Beatty *et al.*, 2002; Leventis *et al.*, 2012; Curcio, Hasan, 2015; Dushku, 2016). The signalling theory is based on description of the attitudinal pattern of two parties, corporate or individual, having access to different pieces of information. Thus, the theory is an attempt to provide panacea to the issue of asymmetry of information in the markets (Morris, 1987). At the outset, the signalling theory originated from the labour market, *i.e.* the individual level (Akerlof, 1970; Spence, 1973), however, its application is now far-fetched (Morris, 1987). At the corporate level, the primary focus of the signalling theory is the deliberate conveyance of positive information in an effort to communicate positive orga-

nisational attributes (Connelly *et al.*, 2011). The issue of asymmetrical information in the Akerlof's (1970) standard, which the signalling theory attempted to resolve, is what is termed "adverse selection". Adverse selection occurs when a firm and/or its products or services are undervalued by the buyers owing to seldom access to the insider information of firm managers (Leventis *et al.*, 2012). This market circumstance of information asymmetry between buyers and sellers if linked to bank financial reporting requires that management strive to mitigate the issue by communicating insider information which is encapsulated in the projected future favourable performance to the investors (Leventis *et al.*, 2012). It is not an overstatement that quite a lot of pieces of information are embedded in LLPs considered the largest banks' accrual in the literature (Ahmed *et al.*, 1999). The panacea to the adverse selection impasse as argued by Kirmani, Rao (2000) is the provision of a signal which yields outcomes that are economically favourable to a firm. By this, signalling becomes favourable to a firm when signalling cycle is completed, that is, signal reaches the receiver from the signaller and a favourable feedback is received by the signaller from the receiver (Connelly *et al.*, 2011).

The prospect theory, propounded by Kahneman, Tversky (1979), seeks to explain the relationship between risk and returns taking into consideration the individual disposition. As demonstrated by Kahneman, Tversky (1979), the individual target level or reference point has a role to play in making a choice. This indicates that when individuals face different levels of returns there is bound to be a display of a mix of risk-seeking and risk-averting dispositions. From this scenario, four basic assumptions can be inferred according to Kahneman, Tversky (1979): (i) the reference point remains a critical factor; (ii) individuals become risk-averse when outcomes are above reference point which indicates that above the reference point the

relationship between the risk and return is positive; (iii) individuals will be seeking for risk when outcomes fall below the reference point indicating that below the reference point risk and return is negatively related; and (iv) risk-taking behaviour appears steeper than risk-averting behaviour. The basic argument from the assumptions of prospect theory is that individuals' value functions are bound to be concave in gains and convex in losses (Burgstahler, Dichev, 1997; Degeorge *et al.*, 1999; Beatty *et al.*, 2002). By concavity in gain, investors become risk averse in their stock trading decisions for a winner and thus opt to sell a return-yielding stock and realise a certain gain done to take a risk to hold the stock, while the losses convexity suggests that investors have a preference for holding the loser and take risk compared to realising a sure loss (Shefrin, Statman, 1985; Shu *et al.*, 2005). Overall, the prospect theory assumes that investors have a propensity to be less willing to gamble with profits and more willing to gamble with losses (Lee, Li, 2016).

The prospect theory, which was originally developed to explain decision-making at the individual level (Kahneman, Tversky, 1979), has been demonstrated and confirmed at the corporate or organisation level in many studies (Fiegenbaum, 1990; Shu *et al.*, 2002; Kliger, Tsur, 2011; Wasiuzzaman *et al.*, 2015; Wang *et al.*, 2017). At the organisation level, the prospect theory is used to explain (among others) the firms' inclination to manage earnings towards exceeding thresholds (Beatty *et al.*, 2002; Shen, Chih, 2005; Wasiuzzaman *et al.*, 2015; Halaoua *et al.*, 2017). Managing earnings to exceed thresholds involves managing earnings to avoid losses, avert decreases in earnings and meet the analysts' forecasts of earnings (Halaoua *et al.*, 2017). Based on the objective of this study, considering LLPs as risk and earnings before taxes and LLPs as return symbolise that the positivity of the relationship between the risk and return above the reference point

confirms the assumptions of the signalling theory whereby the relationship between bank provisioning policies and one-year--ahead changes in earnings (measure of earnings signalling via LLPs) is positive.

Based on the above arguments of corporate entities attempting to resolve the problem of adverse selection via signalling financial prospect and managing earnings to exceed thresholds in order meet the analysts' forecasts of earnings, both signalling theory and prospect theory are adopted to explain Nigerian DMBs' signalling behaviour while providing for loan losses.

## 1.2 Empirical studies and hypotheses development

The previous empirical studies about the use of LLPs for earnings signalling were all about showing whether or not the relationship between LLPs and a number of year's changes in pre-tax and pre-LLPs earnings is significantly positive. From U.S. banking studies, the empirical facts that an increase in LLPs provides favourable news of signals of better future performance of banks were established by many studies (Wahlen, 1994; Beaver, Engel, 1996; Lobo, Yang, 2001; Kanagaretnam *et al.*, 2004; Tran *et al.*, 2020. However, Tran *et al.* (2020) found the use of DLLPs rather than LLPs for earnings signalling. The contrary evidence of the use of LLPs to signal by U.S. banks was reported by Ahmed *et al.* (1999) and Kanagaretnam *et al.* (2005). The Spanish evidence of increased LLPs being considered good news by the investors is mixed. While Anandarajan *et al.* (2003) found that coefficient of one--year-ahead change in pre-tax and pre-provision earnings is found to be significantly negative indicating no evidence of earnings signalling by Spanish banks, Carbo-Valverde and Rodriguez-Fernandez (2018) provided the evidence of use of LLPs for signalling the bank strength, yet particularly identifiable with the pre-crisis period of the first quarter of 1995 to the second quarter of 2007

$(1995_{Q1}-2007_{Q2})$ rather than $2007_{Q3}-2013_{Q4}$. The finding of Anandarajan *et al.* (2007) was the non-use of LLPs to signal in the Australian context while the use of LLPs to signal established by Caporale *et al.* (2018) for Italian banking is considered not to be economically relevant given the coefficient of one--year-ahead changes in earnings that is close to zero.

Similarly to studies from developed economies, the majority of the studies from developing and emerging economies empirically reported evidence of the use of LLPs to signal. The early studies of Ghosh (2007) for Indian banks, Chang *et al.* (2008) for both Indian and Taiwanese banks and Karimiyana *et al.* (2014) for Malaysian Islamic banks established the practice of earnings signalling via LLPs. The subsequent Malaysian study for 15 commercial banks for the period 2002–2012 (Adzis *et al.*, 2015), Albanian banking study (Dushku, 2016) and Kenyan banking conducted for the period 2000–2018 (Muriu, Josea, 2020) reported a negative coefficient of profit signalling. In the Belgian context, Arbak (2017), using bank-level data of 25 credit institutions for the period 1999–2014, found that earnings signalling is weakly present given its insignificantly positive coefficient. From Jordanian banking, Abu-Serdaneh (2018) provided mixed findings of the use of the loan loss account for signalling the bank's financial strength. As specifically found, the coefficient of measure of signalling is positive with LLPs-to-total loans and loan loss allowance-to-total loans as dependent variables; but only significant with the latter. This suggests that the latter (rather than the former) is used to signal the bank's strength in the Jordanian context.

The finding of Abu-Serdaneh (2018) has been earlier established for banks in Middle East and North Africa (MENA) Region by Olson, Zoubi (2014), *i.e.* that allowance for loan losses rather than LLPs are used to signal. For European banks, Curcio, Hasan (2015) found that the Euro Area (EA) and

non-Euro Area (non-EA) banks have differing signalling behaviour in the use of LLPs. Specifically, it was established based on the results of the OLS panel that the coefficient of one-year-ahead changes in pre-LLP and taxes earnings is significantly negative for EA banks but significantly positive for non--EA credit institutions. This is an indication of the use of LLPs to signal future performance by non-EA banks compared to EA financial institutions. Therefore, based on the majority of evidence in the literature, the study's first hypothesis $(H_1)$ is as stated below:

**$H_1$:** Earnings signalling by Nigerian DMBs significantly and positively influence their provisioning practices.

The adoption of IFRSs has become a common parlance in the world of corporate reporting in the developed and emerging economies (Chua *et al.*, 2012; Suadiye, 2017). This might be associated with the evidence of improved financial reporting quality subsequent to the adoption of principles-based global accounting standards (Chua *et al.*, 2012; Müller, 2014). In the Nigerian Prudential Guidelines, priority is given to IFRSs in making provisions for loan losses to be charged in the profit or loss statement and other comprehensive income (CBN, 2010, 2019). This suggests that bank regulatory/supervisory authorities in Nigeria give credence to the quality of financial reporting while reporting in IFRSs. However, evidence in the literature regarding whether the use LLPs for earnings signalling is prompted by IFRSs reporting are mixed. Although Leventis *et al.* (2012) generally provided the evidence of EU banks represented by a sample of 91 listed banks not using LLPs to signal their strength, the coefficient of earnings signalling was later found to be significantly positive indicating use of LLPs to signal upon the IFRS adoption. However, in the MENA countries of Turkey, Tunisia, Morocco, Egypt and Jordan, Attia *et al.* (2013) showed for a

sample 47 listed banks that IFRS decreases banks' propensity to signal over income smoothing. Though conducted for voluntary IFRS period in Nigeria, Ozili (2015) revealed the evidence of the use of LLPs to signal the bank's financial strength only when the interaction terms are included in the model for the entire sample period of 2002 to 2013. However, when the sample period was split into pre-IFRS and post-IFRS periods, no evidence of earnings signalling has been found, as the coefficient is insignificant for both models. In the Belgian context, earnings signalling seem to be weakly present as found by Arbak (2017) in general terms. However, the disappearance of signalling became noticeable upon its interaction with International Accounting Standard (IAS) 39 dummy variable. Contrary to the finding of Arbak (2017), Ashraf *et al.* (2019) showed from evidence of non-use to imminent use of LLPs to signal from the analysis of panel dataset of 7,343 banks from 118 countries upon interaction of earnings signalling coefficient with principles-based accounting standards (IASs/IFRSs). Based on the above, the study's second hypothesis ($H_2$) is stated as:

**$H_2$:** The use of LLPs to signal by Nigerian DMBs is conditional on IFRS reporting.

In Nigeria, banks threatened by the risk of insolvency are either placed under the management of the CBN or have their toxic assets acquired by AMCON at a discount. Banks under the management of the CBN usually have their top management team or board of directors suspended. This may serve as a wrong signal to investors and depositors. To avoid unfavourable market status and unnecessary scrutiny by the regulator, banks may have no alternative than to signal their ability to absorb further losses or handle risk showing that their present situation can be improved upon in an attempt to exit from problems having serious financial and regulatory implications (Leventis *et al.*,

2012). This is typical of the argument of Liu *et al.* (1997) that good tidings embedded in signalling via LLPs are favourable only to troubled banks. It can also be substantiated by the findings of Leventis *et al.* (2012) that the coefficient of earnings signalling is positive for the European banking sector based on annual data of 91 listed banks across the EU obtained for the period 1999–2008. Given the argument and empirical finding, the study's third hypothesis ($H_3$) is stated as follows:

**$H_3$:** The use of LLPs to signal is more positive for Nigerian DMBs threatened by the risk of insolvency.

Since IFRS reporting is expected to improve the financial reporting quality, financial reporting zeal by management to reduce adverse selection should be more pronounced during the IFRS regime. If the signal via LLPs made by the troubled banks is guided by the quality of accounting principles applied as embedded in IFRSs, the confidence of capital owners, depositors and others in the banks is strengthened. This scenario was empirically confirmed by Leventis *et al.* (2012) based on the significantly positive coefficient of earnings signalling of troubled banks during IFRS in the EU context for the period 1999–2008. Since the evidence in the literature supports increased use of LLPs to signal by riskier banks during IFRS, the fourth hypothesis ($H_4$) of the study is stated as follows:

**$H_4$:** The use of LLPs to signal is more positive for Nigerian DMBs threatened by the risk of insolvency during IFRSs.

## 2. Research methods

### 2.1 Research design and data
Since the data for the study were collected at time series and cross-sectional levels,

the longitudinal design (or most especially its cohort type) was adopted, since the data required for the study are related to firms providing similar services which are DMBs. The study's population comprises all depository financial institutions in Nigeria. There were 946 depository institutions as of 31 December 2018 under the supervision of the CBN (CBN, 2018) out of which 26 DMBs with more than 60% having their financial information as related to the objective of this study in the public domain were considered the sampled population. Thus, given access to and availability of information, 16 DMBs were selected, as because they are listed or choose to make their financial statements available as a result of publicly listed status of their foreign parent company elsewhere using judgemental sampling. Regardless of whether a bank still operates in its brand name or has been delisted from the NGX, the DMB with financial information covering 60% and above of the study's sampled period was included in the sample.

Data related to the study's variables were hand-extracted from annual reports of sampled banks between 2007 and 2017. The data extraction started with 2007 financial reports, since vital information including that of risk-based capital ratios reporting became accessible from 2007. Bank-level data beyond 2017 was exempted because there was a switch in loan loss reporting from the "incurred loan loss model" of IAS 39 to the "expected credit loss model" of IFRS 9 on 1 January 2018, which has the capacity to distort the study's findings. It was also subject to the fact that directive issued by the CBN for reporting in IFRS 9 starting from 1 January 2018 is not with full implementation up to 31 December 2021. Thus the IFRS regime for which relevant data were collected was purely for IAS 39. With respect to the 11-year interval for data collection and a sample 16 DMBs, 176 bank-year observations of relevant data are probable. However, 169 bank-year events were used for analysis owing to missing annual reports of some sampled DMBs.

## 2.2 Methods of estimation and data analysis

The levels at which data were collected requires that panel data econometrics are applied for the analysis. However, descriptive statistics was also applied to summarise the data collected. The data collected were analysed descriptively using mean, median, standard deviation, minimum and maximum values. Since the regression estimates having no heteroscedasticity, autocorrelation and/or contemporaneous autocorrelation are said to be reliable, the Panel Corrected Standard Errors (PCSE) was adopted given the presence of the problems in all the study's models. The PCSE was used, rather than the Feasible Generalised Least Square (FGLS) panel, since the study's datasets were unbalanced and had a higher number of cross-sections or sample units than the length of time period for data collection, i.e. $N>T$ (Blackwell, 2005; Solano et al., 2020). It has been argued that the ordinary least square (OLS) or Prais-Winsten regression correlated with PCSEs "employs a sandwich type estimator of the covariance matrix which is robust to the presence of non-spherical errors" (Alhassan et al., 2014: 56). Another argument shows that the presence of heteroscedastic and first-order autocorrelated error structures in the fixed--effects model necessitates the use of PCSE as an estimation technique (Blackwell 2005; Solano et al., 2020). Despite the adoption of PCSE, procedural steps of panel data analysis involving making choice between fixed--effects and random-effects panel models using the result of Hausman test (HUS) and the choice between random-effects model and OLS using the Breusch-Pagan Lagrange Multiplier (LM) if HUS test results are not significant were followed.

Following the procedure enunciated above, the Prais-Winsten regression correlated with PCSEs (PCSE-PW) was adopted to test

the study's hypotheses. Conversely, Pearson's correlation analysis, variance inflation factor, and condition number were used to examine the presence of multi-collinearity among the explanatory variables.

## 2.3 Model specification and study's variables

Having established that provisioning practices are measured using both actual/total LLPs (TLLP) and DLLP in the literature, an attempt was made to segregate LLPs into discretionary and non-discretionary components. This process assisted in adopting DLLP as another dependent variable in addition to TLLP, which can be measured from figures extracted from financial statements. While it is recognised that different loan loss models, though somehow related, are used to separate LLPs into discretionary and non-discretionary components by past studies (Beatty *et al.*, 1995; Beaver, Engel, 1996; Kanagaretnam *et al.*, 2003; Chang *et al.*, 2008; Amidu, Kuipo, 2015), Kanagaretnam's *et al.* (2003) model was adopted. Kanagaretnam's *et al.* (2003) model adopted is as specified below:

$$LLP_{it} = \beta_0 + \beta_1 NPL_{it-1} + \beta_2 CHNPL_{it} + \\ + \beta_3 CHLOAN_{it} + \varepsilon_{it}, \qquad (1)$$

where:

| | |
|---|---|
| $LLP_{it}$ | provision for loan losses scaled by beginning loans, |
| $NPL_{it-1}$ | beginning of period nonperforming loans scaled by beginning loans, |
| $CHNPL_{it}$ | change in the value of nonperforming loans scaled by beginning loans, |
| $CHLOAN_{it}$ | change in value of loans scaled by beginning loans. |

In the model 1, the explanatory variables account for the non-discretionary component of LLP while the residual term represents DLLP.

To test the study's hypotheses subsequent to derivation of DLLP, four models were specified with the help of two dependent variables of TLLP and DLLP. Te two models were individually specified to test the use of LLPs to signal by Nigerian DMBs without and with conditional effects of IFRSs and the solvency risk. The first hypothesis was tested with models (2a) and (2b), while the remaining three hypotheses were tested with models (3a) and (3b). The components of each model were based on deductions from previous studies including Ahmed *et al.* (1999), Anandarajan *et al.* (2003, 2007), Leventis *et al.* (2012) and Curcio, Hasan (2015).

The first hypothesis formulated to establish the use of LLPs to signal future earnings by Nigerian DMBs without the conditional effect of IFRS and the solvency risk was tested using the following econometric models with TLLP and DLLP as dependent variables respectively:

$$TLLP_{it} = \alpha_0 + \alpha_1 SIGN_{it} + \alpha_2 \Delta NPL_{it} + \\ + \alpha_3 LEV_{it} + \alpha_4 LgTA_{it} + \\ + \alpha_5 LST_{it} + \mu_{it}, \qquad (2a)$$

$$DLLP_{it} = \alpha_0 + \alpha_1 SIGN_{it} + \alpha_2 LTA_{it} + \\ + \alpha_3 LEV_{it} + \alpha_4 LgTA_{it} + \\ + \alpha_5 LST_{it} + \mu_{it}. \qquad (2b)$$

Given the interactions of signalling with IFRS adoption and bank riskiness, the use of LLPs for earnings signalling was tested following the approach of Leventis *et al.* (2012). This necessitated the expansion of models (2a) and (2b) but with the inclusion of indicators of earnings smoothing and capital management as additional control variables. The resulting econometric models with TLLP and DLLP as dependent variables are specified in equations (3a) and (3b) (on next page).

The definitions and measurements of variables included in models (2a), (2b), (3a) and (3b) are presented in Table 1.

$$TLLP_{it} = \alpha_0 + \alpha_1 SIGN_{it} + \alpha_2 IFRS_{it} + \alpha_3 \left( IFRS * SIGN \right)_{it} + \alpha_4 SVR_{it} + \alpha_5 \left( SVR * SIGN \right)_{it} +$$
$$+ \alpha_6 \left( IFRS * SVR * SIGN \right)_{it} + \alpha_7 CCAR_{it} + \alpha_8 TRCAR_{it} + \alpha_9 EBTL_{it} +$$
$$+ \alpha_{10} \Delta NPL_{it} + \alpha_{11} LEV_{it} + \alpha_{12} LgTA_{it} + \alpha_{13} LST_{it} + \mu_{it}, \tag{3a}$$

$$DLLP_{it} = \alpha_0 + \alpha_1 SIGN_{it} + \alpha_2 IFRS_{it} + \alpha_3 \left( IFRS * SIGN \right)_{it} + \alpha_4 SVR_{it} + \alpha_5 \left( SVR * SIGN \right)_{it} +$$
$$+ \alpha_6 \left( IFRS * SVR * SIGN \right)_{it} + \alpha_7 CCAR_{it} + \alpha_8 TRCAR_{it} + \alpha_9 EBTL_{it} + \alpha_{10} LTA_{it} +$$
$$+ \alpha_{11} LEV_{it} + \alpha_{12} LgTA_{it} + \alpha_{13} LST_{it} + \mu_{it}. \tag{3b}$$

*Table 1. Definition and measurement of variables specified in the study's econometric models.*

| S/N | Notation | Variable Name | Description | Sources |
|---|---|---|---|---|
| 1 | $TLLP_{it}$ | Actual Loan Loss Provisions | Ratio of LLPs scaled by gross loans | Ahmed *et al.* (1999) |
| 2 | $DLLP_{it}$ | Discretionary LLPs | Residual of Model (1) | Kanagaretnam *et al.* (2003) |
| 3 | $SIGN_{it}$ | One-year-ahead changes in earnings | (EBTL of year t+1 – EBTL of year t)/total assets | Anandarajan *et al.* (2003) |
| 4 | $CCAR_{it}$ | Core capital | Ratio of Tier 1 capital to risk-weighted assets | Curcio *et al.* (2017) |
| 5 | $TRCAR_{it}$ | Total regulatory capital | Ratio of Tier 1 & Tier 2 capitals to risk-weighted assets | Ozili (2015) |
| 6 | $EBTL_{it}$ | Earnings before LLP and tax | EBTL scaled by total assets | Ahmed *et al.* (1999) |
| 7 | $IFRS_{it}$ | IFRS reporting | Dummy variable (1) for IFRS reporting and (0) otherwise | Leventis *et al.* (2012) |
| 8 | $SVR_{it}$ | Solvency risk | Dummy variable (1) for bank with z-score below median z-score of all sampled banks and (0) otherwise | Leventis *et al.* (2012) |
| 9 | $IFRS*SIGN_{it}$ | IFRS and change in earnings | Interaction of change in earnings with accounting regime | Leventis *et al.* (2012) |
| 10 | $SVR*SIGN_{it}$ | Solvency risk and earnings signalling | Interaction of change in earnings with solvency risk status | Leventis *et al.* (2012) |
| 11 | $IFRS*SVR*SIGN_{it}$ | IFRS, Solvency risk and earnings signalling | Interaction among IFRS, risk level and change in earnings | Leventis *et al.* (2012) |
| 12 | $\Delta NPL_{it}$ | Change in non-performing loans | Difference between current and previous years non-performing loans scaled by previous year non-performing loans | Gebhardt, Novotny-Farkas (2011) |
| 13 | $LTA_{it}$ | Credit risk | Ratio of total loans to total assets | Curcio, Hasan (2015) |
| 14 | $LEV_{it}$ | Leverage of Banks | Ratio debts to equity | Amidu , Kuipo (2015) |
| 15 | $LgTA_{it}$ | Size | Natural Logarithm of total assets | Anandarajan *et al.* (2003) |
| 16 | $LST_{it}$ | Listing status | Dummy variable (1) for bank listed in other clime, (0) otherwise | Leventis *et al.* (2011) |

*Source: Authors' compilation (2020) based on deductions from related literature and conceptual framework.*

## 3. Results and discussion

This section contains the descriptive, correlation, variance inflation factor (VIF) and regression analyses of data collected to achieve the purpose of the study. While the descriptive statistics were used for data summary, the correlation, VIF, and condition index were used to check for the level of multi-collinearity among the study's explanatory variables.

## 3.1 Descriptive statistics

Following the approach of previous studies (Leventis *et al.*, 2011; Curcio *et al.*, 2017), descriptive statistics were performed with respect to the adoption of IFRSs and Nigerian DMBs' riskiness. This necessitated the categorisation of the analysis of descriptive statistics into pre-IFRS, IFRS and full sample periods on one hand and risky banks, less risky banks and all sampled banks on the

*Table 2.  Descriptive statistics of the study's variables based on the reporting regime.*

| Variable | PRE-IFRS PERIOD (Observation = 76) | | | | | IFRS PERIOD (Observation = 93) | | | | | FULL SAMPLE PERIOD (Observation = 169) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Median | Std.Dev. | Min | Max | Mean | Median | Std.Dev. | Min | Max | Mean | Median | Std.Dev. | Min | Max |
| SIGN | 0.01 | 0.01 | 0.04 | −0.15 | 0.16 | 0.003 | 0.003 | 0.02 | −0.08 | 0.10 | 0.005 | 0.004 | 0.03 | −0.15 | 0.16 |
| CCAR | 0.17 | 0.20 | 0.23 | −0.97 | 0.48 | 0.13 | 0.15 | 0.24 | −1.98 | 0.34 | 0.15 | 0.16 | 0.24 | −1.98 | 0.48 |
| TRCAR | 0.21 | 0.22 | 0.16 | −0.64 | 0.51 | 0.15 | 0.18 | 0.25 | −1.98 | 0.34 | 0.18 | 0.20 | 0.22 | −1.98 | 0.51 |
| EBTL | 0.02 | 0.03 | 0.04 | −0.20 | 0.06 | 0.03 | 0.03 | 0.02 | −0.03 | 0.09 | 0.03 | 0.03 | 0.03 | −0.20 | 0.09 |
| ΔNPL | 0.84 | 0.10 | 2.01 | −0.77 | 8.11 | 0.30 | 0.15 | 0.95 | −0.99 | 6.91 | 0.54 | 0.13 | 1.54 | −0.99 | 8.11 |
| LTA | 0.45 | 0.42 | 0.14 | 0.18 | 1.01 | 0.45 | 0.46 | 0.11 | 0.06 | 0.77 | 0.45 | 0.45 | 0.13 | 0.06 | 1.01 |
| LEV | 6.09 | 5.10 | 6.49 | −9.64 | 35.03 | 8.60 | 6.51 | 19.25 | −1.65 | 191.21 | 7.47 | 6.05 | 14.94 | −9.64 | 191.21 |
| LgTA | 20.29 | 20.28 | 0.76 | 18.68 | 21.77 | 20.98 | 20.95 | 0.80 | 18.87 | 22.45 | 20.67 | 20.76 | 0.85 | 18.68 | 22.45 |
| LST | 0.26 | 0.00 | 0.44 | 0.00 | 1.00 | 0.38 | 0.00 | 0.49 | 0.00 | 1.00 | 0.33 | 0.00 | 0.47 | 0.00 | 1.00 |
| TLLP | 0.04 | 0.02 | 0.06 | −0.28 | 0.31 | 0.06 | 0.02 | 0.30 | −0.02 | 2.93 | 0.05 | 0.02 | 0.23 | −0.28 | 2.93 |
| DLLP | −0.00 | −0.01 | 0.07 | −0.31 | 0.29 | 0.0002 | −0.01 | 0.02 | −0.04 | 0.07 | −0.00 | −0.01 | 0.05 | −0.31 | 0.29 |
| ADLLP | 0.04 | 0.02 | 0.06 | 0.00 | 0.31 | 0.02 | 0.02 | 0.01 | 0.00 | 0.07 | 0.03 | 0.02 | 0.04 | 0.00 | 0.31 |
| ZSCORE | 16.53 | 17.13 | 11.83 | −4.93 | 43.08 | 13.46 | 14.38 | 9.39 | −38.34 | 29.52 | 14.84 | 15.29 | 10.64 | −38.34 | 43.08 |

*Source: Authors' computation (2020) based on STATA 14 outputs.*

*Table 3. Descriptive Statistics of the Study's Variables based on Banks' Riskiness.*

| Variable | RISKY BANKS (Observation = 84) | | | | | LESS RISKY BANKS (Observation = 85) | | | | | ALL SAMPLE BANKS (Observation = 169) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Median | Std.Dev. | Min | Max | Mean | Median | Std.Dev. | Min | Max | Mean | Median | Std.Dev. | Min | Max |
| SIGN | 0.004 | 0.003 | 0.04 | -0.15 | 0.16 | 0.01 | 0.005 | 0.02 | -0.04 | 0.05 | 0.005 | 0.004 | 0.03 | -0.15 | 0.16 |
| CCAR | 0.05 | 0.13 | 0.29 | -1.98 | 0.25 | 0.24 | 0.23 | 0.08 | 0.12 | 0.48 | 0.15 | 0.16 | 0.24 | -1.98 | 0.48 |
| TRCAR | 0.10 | 0.17 | 0.27 | -1.98 | 0.44 | 0.26 | 0.24 | 0.08 | 0.16 | 0.51 | 0.18 | 0.20 | 0.22 | -1.98 | 0.51 |
| EBTL | 0.02 | 0.03 | 0.04 | -0.20 | 0.09 | 0.04 | 0.04 | 0.01 | 0.005 | 0.07 | 0.03 | 0.03 | 0.03 | -0.20 | 0.09 |
| ΔNPL | 0.38 | 0.11 | 1.20 | -0.99 | 5.79 | 0.70 | 0.15 | 1.81 | -0.76 | 8.11 | 0.54 | 0.13 | 1.54 | -0.99 | 8.11 |
| LTA | 0.44 | 0.43 | 0.14 | 0.06 | 1.01 | 0.45 | 0.46 | 0.11 | 0.17 | 0.65 | 0.45 | 0.45 | 0.13 | 0.06 | 1.01 |
| LEV | 9.60 | 7.28 | 20.98 | -9.64 | 191.21 | 5.36 | 5.66 | 1.52 | 2.50 | 9.75 | 7.47 | 6.05 | 14.94 | -9.64 | 191.21 |
| LgTA | 20.46 | 20.68 | 0.87 | 18.68 | 22.28 | 20.87 | 20.80 | 0.79 | 19.20 | 22.45 | 20.67 | 20.76 | 0.85 | 18.68 | 22.45 |
| LST | 0.36 | 0.00 | 0.48 | 0.00 | 1.00 | 0.29 | 0.00 | 0.46 | 0.00 | 1.00 | 0.33 | 0.00 | 0.47 | 0.00 | 1.00 |
| TLLP | 0.07 | 0.03 | 0.32 | -0.28 | 2.93 | 0.02 | 0.01 | 0.02 | -0.01 | 0.08 | 0.05 | 0.02 | 0.23 | -0.28 | 2.93 |
| DLLP | 0.01 | 0.001 | 0.07 | -0.31 | 0.29 | -0.01 | -0.01 | 0.02 | -0.09 | 0.04 | -0.00 | -0.01 | 0.05 | -0.31 | 0.29 |
| ADLLP | 0.04 | 0.02 | 0.06 | 0.00 | 0.31 | 0.02 | 0.01 | 0.01 | 0.00 | 0.09 | 0.03 | 0.02 | 0.04 | 0.00 | 0.31 |
| ZSCORE | 6.59 | 7.19 | 7.47 | -38.34 | 14.94 | 22.99 | 22.11 | 5.99 | 15.29 | 43.08 | 14.84 | 15.29 | 10.64 | -38.34 | 43.08 |

*Source: Authors' computation (2020) based on STATA 14 outputs.*

other hand. As revealed in Table 2, the level of signalling indicated by one-year-ahead changes in earnings (SIGN) is higher in the pre-IFRS compared to IFRS period (1% to 0.3%). This is also the case for the capitalisation as measured by core capital (CCAR) and total regulatory capital (TRCAR). However, based on the mean value of EBTL, the proportion of earnings before taxes and LLP (EBTL) is lower in the pre-IFRS com-

pared to IFRS period (2% to 3%). The level of loans and advances are higher in the IFRS period if mean and maximum values of actual LLPs (TLLP) considered though median values are similar. This is an indication of increase in provision of loans and advances to individuals and corporate entities by Nigerian DMBs during the IFRS period. The IFRS period is found to be a mix of income-increasing and income-decreasing earnings smoothing given positive and negative mean and median values of DLLP respectively, yet negative mean and median values of DLLP pre-IFRS show that earnings smoothing is purely income-increasing. However, the level of discretion in provisioning is at the higher ebb in the pre-IFRS if the maximum value of DLLP (0.29) is compared to that of the IFRS period (0.07). The mean, median and maximum values of the absolute value of DLLP (ADLLP) which are 0.04, 0.02 and 0.31 respectively in the pre-IFRS compared to 0.02, 0.02 and 0.07 respectively during the IFRS period provide further evidence of higher discretions in loan loss reporting in the pre-IFRS period. Other variables' summary statistics are as reported in Table 2.

For the summary statistics, when the analysis is categorised based on DMBs' riskiness, it is evident as revealed in Table 3 that a higher number of Nigerian DMBs is threatened by the risk of insolvency given no clear-cut difference between the number of bank-year observations of risky and less risky banks, *i.e.* 84 against 85. It is also evident that superior descriptive statistics of the study's variables are identifiable with less risky banks against risky banks in earnings signalling, as indicated by one-year-ahead changes in earnings before LLPs and taxes (SIGN), capital adequacy as measured by TRCAR and CCAR, earnings as measured by EBTL, loans to assets (LTA), leverage (LEV), bank size (LgTA), ADLLP, and bank's solvency measured by ZSCORE. The level of TLLP appears to be higher for risky banks with

the mean (median) and maximum values of 7% (3%) and 293% respectively against 2% (1%) and 8% respectively for less risky banks. The higher values of summary statistics of TLLP and ADLLP and the lower values of ZSCORE are typical signs of banks' riskiness as shown in Table 3. Despite the superior summary statistics of less risky banks, higher changes in non-performing loans (ΔNPL) which is an indication of increase in banks' credit risk are peculiar to Nigerian less risky DMBs with the mean (median) and maximum values of 70% (15%) and 811% against 38% (11%) and 579% respectively for risky banks. Other variables' descriptive statistics are as presented in Table 3.

## 3.2 Correlation analysis, variance inflation factor and condition index

When some explanatory variables in a regression model are perfectly correlated, the regression residuals are likely to be reported with inflated values (Gujarati, Porter, 2009; Torres-Reyna, 2007). To increase the level of preciseness of the study's regression models, Pearson's product moment correlation analysis, variance inflation factor (VIF) and the condition number were performed to detect the level of multi-collinearity among the study's explanatory variables. However, following the approach of Gebhardt, Novotny-Farkas (2011), Leventis *et al.* (2011) and Curcio *et al.* (2017), non-interaction terms which are original study's variables were included in Pearson's correlation matrix, VIF and the condition index presented in Tables 4, 5 and 6 respectively.

Using a threshold of the correlation coefficient of 0.80 above which multi-collinearity sets in stated by Brooks (2008), the only two explanatory variables that are collinear are TRCAR and CCAR, suggesting that their inclusion in the same regression model may be counter-productive. However, the alternative approach of VIF could not reveal such as all the variables including two variables (TRCAR and CCAR) with higher

*Table 4. Pearson's correlation matrix of the study's non-interaction explanatory variables.*

| Variables | SIGN | CCAR | TRCAR | EBTL | IFRS | SVR | ΔNPL | LTA | LEV | LgTA | LST |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SIGN | 1.00 | | | | | | | | | | |
| CCAR | 0.06 | 1.00 | | | | | | | | | |
| TRCAR | 0.04 | 0.88* | 1.00 | | | | | | | | |
| EBTL | −0.52* | 0.27* | 0.15* | 1.00 | | | | | | | |
| IFRS | −0.05 | −0.08 | −0.14 | 0.23* | 1.00 | | | | | | |
| SVR | −0.03 | −0.42* | −0.36* | −0.33* | 0.07 | 1.00 | | | | | |
| ΔNPL | 0.00 | 0.11 | 0.06 | 0.02 | −0.17* | −0.10 | 1.00 | | | | |
| LTA | 0.18* | −0.08 | −0.07 | −0.28* | 0.01 | −0.02 | 0.18* | 1.00 | | | |
| LEV | 0.04 | −0.07 | −0.09 | −0.07 | 0.08 | 0.14 | −0.05 | −0.12 | 1.00 | | |
| LgTA | −0.04 | 0.30* | 0.23* | 0.27* | 0.41* | −0.24* | −0.05 | 0.03 | −0.12 | 1.00 | |
| LST | 0.02 | 0.09 | 0.06 | 0.16* | 0.12 | 0.07 | 0.03 | 0.10 | −0.03 | 0.47* | 1.00 |

*Source: Authors' computation (2020) based on STATA 14 outputs. * Indicates significance at 95% confidence level.*

*Table 5. VIF analysis of the study's non-interaction explanatory variables.*

| Variable | VIF | Square Root VIF | Tolerance (1/VIF) | R-Squared |
|---|---|---|---|---|
| SIGN | 1.63 | 1.28 | 0.6127 | 0.3873 |
| CCAR | 5.40 | 2.32 | 0.1853 | 0.8147 |
| TRCAR | 4.82 | 2.20 | 0.2075 | 0.7925 |
| EBTL | 2.32 | 1.52 | 0.4308 | 0.5692 |
| IFRS | 1.50 | 1.23 | 0.6651 | 0.3349 |
| SVR | 1.56 | 1.25 | 0.6391 | 0.3609 |
| ΔNPL | 1.10 | 1.05 | 0.9089 | 0.0911 |
| LTA | 1.23 | 1.11 | 0.8159 | 0.1841 |
| LEV | 1.07 | 1.04 | 0.9302 | 0.0698 |
| LgTA | 1.91 | 1.38 | 0.5227 | 0.4773 |
| LST | 1.47 | 1.21 | 0.6806 | 0.3194 |
| Mean VIF | | 2.18 | | |

*Source: Authors' computation (2020) based on STATA 14 outputs.*

correlation coefficients identified under the correlation analysis have VIF and tolerance level <10 and >0.1 respectively. This implies that with VIF not exceeding 10 and 1/VIF not less than 0.1 coupled with $R^2$ of each variable not >0.90 (Gujarati, Porter, 2009), the problem of inflated values of residuals engendered by a high level collinearity (Torres-Reyna, 2007) is not evident in this study. However, the use of the condition index confirmed the results of correlation analysis with an overall condition index of 116.68. The rule of thumb when the condition number is used to detect level of multi-collinearity is that when the condition index is in excess of 30, the level of multi-collinearity is higher (Gujarati, Porter, 2009). The evidence of multi-collinearity reported by Pearson's correlation matrix and the condition index prompted the non-inclusion of TRCAR and CCAR in the same regression model. Thus two regression models were performed for each of models (3a) and (3b).

Table 6. Eigenvalues and condition index of study's non-interaction explanatory variables.

| | Eigenvalues | Condition Index |
|---|---|---|
| 1 | 6.0983 | 1.0000 |
| 2 | 1.4095 | 2.0801 |
| 3 | 1.2320 | 2.2249 |
| 4 | 0.8949 | 2.6104 |
| 5 | 0.7517 | 2.8482 |
| 6 | 0.5726 | 3.2635 |
| 7 | 0.4783 | 3.5707 |
| 8 | 0.2653 | 4.7941 |
| 9 | 0.1948 | 5.5953 |
| 10 | 0.0677 | 9.4920 |
| 11 | 0.0345 | 13.2996 |
| 12 | 0.0004 | 116.6755 |

Source: Authors' computation (2020) based on STATA 14 outputs.

Table 7. First-stage regression results of Kanagaretnam's et al. (2003) model.

| Variable | Dependent Variable: LLP | | |
|---|---|---|---|
| | Coefficient | t | P-value |
| $NPL_{(t-1)}$ | 0.0994543* | 3.43 | 0.001 |
| CHNPL | 0.0144808* | 5.39 | 0.000 |
| CHLOAN | 0.0090474 | 0.81 | 0.417 |
| _cons | 0.0178782* | 2.89 | 0.004 |
| $R^2$ | 0.1802 | | |
| Adj.$R^2$ | 0.1653 | | |
| F(stat) | 12.09 (0.000)* | | |
| RMSE | 0.05207 | | |
| Observation | 169 | | |
| Model Type | Pooled OLS | | |

Source: Authors' computation 2020 based on STATA 14 outputs. $R^2$ and Adj.$R^2$ stand for the coefficient of determination and its adjusted form respectively while RMSE represents the root mean squared error. F-statistics (F-stat) reported chi-square statistics with p-value in parenthesis. * Is a sign of significance at 99% confidence level.

### 3.3 Regression analysis
#### 3.3.1 First-stage regression model
The use of DLLP in addition to TLLP as a dependent variable prompted the derivation of DLLP from model (1). Following the approach adopted by previous studies (Kanagaretnam et al., 2003; Shawtari et al., 2015; Zainuldin, Lui, 2020) in separating LLPs into non-discretionary and discretionary components, the estimation of the model (1) was performed using the pooled OLS. As demonstrated in Table 7, the assumption in the literature that increase in LLPs is prompted by increase in bad loans, change in non-performing loans and loans and advances (Kanagaretnam et al., 2004) is confirmed by means of the positive coefficients of $NPL_{t-1}$, CHNPL and CHLOAN, although CHLOAN is not significant. These findings agree, to certain extent, with the findings of Kanagaretnam et al. (2004) and Shawtari et al. (2015), who previously adopted the same model. There are also some levels of agreement with the findings of Lassoued et al. (2017) and Zainuldin, Lui (2020), who adopted the related models for segregating LLPs. However, contrary results were obtained by Ben Othman and Mersni (2014) regarding NPL and CHNPL, while those of Shawtari et al. (2015) are related to CHLOAN. Notwithstanding the findings obtained from the estimation of the model (1), the residuals of the regression model were used as a measure of DLLP. Given the dichotomy of income-increasing and income-decreasing discretionary accruals with negative and positive DLLP respectively (Quttainah et al., 2013; Zainuldin, Lui, 2020), the absolute value of DLLP (ADLLP) was adopted as a dependent variable in the relevant models where DMBs' signalling behaviour with respect to DLLP was tested.

#### 3.3.2 Hypotheses testing
The models (2a) and (2b) were estimated to test the first hypothesis. Following the panel regression procedure, both models were estimated using PCSE-PW. The adoption of PCSE-PW for the estimating models (2a) and (2b) testing use of LLPs for earnings signalling without the interaction of IFRS adoption and banks' riskiness, as required by the first hypothesis ($H_1$) and presented in Table

*Table 8. Regression Estimates Testing Use of Provisions for Earnings Signalling (Without Interactions).*

| Variables | Dep. Var. = TLLP | | | | Dep. Var. = ADLLP | | | |
|---|---|---|---|---|---|---|---|---|
| | Coefficient | PCSE | z | P>\|z\| | Coefficient | PCSE | z | P>\|z\| |
| **SIGN** | –2.7225* | 0.4605 | –5.91 | 0.000 | 0.1217* | 0.0452 | 2.69 | 0.007 |
| **ΔNPL** | –0.0019 | 0.0047 | –0.40 | 0.690 | – | – | – | – |
| **LTA** | – | – | – | – | 0.0525* | 0.0139 | 3.77 | 0.000 |
| **LEV** | –0.0010 | 0.0007 | –1.45 | 0.146 | –0.0001$^\lambda$ | 0.0001 | –2.37 | 0.018 |
| **LgTA** | –0.1128* | 0.0284 | –3.97 | 0.000 | –0.0176* | 0.0024 | –7.49 | 0.000 |
| **LST** | 0.0344$^\omega$ | 0.0194 | 1.78 | 0.075 | –0.0026 | 0.0031 | –0.84 | 0.400 |
| **_cons** | 2.4066* | 0.5886 | 4.09 | 0.000 | 0.3735* | 0.0524 | 7.12 | 0.000 |
| **HUS** | 4.40(0.4930) | | | | 7.04(0.2178) | | | |
| **LM** | 0.00(0.4781) | | | | 1.40(0.1187) | | | |
| **BPCW-H1** | 13.00(0.0003)* | | | | 7.82(0.0052)* | | | |
| **BPCW-H2** | 13.79 (0.0170)$^\lambda$ | | | | 8.25(0.1430) | | | |
| **W-AR(1)** | 23.877(0.0002)* | | | | 5.798(0.0294)$^\lambda$ | | | |
| **R²** | 0.2791 | | | | 0.2390 | | | |
| **F-test/Wald** | 54.14(0.0000)* | | | | 115.46(0.0000)* | | | |
| **Model Type** | PCSE-PW | | | | PCSE-PW | | | |
| **Observation** | 169 | | | | 169 | | | |

*Source: Authors' computation (2020) based on STATA 14 outputs. TLLP stands for actual loan loss provisions, PCSE means panels-corrected standard errors while PSCE-PW means Prais-Winsten Regression with correlated PCSEs. Breusch-Pagan / Cook-Weisberg test for heteroscedasticity with fitted values of dependent variable-TLLP/ADLLP (BPCW-H1) and independent variables (BPCW-H2), Random-Effects Breusch-Pagan Langrange The multiplier test (LM), Hausman statistics (HUS) and Wald Statistics (Wald) reported chi-square statistics with p-values in parentheses. Wooldridge panel data first-order autocorrelation test: W-AR(1) reported F-statistics with p-value in parenthesis. \*, $^\lambda$ and $^\omega$ indicate significance at 99%, 95% and 90% confidence levels respectively.*

8, is subject to the significance of chi-square statistics of Breusch-Pagan/Cook-Weisberg test of heteroscedasticity (BPCW-H1 and BP-CW-H2) and the panel data first-order autocorrelation test-W-AR(1) at p-value <0.05 after establishing that the pooled OLS is appropriate given insignificant chi-squared statistics of HUS and LM. As depicted in Table 8 for the results of the estimation of models (2a) and (2b), at z = –5.91 and z = 2.69 in the models with TLLP and ADLLP as dependent variables respectively, there is no doubt that the coefficients of one-year-ahead changes in EBTL (SIGN) have significantly negative and positive impact respectively on banks' provisioning practices in Nigeria. Thus, it is evident that signalling behaviour of Nigerian DMBs is achievable via DLLP rather TLLP.

However, the increase in proportion of loans-to-assets (LTA) is instrumental to the increase in DLLP based on significantly positive coefficient of LTA. On the contrary, leverage (LEV) and bank size (LgTA) are inversely related to provisioning practices of Nigerian DMBs based on their negative coefficients except that LEV is insignificant in the model with TLLP as dependent variable.

To test the individual and joint effects of the IFRS adoption and Nigerian DMBs' riskiness on the use of LLPs to signal as contained in hypotheses 2, 3, and 4 ($H_2$, $H_3$ and $H_4$), models (3a) and (3b) were estimated. The results of the regression estimates are presented in Tables 9 and 10 with respect to two measures of capital management adopted which are collinear.

As depicted in Tables 9 and 10, the sign

*Table 9. Regression estimates testing use of provisions for earnings signalling given IFRS and risk interactions (Model Excluding TRCAR).*

| Variable | Dependent Variable: TLLP | | | | Dependent Variable: ADLLP | | | |
|---|---|---|---|---|---|---|---|---|
| | Coefficient | PCSE | z | P>\|z\| | Coefficient | PCSE | z | P>\|z\| |
| SIGN | −0.1027 | 0.4929 | −0.21 | 0.835 | −0.2041$^λ$ | 0.0993 | −2.05 | 0.040 |
| IFRS | −0.0714* | 0.0233 | −3.06 | 0.002 | −0.0160* | 0.0043 | −3.69 | 0.000 |
| IFRS*SIGN | −0.2240 | 0.7978 | −0.28 | 0.779 | 0.2581 | 0.2397 | 1.08 | 0.282 |
| SVR | −0.0610* | 0.0163 | −3.74 | 0.000 | 0.0033 | 0.0042 | 0.79 | 0.429 |
| SVR*SIGN | 0.2625 | 0.4872 | 0.54 | 0.590 | −0.2354$^λ$ | 0.1114 | −2.11 | 0.035 |
| IFRS*SVR*SIGN | −4.5459* | 1.3207 | −3.44 | 0.001 | −0.1962 | 0.3241 | −0.61 | 0.545 |
| CCAR | −0.6708* | 0.0607 | −11.06 | 0.000 | −0.0314* | 0.0105 | −2.99 | 0.003 |
| EBTL | 0.8795$^λ$ | 0.4006 | 2.2 | 0.028 | −0.7435* | 0.0745 | −9.98 | 0.000 |
| ΔNPL | 0.0148* | 0.0038 | 3.88 | 0.000 | – | – | – | – |
| LTA | – | – | – | – | 0.0055 | 0.0197 | 0.28 | 0.780 |
| LEV | −0.0004 | 0.0003 | −1.36 | 0.174 | −0.0002$^λ$ | 0.0001 | −2.56 | 0.010 |
| LgTA | −0.0056 | 0.0065 | −0.86 | 0.390 | −0.0017 | 0.0024 | −0.70 | 0.487 |
| LST | 0.0067 | 0.0091 | 0.74 | 0.458 | 0.0030 | 0.0045 | 0.67 | 0.500 |
| _cons | 0.3061$^λ$ | 0.1366 | 2.24 | 0.025 | 0.0919$^ө$ | 0.0484 | 1.90 | 0.058 |
| HUS | 17.20(0.1020) | | | | 8.65(0.7324) | | | |
| LM | 0.00(1.0000) | | | | 0.00(1.0000) | | | |
| BPCW-H1 | 134.42(0.0000)* | | | | 28.62(0.0000)* | | | |
| BPCW-H2 | 141.83(0.0000)* | | | | 30.81(0.0021)* | | | |
| W-AR(1) | 6.844(0.0194)$^λ$ | | | | 5.856(0.0287)$^λ$ | | | |
| R² | 0.8061 | | | | 0.4788 | | | |
| Wald | 450.73(0.0000)* | | | | 824.51(0.0000)* | | | |
| Model Type | PCSE-PW | | | | PCSE-PW | | | |
| Observation | 169 | | | | 169 | | | |

*Source: Authors' computation (2020) based on STATA 14 outputs. TLLP stands for actual loan loss provisions, ADLLP stands for absolute value of discretionary LLPs while PCSE means panels-corrected standard errors. The Breusch-Pagan / Cook-Weisberg test for heteroscedasticity with fitted values of dependent variable-TLLP/ADLLP (BPCW-H1) and independent variables (BPCW-H2), the Random-Effects Breusch-Pagan Langrange Multiplier test (LM), Hausman statistics (HUS) and Wald Statistics (Wald) reported chi-square statistics with p-values in parentheses. The Wooldridge panel data first-order autocorrelation test: W-AR(1) reported F-statistics with p-value in parenthesis. \*, $^λ$ and $^ө$ indicate significance at 99%, 95% and 90% confidence levels respectively.*

of the coefficient of one-year-ahead changes in earnings before taxes and LLP (SIGN) is negative though not significant in the CCAR model with TLLP as a dependent variable. This is an indication that Nigerian DMBs do not use LLPs to signal their financial strength. As further reported in Tables 9 and 10, lower TLLP and DLLP are evident during the IFRS owing to the significantly negative coefficient of the IFRS. However, there is an attempt by Nigerian DMBs to use DLLP to signal during the IFRS given the positive coefficient of IFRS*SIGN, though not significant in all the models.

In addition, the threat of solvency risk reduces LLPs with the significantly negative coefficient of SVR in the TLLP model but increases DLLP, with respect to the positive coefficient of SVR, though not significant in the ADLLP model. While no conclusive evidence of the use of LLPs to signal by DMBs threatened by the solvency risk

*Table 10. Regression estimates testing use of provisions for earnings signalling given IFRS and risk interactions (model excluding CCAR).*

| Variable | Dependent Variable: TLLP | | | | Dependent Variable: ADLLP | | | |
|---|---|---|---|---|---|---|---|---|
| | Coefficient | PCSE | z | P>|z| | Coefficient | PCSE | z | P>|z| |
| **SIGN** | −1.0896ᵉ | 0.5943 | −1.83 | 0.067 | −0.2148ᵉ | 0.1150 | −1.87 | 0.062 |
| **IFRS** | −0.0634* | 0.0178 | −3.56 | 0.000 | −0.0142* | 0.0046 | −3.09 | 0.002 |
| **IFRS*SIGN** | 0.9354 | 1.1025 | 0.85 | 0.396 | 0.3267 | 0.2488 | 1.31 | 0.189 |
| **SVR** | −0.0597* | 0.0194 | −3.07 | 0.002 | 0.0047 | 0.0044 | 1.08 | 0.282 |
| **SVR*SIGN** | 0.8129 | 0.5953 | 1.37 | 0.172 | −0.2526ᵞ | 0.1198 | −2.11 | 0.035 |
| **IFRS*SVR*SIGN** | −2.4876ᵉ | 1.2828 | −1.94 | 0.052 | −0.3582 | 0.3378 | −1.06 | 0.289 |
| **TRCAR** | −0.9549* | 0.0539 | −17.71 | 0.000 | −0.0183 | 0.0134 | −1.37 | 0.170 |
| **EBTL** | 1.3246* | 0.4845 | 2.73 | 0.006 | −0.8058* | 0.0716 | −11.25 | 0.000 |
| **ΔNPL** | −0.0004 | 0.0039 | −0.09 | 0.924 | – | – | – | – |
| **LTA** | – | – | – | – | 0.0043 | 0.0212 | 0.2 | 0.838 |
| **LEV** | −0.0016* | 0.0005 | −3.07 | 0.002 | −0.0002ᵉ | 0.0001 | −1.88 | 0.061 |
| **LgTA** | −0.0044 | 0.0074 | −0.6 | 0.548 | −0.0034 | 0.0025 | −1.36 | 0.172 |
| **LST** | −0.0071 | 0.0128 | −0.55 | 0.581 | 0.0031 | 0.0041 | 0.74 | 0.459 |
| **_cons** | 0.3566ᵞ | 0.1376 | 2.59 | 0.010 | 0.1270ᵞ | 0.0496 | 2.56 | 0.010 |
| **HUS** | 22.56(0.0204)ᵞ | | | | 8.61(0.7360) | | | |
| **W-HET** | 6357.14(0.0000)* | | | | – | | | |
| **LM** | – | | | | 0.00(1.0000) | | | |
| **BPCW-H1** | – | | | | 24.08(0.0000)* | | | |
| **BPCW-H2** | – | | | | 27.32(0.0069)* | | | |
| **W-AR(1)** | 5.855(0.0289)ᵞ | | | | 5.992(0.0258)ᵞ | | | |
| **R²** | 0.7711 | | | | 0.4742 | | | |
| **Wald** | 1.00e+07(0.0000)* | | | | 594.91(0.0000)* | | | |
| **Model Type** | PCSE-PW | | | | PCSE-PW | | | |
| **Observation** | 169 | | | | 169 | | | |

*Source: Authors' computation (2020) based on STATA 14 outputs. TLLP stands for actual loan loss provisions, ADLLP stands for absolute value of discretionary LLPs while PCSE means panels-corrected standard errors. The Breusch-Pagan / Cook-Weisberg test for heteroscedasticity with fitted values of dependent variable-TLLP/ADLLP (BPCW-H1) and independent variables (BPCW-H2), the Random-Effects Breusch-Pagan Langrange Multiplier test (LM), Hausman statistics (HUS), panel data Wooldridge test for heteroscedasticity (W-HET) and Wald Statistics (Wald) reported chi-square statistics with p-values in parentheses. The Wooldridge panel data first-order autocorrelation test: W-AR(1) reported F-statistics with p-value in parenthesis. \*, ᵞ and ᵉ indicate significance at 99%, 95% and 90% confidence levels respectively.*

can be established, given the insignificantly positive coefficient of SVR*SIGN, it is empirically evident that Nigerian DMBs threatened by the solvency risk do not use DLLP to signal their strengths as the coefficient of SVR*SIGN is significantly negative in the ADLLP models. Similar occasion of not non-use of provisions to signal by Nigerian DMBs threatened by the solvency risk

is evident during the IFRS as the coefficient of IFRS*SVR*SIGN is negative across all models.

Further findings in Tables 9 and 10 showed that ΔNPL and LEV in the CCAR model are significantly positive and negative respectively, as well as LEV in the TRCAR model is significantly negative. However, other variables including LTA, LgTA and LST are not

significant.

For diagnostic tests, two regression models in Table 9 initially opted for the pooled OLS based on results of the Hausman statistics (HUS) and LM tests that are both insignificant. However, the eventual estimation using PCSE-PW is subject to the significance of BPCW-H1, BPCW-H2 and W-AR(1) at p-value <0.05. The ADLLP model in Table 10 follows a similar procedure to both models in Table 9 but HUS is significant in the TLLP model in Table 10 indicating the initial panel FE before significance of W-HET and W-AR(1) made PCSE-PW an appropriate model for the estimates.

## 4. Discussion of the findings

Based on the results of the test of the first hypothesis, the use of LLPs to signal is not evidently conclusive in Nigeria. While Nigerian DMBs seem not to be using LLPs to signal their strength based on the significantly negative coefficient of SIGN in the TLLP model, the significantly positive coefficient of SIGN in the ADLLP model is an indication of the use of DLLPs to signal by Nigerian banks. Signalling through DLLPs rather than TLLP may account for why a number of banks collapse subsequent to the conviction that such banks can withstand shocks by the investors. This is premised on the fact that DLLPs constitute some elements of manipulations which may make the signals being provided a huge ruse. Although the significantly positive coefficient of SIGN in the ADLLP model is a confirmation of the signalling theory, it may compound the issue of the adverse selection which the signalling hypothesis seeks to solve owing to the consideration of DLLP as a measure of earnings manipulation. The evidence of non-use of reported LLPs to signal by Nigerian DMBs as found in this study has been previously established by Ahmed *et al.* (1999), Anandarajan *et al.* (2003, 2007), Leventis *et al.* (2012),

Olson, Zoubi (2014), Adzis *et al.* (2015), and Dushku (2016), but refuted by Kanagaretnam *et al.* (2005), Ghosh (2007), Karimiyana *et al.* (2014), Abu-Serdaneh (2018), and Caporale *et al.* (2018). For the evidence of signalling via discretionary provisions, similar evidence has been provided by Chang *et al.* (2008) and Tran *et al.* (2020), yet contrary evidence is provided by Kanagaretnam *et al.* (2004).

With regard to how the IFRS adoption and the level of solvency risk affect the relationship between provisioning practices and Nigerian DMBs' earnings signalling, there is virtually no evidence of the use of LLPs, whether actual or discretionary, by Nigeria DMBs to signal their financial strength. However, signalling potentials are noticeable in the TRCAR model during the IFRS regardless of LLPs measure and in the CCAR model with ADLLP as a dependent variable, though their coefficients are insignificant. This is also the case with signalling potentials of riskier banks as evident in the TLLP models. The non-use of LLPs to signal and/or no clear-cut signalling potential of Nigerian DMBs might be responsible for why investors and depositors are caught unaware and incur great losses when any of these banks collapse. The weak presence of the signalling potential during the IFRS as found in this study is comparable to the findings of Arbak (2017) and Ashraf *et al.* (2019) but contrary to the findings of Leventis *et al.* (2012) and Ozili (2015). For the use of LLPs to signal, which is not empirically evident in this study, increased signalling potentials including during IFRS period by riskier banks are reported by Leventis *et al.* (2012).

## 5. Concluding remarks

Resolving the issue of information asymmetry involves efforts made by corporate entities' management to mitigate the problem of the adverse selection via communicating in-

sider information related to the projected future favourable performance to the investing public and other stakeholders. It also involves managing earnings to exceed thresholds which are evident, among others, in terms of meeting analysts' forecasts of earnings. The reality of this practice is embedded in the use LLPs to signal financial prospect by depository financial institutions based on the evidence from relevant literature. This was examined in the Nigerian banking context having recourse to the fact that quite a number of Nigerian DMBs threatened by risk of insolvency will be poised to redeem their image and that the recent IFRS adoption in the country would have facilitated improved financial reporting quality achievable through favourable earnings signalling. Using unbalanced panel datasets of 16 Nigerian DMBs obtained between 2007 and 2017, the analysis based on the Prais-Winsten regression correlated with PCSEs (PCSE-PW) showed no clear-cut evidence to establish that Nigerian DMBs use LLPs for profit signalling except in the model with ADLLP as a dependent variable without interactions of the IFRS adoption and the risk of insolvency. Although signalling would have become a reality most especially with the positive coefficients of IFRS*SIGN and SVR*SIGN, both are insignificant. However, there is a higher level of the non-use of LLPs for signalling as SIGN coefficients (with or without interactions) are significantly negative.

Nigerian DMBs' inability to signal via LLPs is an indication of the fact that Nigerian DMBs do not place higher priority on earnings signalling. Also, since the failure of Nigerian DMBs to signal their financial strength via LLPs based on sustained increase in one-year-ahead changes in EBTL has occurred regardless of the change in the accounting regime (the IFRS adoption) and DMBs' riskiness, Nigerian DMBs may be considered as non-going concerns by some analytical investors and depositors. Notwithstanding the non-use of LLPs to signal by

Nigerian DMBs during the IFRS, the IFRS adoption has brought about reduction in the level of LLPs including DLLP of all DMBs whether risky or less risky given significantly negative coefficient of IFRS in relevant regression estimates. The reduction in discretionary provisioning engendered by IFRS reporting is an indication of improved financial reporting quality.

The failure of Nigerian DMBs to signal their financial prospect through LLPs represents a positive call to the need for enhancing the reporting requirements as related to accounting for loan losses. In enhancing the reporting requirements, some caution must be exercised to avoid "requirements overload". The review of the Prudential Guidelines for DMBs, as contained in the exposure draft (CBN 2019), is a welcome development but some levels of care must be maintained to ensure the main objectives of the review are achieved. If the use of LLPs for signalling is accorded higher priority, it is evident that it has not been achieved in relation to the one of the objectives of the last Prudential Guidelines in 2010, which has provided a framework for ensuring that the provisioning policies by Nigerian DMBs are counter-cyclical (CBN, 2010). This is based on the fact that the study's sampled period covered a substantial part of the 2010 Revised Prudential Guidelines regime and evidence of more negative signs of the coefficients of the measure of earnings signalling in the majority of study's regression models. The non-use of LLPs to signal by Nigerian DMBs as found in this study can also substantiate the CBN's directives to DMBs to switch to IFRS 9 from IAS 39 reporting, since the IAS 39 regime is not favourable to counter-cyclical provisioning, which provides mechanisms for earnings signalling and banks' ability to absorb future loan losses.

With respect to no clear-cut demarcation between the number of bank-year events of risky and less risky DMBs established

and the recent IFRS adoption in Nigeria, the joint effect of the IFRS adoption and banks' solvency risk on the relationship between earnings signalling and bank provisioning policies examined in this study is a substantial contribution to knowledge. However, the focus on only one regime (IAS 39) of the IFRS loan loss reporting may affect the generalisation of the study's findings though mitigated by the fact that

the IFRS 9 regime of loan loss accounting in Nigeria is not backed-up by full implementation from 1 January 2018 to 31 December 2021 according to the CBN's directive. Thus, a comparative study of the two regimes will provide additional evidence of the use of LLPs to signal by Nigerian DMBs.

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